The Mega-universities and the Knowledge Media:

implications of new technologies for large

distance teaching universities.

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ABSTRACT

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distance teaching universities.

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We describe the development of distance education with reference to its history, the technologies it has used and the pedagogical situations it creates. It is useful to distinguish between the remote-classroom and correspondence traditions of distance education and between synchronous and asynchronous methods. This provides a basis for reviewing the status of the mega-universities, the ten distance teaching universities that enrol over 100,000 students, and the strategic challenges these institutions face.

Although the mega-universities operate at much lower unit costs than conventional universities they face competitive challenges as more institutions adopt distance teaching methods. We analyse the competitive situation of the mega-universities, using a framework developed by Michael Porter, in order to determine where these institutions should focus their efforts to achieve cost leadership and/or desirable differentiation.

We then examine how new technologies might help the mega-universities to enhance their competitive advantage in priority areas, notably by improving the cost-effectiveness of teaching and learning. The knowledge media that have grown out of the convergence of computing, telecommunications and the cognitive sciences receive special attention.

The study concludes that networking students from their home computers should reinforce the competitive advantage of the mega-universities. Distance education has already evolved through two generations, correspondence courses and multi-media packages. The knowledge media represent a third generation of supported open learning that enriches distance education by giving students rapid communication with the people and learning resources of the academic community.

ACKNOWLEDGEMENTS

'The objects of the University shall be the advancement and dissemination of learning and knowledge by teaching and research, **by a diversity of means such as broadcasting and technological devices appropriate to higher education, by correspondence tuition, residential courses and seminars and in other relevant ways** and shall be to provide education of university and professional standards for its students, and to promote the educational well-being of the community generally.'

Article 3 of the Royal Charter of the UK Open University, 1969

'The objects of the University shall be to advance and disseminate learning and knowledge **by a diversity of means, including the use of any communication technology,** to provide higher education to a larger segment of the population and to promote the educational well-being of the community generally, to encourage the Open University and distance education systems in the educational pattern of the country and to co-ordinate and determine the standards of such systems...'

The Indira Gandhi National Open University Act 1985, para. 4

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CHAPTER 1

· CONTEXT, PURPOSE AND METHODS

1.1 BACKGROUND

The demand for education and training has grown steadily in most parts of the world in recent decades and is likely to remain buoyant in the future (Coombs, 1985). The earth's population will continue to climb until well into the 21st century. Individuals and governments are pitching ever higher their ambitions for educational attainment and the acquisition of skills. In the industrialised world there is increasing demand for post secondary education and training. The developing world is still trying to achieve universal primary schooling and wider access to secondary education.

Growth in the demand for education gathered speed in the 1950s and 1960s. In those days most governments had the financial means to help satisfy this demand with public funds. In most countries, however, 'education managers and their systems were caught in a squeeze between rising unit costs and resisting budget ceilings' by the early 1970s (Coombs, 1985:136). The increasing severity of this squeeze has led governments to ask consumers to bear a greater proportion of the costs of education and training at all levels. This trend has inevitably drawn attention to those costs.

The unit costs of face-to-face teaching are relatively inelastic and insensitive to volume. To reduce these costs significantly requires alternative instructional methods. In the mid-nineteenth century the introduction of universal postal services provided educators with a new means of communication with students. Correspondence education was born. It has evolved, over more than a century, into modern multi-media distance education.

Until very recently, however, face-to-face instruction continued to account for an overwhelming proportion of all formal education and training. Hence, despite the dramatic technological devel-

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opments that have occurred in most fields of endeavour in the twentieth century, there are few instances where alternative approaches to education and training have reduced costs enough to have had a noticeable impact on national education budgets.

This is a challenge for humankind in the twenty-first century. A scarcity of physical resources may limit the quality of the material environment in which many people live. However, the world's educators should aim to ensure that all people can develop their potential in the essentially unlimited domain of the intellect. Meeting this challenge will require more cost-effective methods for education and training.

This imperative gives special significance to a successful use of alternative instructional technology that has yielded the economies of scale associated with mass production in industry. A number of distance education institutions have achieved this breakthrough. Most of them offer tertiary-level education and training and partly owe their creation to the example of the UK Open University. By 1995, among some fifty public institutions around the world dedicated to distance education, there were ten large tertiary-level institutions with enrolments of over 100,000 students a year. Their combined enrolments exceeded two million registered students (ICDL, 1995).

The lower unit costs of these mega-universities, compared to the conventional classroom-based universities, have impressed policy makers. Many governments now encourage the development of distance education, especially within the existing conventional institutions since that is where most of public expenditure on education goes and where they see the largest potential for savings.

This trend in public policy, combined with the emergence of new technologies, will change the context in which the mega-universities operate. These institutions had little competition from other distance education providers until about 1990. Since then a brisk market for this form of education has begun to develop in many countries. Pressure from governments and students is making the education sector readier to adopt new teaching technologies. The entry barriers facing an institution wishing to offer distance education through the older technologies (e.g. print, video) are now substantially lower than when the UK Open University began operations in 1969.

There is no guarantee that the large distance education providers will be able to maintain their comparative advantages of cost and quality over conventional institutions in the coming era. Emerging technologies and public policies that now favour distance education present threats as

well as opportunities. Will the mega-universities be as successful in the next quarter century as they have been to date?

1.2 PURPOSE AND SCOPE

The purpose of this study is to suggest how large distance teaching universities (the mega-universities) could use technology, especially the emerging combination of communications and information technologies (the knowledge media) to retain and enhance their competitive advantage.

1.2.1 Distance education and the mega-universities

The first part of the study traces the development of distance education. This will provide a basis for assessing the status of the ten largest distance teaching universities and the challenges they face. We focus on the strengths and weaknesses of these systems drawing on Porter's (1985) approach to the competitive advantage of organisations.

We define the mega-universities in terms of the absolute size of their student body. The impact of a distance education institution on the society it serves is not necessarily, of course, a function of its absolute size. Québec's Télé-université serves a population of six million francophone Québecois. By enrolling 16,000 students it would achieve a penetration of its community that would match a UKOU enrolment of 150,000 students from the 55 million population of the United Kingdom.

For this study, however, absolute size is a more appropriate measure than size relative to population. Some of the key strengths and weaknesses of the mega-universities are due to their absolute size. For example, the financial base associated with their size allows them to make substantial financial investments in new technologies. Equally, the scale of their logistics creates an inertia not found in smaller institutions. Furthermore, some new technologies may lead distance teaching institutions to serve students beyond their national boundaries. Size may influence the international reach of individual distance teaching institutions.

The study of the ten mega-universities allows us to identify a set of common competitive challenges that they face.

1.2.2 The nature of competitive advantage

Competitiveness is a complex phenomenon. Porter (1985) has provided a comprehensive analysis of the elements of competitive advantage which we describe and apply to the mega-universities using data from the Open University of the United Kingdom. This creates a framework for reviewing the role of technology in the future of these institutions.

1.2.3 The role of new technologies

The second part of the study juxtaposes the competitive challenges facing the mega-universities with recent technological developments in order to evaluate how their deployment might help these institutions implement six key priorities. What opportunities and threats do different technologies present?

Some argue (Eisenstadt, 1995) that the convergence of computing, communications and the cognitive sciences has produced technologies whose potential in education is superior, in a qualitative manner, to what has been available hitherto. Eisenstadt has coined the term 'knowledge media' to designate these developments.

We examine the nature of the knowledge media and other educational technologies against the criteria for effective university teaching set out by Laurillard (1993).

1.2.4 Implementation of technology strategies

The third aim of the study is to examine how the mega-universities might implement changes in their teaching and support systems. This section of the study addresses some of the practicalities involved in putting a technology strategy in place. A crucial challenge in the use of the knowledge media is that they appear to provide fewer economies of scale than the mass media because there is less scope for centralised production.

1.3 METHODS

The study employs a variety of approaches to match the different types of analysis required. There is an abundant literature on the general characteristics of distance education and some descriptive documentation about the mega-universities. Much of this writing is, however, essentially self-referential. The use of Porter's (1985) framework for the analysis of relative advantage helps

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both to place this study of the mega-universities in a wider context and to ensure that competitive considerations are prominent.

Identifying and evaluating the salient trends in the development of new technologies requires a different approach because this is a time of rapid change. Use of the Internet and CD-ROM technology has grown geometrically during the period of the study. This part of the study draws on Laurillard's (1993) work on effective teaching to establish a framework for assessing media. It canvasses a range of contemporary reporting and evaluative studies in order to identify the essential teaching and learning qualities of various technologies. The UKOU has good documentation on student attitudes to technology that allows some extrapolation to other contexts.

Useful and up-to-date information on future plans has been hard to obtain for mega-universities other than the UKOU because most institutions have not yet articulated a technology strategy. However, the world conference of the International Council for Distance Education, held in June 1995, provided a forum for debate about these issues with heads or their representatives from nine of the ten mega-universities. This was followed by correspondence with the head of each mega-university over the first draft of the account of their institution in section 3.2. Some helpful information resulted from these exchanges.

The study of implementation strategies drew on these contacts in the mega-universities and, particularly on work at the UK Open University The particular challenge facing the mega-universities is to migrate from one set of technologies to another whilst maintaining in operation a teaching system that represents a large investment in equipment and working methods and has usually established a reputation among students for reliability.

CHAPTER 2

CHARACTERISTICS OF DISTANCE EDUCATION

2.1 INTRODUCTION

This chapter begins building a framework for identifying the competitive advantages and disadvantages of the distance teaching mega-universities. The next chapter reviews individual institutions in more detail. This provides the context for exploring how new technologies might enhance or erode the competitive position of these institutions.

In his analysis of the competitive advantage of organisations Porter (1985:3) stresses the importance of examining first the attractiveness and the structure of the industry to which the organisation belongs. A successful organisation needs to have a strong relative position in an attractive industry. The organisation's profitability will depend as much on the structure of its industry as on its own particular merits. Industry structure also determines the threat of substitute products and the barriers that face new entrants to the industry.

We begin, therefore, by analysing the nature and the structure of the industry in which the mega-universities operate. Since many of them enrol thousands of students outside their own countries they are part of the global enterprise of education and training. The demand for education and training seems set to remain buoyant around the world so the mega-universities are in an industry that is inherently attractive. Although the industry structure in its own country is of most interest to each institution, one issue within the global education industry is crucial to all the mega-universities.

This central issue is the changing role of distance education within the wider enterprise of education and training. Distance education has evolved as a function of time, place and technology. As a result it now means different things in different parts of the world. Clarity about the characteris-

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tics of the various manifestations of distance education is particularly necessary now that it has a prominent place in public policy.

To give a holistic picture of the current role and potential of distance education it is helpful to view it from several angles. We shall first summarise its historical development, then examine the contribution of earlier technologies and, finally, compare the pedagogies of distance education.

2.2 HISTORICAL DEVELOPMENT OF DISTANCE EDUCATION

2.2.1 The beginnings

The approaches to teaching used in the early Christian church illustrate different educational and training methods and some key concepts of modern distance education. Christ taught face-to-face in small and large groups. Teacher and taught had to be present at the same time, which is now called synchronous communication. St. Paul, however, who had the challenge of instructing a dispersed community, developed a method of distance education. He wrote letters to individual church groups and asked local church elders to read them to their community when it assembled for worship. The analogy with the tutors and study groups of modern distance education is clear. Since each copy had to be hand-written and many church members were illiterate, there was little opportunity for individuals to study Paul's letters at home. Paul directed his approach to groups. It was a forerunner of the remote-classroom approach to distance education. From Paul's standpoint communication was asynchronous because he was not present when his letters were studied. However, for the church groups communication was synchronous because they listened together to the reading of the letters.

Two technological developments, the invention of printing and the introduction of universal postal services, allowed distance education to reach individuals in their homes or places of work. Asynchronous communication between individuals for educational purposes became possible. These innovations came together in England in the mid-19th century and led quickly to the offering of courses by correspondence. The earliest offerings ranged from Shorthand (Britain) through English (Sweden) to Mining Safety (USA). Some universities in Australia, Canada and the USA made correspondence courses available alongside their conventional programmes before the end of the 19th century.

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The essence of remote-classroom education is a synchronous relationship between an individual teacher and a number of groups of students. In contrast, the essence of correspondence education is a direct but asynchronous relationship between an institution and an individual student, who receives printed material in the mail and returns homework assignments, also by mail, for correction and comment by the institution. Because the focus is on teaching individuals, rather than groups, correspondence education does not require fixed study timetables. Students can usually begin courses when they choose and study at their own pace.

Another variant of distance education began in Britain in 1836 when the University of London introduced its external examination system. The original aim was to offer a credible examination service to people studying in small colleges. However, the proportion of candidates preparing themselves for the examinations by private study grew steadily. Commercial correspondence colleges saw an opportunity to help these people. By the end of the century over 60% of those graduating in Arts through the external examination system had studied with the (private) University Correspondence College (Bell and Tight, 1993:50).

Correspondence education continued to develop steadily in the 20th century. School systems in Canada, Australia and New Zealand introduced correspondence tuition for children they could not serve by conventional methods. Representatives of these programmes convened the first meeting of the International Council for Correspondence Education (ICCE) in Victoria, British Columbia in 1938. For the next three decades ICCE's constituency also included the commercial and military correspondence schools and the correspondence branches of university continuing education departments.

Public sector institutions used a variety of terms, including home study, external study, independent study and guided study instead of the expression 'correspondence study', probably because the dubious ethics and poor quality of some commercial correspondence schools gave the term a poor image.

2.2.2 Developments between 1960 and 1990

Between 1960 and 1990 the evolution of distance education accelerated as a result of both technological and political developments. Two innovations were of note, the use of telecommunications to link remote classrooms and the enrichment of correspondence education by the integration of other media.

2.2.2.1 Telecommunication with remote classrooms

The development of telecommunications produced a new interest in the remote-classroom method of distance education, notably in the USA. The American land grant universities had a tradition of serving people in the rural areas. A leader among them was the University of Wisconsin whose president challenged his staff in 1907 to extend 'the boundaries of the campus to the boundaries of the state' (Parker, 1984:xiii). Until the 1960s, however, universities had to fulfil such ambitions through a combination of correspondence courses and travelling lecturers.

The arrival of effective audio teleconferencing technology allowed an instructor to offer a course at numerous sites simultaneously. The University of Wisconsin implemented such a system in the 1970s. Soon afterwards satellites could transmit video signals to remote classroom networks. Since then this form of distance education has developed steadily, especially in the USA. A good example is the National Technological University, a consortium of engineering schools which offers graduate-level courses by satellite across the USA and internationally.

2.2.2.2 Diversification of media for correspondence tuition

Policies of widening access to tertiary education, combined with the availability of public TV and radio broadcasting networks, led to the modernisation of correspondence education. The primary locus for this development was the UK Open University. Helped by strong political support, the UKOU's founders created an institution that quickly earned a high reputation for quality and effectiveness.

2.2.3 Key features of distance education

We shall examine these developments from other angles in later sections. From this summary history of distance education we note thr.e key features:

a) There are two basic approaches to distance education: remote-classroom teaching (synchronous communication) and correspondence study (asynchronous communication).

b) Distance education encourages the division of the processes of teaching and assessment into separate operations that may then be carried out by distinct individuals or institutions in different locations.

c) Technological developments have determined the progress of distance education.

2.3 THE EVOLUTION OF TECHNOLOGY IN DISTANCE EDUCATION

It is helpful to trace the evolution of distance education in terms of the technologies that it has used. According to Holmberg (1977) distance education operates by conducting a 'guided didactic conversation' between the institution and the student. The separation of institution and student in both time and space requires the use of media for communication between them. Distance education has evolved by the progressive incorporation of additional media into the earlier versions of correspondence tuition and remote-classroom instruction.

Four broad groupings of technologies have influenced the development of distance education: 1) the combination of printing and the post in correspondence tuition; 2) the mass media of broadcasting; 3) personal media; 4) telecommunication systems. Some claim that new technological combinations, which Eisenstadt (1995) has labelled the 'knowledge media' are potentially the most significant mutation that distance education has yet seen.

2.3.1 Correspondence tuition: the foundation

Correspondence study has provided a robust and adaptable foundation for subsequent developments. The majority of the world's distance students still do most of their work through print and correspondence tuition. A decade ago this led Rumble and Keegan (1982:212) to observe:

'In retrospect the distance teaching universities, taken as a whole, have been marked by a curious mixture of public identification with and stress on the use of educational broadcasting and the playing down of their actual basis in correspondence teaching and the use of print'.

As institutions come to terms with a new generation of technology it is also instructive to note the assumptions of the UKOU's planners. The report of the Planning Committee (1969:6) stated:

'It is, however, neither practically possible nor pedagogically sound to rely on broadcasting as the principal or exclusive means of instruction in an operation designed to provide disciplined courses at university level... The only method of individual instruction capable of being made available everywhere, and capable of indefinite expansion as new needs arise, is correspondence tuition, which can readily incorporate these new techniques (i.e. broadcasting)'.

The longevity and reliability of correspondence tuition suggest that the new technologies which most closely match its characteristics merit particular attention.

2.3.2 The mass media (broadcasting)

The previous section has evoked the paradox of the broadcast media. For Harold Wilson, the political founder of the UKOU, the use of the mass medium of broadcasting for educational purposes was an end in itself. He thought this powerful medium of communication was too precious to be used solely for entertainment. The charter of the UKOU directs it to conduct 'teaching and research by a diversity of means such as broadcasting and technological devices appropriate to higher education'.

The UKOU continues to broadcast programmes, especially on television, for some 20 hours per week. The British public knows it best for this use of the mass media. The University consistently resists attempts by the BBC to reduce its airtime or move its programmes to less popular viewing slots. Yet more than a decade ago, when Bates (1982) reviewed the use of educational media in twelve distance-learning systems, he reported that there was a general movement away from broadcasting.

The key to this apparent paradox is that the UKOU and other mega-universities use media with multiple objectives in mind. One of the charter obligations of the UKOU is to 'promote the educational well-being of the community generally'. By transmitting its TV and radio programmes to the general public through open circuit broadcasting the UKOU provides an informal educational service to a much larger audience than its registered student body. The highest annual enrolment on any single UKOU course is 9000 whereas, over a three-week period, several million viewers watch UKOU TV for at least fifteen minutes (Acaster and McCron, 1994:7).

Its substantial presence on the broadcast media has nelped the UKOU to recruit students and to acquire a high academic reputation. Annual Gallup surveys (Open University, 1995a) show that 90% of British adults are aware of the UKOU, a very high figure for any institution. Broadcasting helped to create this level of awareness. Many viewers, finding they enjoyed and understood the UKOU programmes, decided to become students. Academics at other institutions, judging that the UKOU programmes were professional and up-to-date treatments of their subjects, viewed the institution with respect.

It would be wrong to conclude, however, that the sole function of UKOU broadcasting is general education and publicity. Registered students, many of whom are otherwise isolated, say that viewing the programmes makes them feel part of a learning community. This explains why many

of the students who record the programmes on VCRs also watch them at the time they are broad-cast (Acaster and McCron, 1994:6). Broadcasting also obliged the UKOU to create a paced study regime with identical start and finish dates for all students in a course. This was a break with the more liberal unpaced tradition of correspondence education that has helped the UKOU achieve high completion rates (Daniel and Shale, 1979).

Nevertheless, broadcasting requires mega-universities to be clear about the outcomes they wish to achieve. This will be equally true for the newer forms of broadcasting, through satellite and cable, that we shall examine later. If the sole purpose of using audio-visual media is to enhance the learning of registered students it is better to make them available as audio-cassettes or video-cassettes. This partly explains why the development of personal media has been so helpful to distance education.

2.3.3 The personal media

During the 1980s the term 'personal media' came into use to describe equipment, such as per-sonal computers (PCs), audio-cassette players and video-cassette recorders (VCRs), which gave students with this equipment at home greater autonomy and flexibility in their studies. The rather gradual adoption by students of the personal media – faster for VCRs, slower for PCs – posed a challenge to the growing mega-universities. The mass-media, by their nature, facilitate and equal-ise access besides lending themselves to economies of scale. The personal media do none of these things until all students are in possession of the relevant equipment, which can take many years.

The growing use of the personal media also reinforced the view that simple media can be very effective in distance education. For example, Bates (1982:11) concluded that for the UKOU 'the greatest media development during its twelve years of existence has been the humble audio-cas-sette'. Audio-cassettes are popular with administrators because they are inexpensive. Academics feel they have more control over the making of audio-cassettes than of broadcasts. Students find cassettes convenient and informal: 'like a personal tutorial with the course author'.

Since Bates conducted his study the most important development in personal media at the UKOU has been the personal computer. The introduction of the home computing policy (now called the personal computing policy) by the UKOU has been reviewed by Jones, Kirkup and Kirkwood

(1992) who conclude that it has been remarkably successful even though British households did not acquire computers as fast as expected.

2.3.4 Telecommunications

The rapid improvement of telecommunications in the last two decades has been helpful to both types of distance education, correspondence study and remote-classroom teaching. Moreover, the pace of telecommunications developments continues to increase as services are privatised and deregulated around the world (Cairncross, 1995). It appears that some developing countries will be able to leapfrog previous generations of telecommunications technology and equip themselves with modern systems in the next decade. As Cairncross (1995:39) puts it: 'The death of distance will mean that any activity that relies on a screen or a telephone can be carried out anywhere in the world'.

In the correspondence mode of distance education the main impact of telecommunications has been to enhance tutorial contact with students. For example, at Athabasca University, Alberta, which has enjoyed a rich telecommunications environment since its creation in the 1970s, the telephone has always been a primary means of communication between tutors and students. The University pays for the installation and rental of a second 'phone in the tutor's dwelling for this purpose (Daniel and Meech, 1978:95). Daniel and Turok (1975:133) noted that in the early 1970s the DeVry Institute, a large American commercial correspondence school, received some 2000 student calls per day on its toll-free telephone line.

Countries like the UK, where telephone ownership and a telephone culture have developed more slowly, are only now beginning to use telecommunications intensively. UKOU students, for example, are steadily switching to the telephone, instead of the mail, for their administrative communications with the institution. This poses a challenge to the UKOU which finds that it is better organised for handling letters than telephone calls (Edwards et al., 1995).

Another important product of telecommunications development is the fax machine. This allows institutions to speed up the turnaround of student assignments, a core element of the effectiveness of any teaching system. The UKOU provides fax machines to its UK-based tutors who teach students in continental Europe. In the Los Angeles Community College District more than one-third of telecourse students submit their assignments by fax (McClatchey, 1995:124).

In addition to its use for one-to-one communication the telephone is now used regularly in conference mode to link students in tutorial groups. Again, such audio teleconference tutorials have been commonplace in Canada for years. Only in the last decade has the UKOU made systematic use of this technology, notably for its more dispersed students in Wales and Scotland (George, 1994).

Improved telecommunications have been helpful to institutions operating in the correspondence mode. For the remote-classroom mode of distance education they have been essential. Indeed, until telecommunications promoted its renaissance, the theoreticians of distance education tended to ignore this component of the field in favour of the correspondence tradition. Keegan's (1980) definition of distance education included only 'the possibility of occasional meetings for didactic and socialisation purposes'.

Yet, for example, Taylor and Carter (1995), in a survey of the diverse distance education scene in Australia, report that institutions in several states now use audio conferencing and video conferencing regularly with remote groups of students.

These technologies are particularly attractive to conventional institutions seeking to develop distance education activity. Classroom instructors believe they can adapt relatively easily to the demands of teaching over audio or video links. As the costs of telecommunications decline, remote classroom teaching will be an increasingly viable option even where numbers are small. Furthermore, desk-top publishing makes it easy to produce attractive instructional materials to supplement the teleconference sessions.

These technological changes contribute to an important trend documented by Jenkins (1995). Surveying the OECD countries she showed that there has been a 'rapid, recent and substantial change in numbers of universities providing distance education'. In Canada, where 42 of 69 universities are now providers, this represents a 50% increase in eight years. The proportions of universities offering distance courses in some other OECD countries are: France – 40%; Sweden – almost all; UK – 75%; USA – almost all (Jenkins, 1995:427). This trend may be a competitive threat to the mega-universities and to all distance universities.

2.3.5 The knowledge media

All institutions offering any form of distance education now face a further wave of technological change. The coming together of telecommunications, television and computing is producing a media environment for distance education that is more than the sum of its component elements. Eisenstadt (1995) describes this environment as the knowledge media. It denotes the convergence of the learning and cognitive sciences with computing and telecommunications technology. Behind this new term is the belief that with the knowledge media the conventional, rather static, notion of 'content' will become less important than the dynamic means of accessing, sharing and creating knowledge that are now available.

The implications of the knowledge media for the mega-universities, which are a primary focus of this thesis, will be examined in a later chapter. What relevant conclusions can we draw from earlier applications of technology in distance education?

2.3.6 Lessons from earlier uses of technology

a) Correspondence education is a robust and effective form of instruction.

b) Institutions that use broadcasting have to make trade-offs between multiple objectives.

c) The availability of equipment to students is a key factor in the introduction of new technology for home study.

d) Technologies that are popular with students, academics and administrators will likely be successful.

e) Students are increasingly turning to telecommunications for communication with their institutions on academic and administrative matters.

f) Video conferencing technology is attracting conventional institutions to offer distance education of the remote-classroom type.

g) Technological developments have reduced the entry barriers to distance education so that economies of scale are no longer always a pre-requisite.

2.4 THE PEDAGOGIES OF DISTANCE EDUCATION

As distance education has evolved, so have the roles of student, teacher and institution in the teaching system. We noted above that as recently as 1980 distance education was defined primarily in terms of the correspondence tradition (Keegan, 1980). In view of the increasing importance of remote-classroom approaches Moore's earlier and more inclusive definition is now more appropriate, although not particularly helpful. According to Moore (1973) distance education is the 'family of instructional methods in which the teaching behaviours are executed apart from the learning behaviours'.

In reality, distance education no longer has a distinct pedagogy common to all its forms. The pedagogy of synchronous remote-classroom teaching resembles the pedagogy of classroom teaching more than it resembles the pedagogy of asynchronous correspondence teaching. With one exception (China) the mega-universities all derive from the correspondence tradition of distance education.

2.4.1 Correspondence education

The aim of correspondence education is to create a genuinely student-centred learning system. It is to deliver, at a place and time chosen by the student, an effective learning environment. This involves providing the student with study materials and helping the student to learn by correcting and commenting on the student's exercises. Correspondence education is thus a blend of independent and interactive activities (Daniel and Marquis, 1979). The student works independently on the course materials (reading, writing, conducting experiments, viewing audio-visual material) but interactively with a tutor on the assignments.

A key strength of correspondence study is its flexibility for both student and institution. The course materials are portable and, because the student relates to the institution as an individual, communicating by mail and/or telephone, there are few constraints of time and place. For the institution the system is flexible in two related ways. It permits division of labour (e.g. course authors and course tutors can be different people) and it can be expanded rapidly with economies of scale.

Economies of scale give correspondence education another strength. Operating with large numbers of students provides the resources needed to produce high quality learning materials. This should be one of key competitive advantages of the mega-universities.

The major perceived weakness of correspondence education is the extent and immediacy of interaction. In the context of the technologies of the 1970s, Daniel and Marquis (1979) noted that attempts to increase the interactive component of correspondence teaching (e.g. through face-to-face sessions) usually had two drawbacks: they reduced the possibilities of economies of scale and they placed extra constraints of time and place on the student. For this reason these authors considered that the key challenge in designing a correspondence study system was 'getting the mixture' of independent and interactive activities right.

Some years later Daniel (1983) returned to this theme to ask whether some of the home electronic systems of the 1980s could produce the advantages of effective interaction for the student whilst conserving the economic structure of independent activities for the institution. This question will be of even greater significance with the knowledge media. Interaction is a crucial but slippery concept in distance education. As Mason (1994:25) writes:

> 'The word 'interactivity' is currently used in a wide variety of ways. The obvious meaning – communication between two or more people – is by no means the only one... Much of what passes for interactivity should really be called 'feedback' – to the organisation or the teacher. It would be useful if the word 'interactivity' were reserved for educational situations in which human responses – either vocal or written – referred to previous human responses. The educational value of any specific interactive session could then be seen in terms of the degree to which each utterance built on previous ones.'

2.4.2 Remote-classroom teaching

The characteristic strengths and weaknesses of this form of distance education are almost the reverse of those identified for correspondence education. This is a teacher-centred approach to distance education in the sense that it takes classroom teaching as its starting point and attempts to make it possible for a teacher to instruct a number of classes simultaneously. The communications networks used to link the classrooms can be more or less sophisticated, the most common variants being: 1) audio teleconferencing; 2) audio teleconferencing with a second audio network used to transmit graphics (e.g. on electronic whiteboards); 3) slow scan television to deliver the instructor's image and voice with a separate audio network for use by students asking questions; 4) video conferencing with separate audio lines for questions; 5) multi-point video-conferencing.

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In all of these configurations the role of the students more closely resembles their role in a single conventional classroom than their role in a correspondence study system. To achieve success and student satisfaction, however, remote-classroom systems have found it necessary to modify conventional classroom practices. For the teacher this means special training in the use of the equipment and attention to instructional design, especially techniques for making remote oral interaction effective. For the student it means having access to more and better written study materials than would usually be provided for a classroom lecture on campus. Hence remote-classroom distance education leads its practitioners to adopt, in a modest way, some of the approaches characteristic of correspondence teaching.

The strength of the remote-classroom approach is its potential for interaction between student and teacher and between students. Whether this potential is achieved, and whether the interaction is pedagogically effective when achieved, depends greatly on the skills of the instructor. Special techniques are required to make interaction effective in a face-to-face teaching session involving more than, say, 100 students in one classroom. They are even more necessary when such numbers are dispersed in multiple sites.

On the criterion of flexibility remote-classroom systems have a strength and a weakness. The strength is that instructors can update content easily, as they would for a regular class. The weakness is that students are still constrained by obligations of attendance at a set time and place, even though their local remote classroom may be more convenient than the central campus.

2.4.3 Flexible learning

As conventional institutions adopt various techniques of distance teaching some are using the term flexible learning (also called multi-channel learning (Anzalone et al., 1995)) to describe their activity. The aim is to augment or replace conventional classroom activities with a range of technologies such as interactive multi-media, computer-mediated conferencing, and electronic mail. The strengths of this approach are flexibility and interactivity. A weakness, according to Taylor (1995), is that it does not yield refined study materials. The role of specially prepared materials is, of course, a matter of controversy. For example, Bell and Tight (1993:3) argue that such materials are not essential and that authors such as Lewis (1990) place too much emphasis on this component of distance education.

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The arrival of conventional institutions into the field of distance learning must encourage the mega-universities to assess their own competitive advantages. By emphasising that distance education is simply a component of the wider enterprise of education and training, this development also counters the tendency to claim that distance education is a separate academic discipline (e.g. Holmberg, 1986). Attempts to define distance education in a distinctive way have led to 'idealization and unreality' (Bell and Tight, 1993:6) and, in any case, have tended not to accommodate the growing activity of remote-classroom distance education.

As many conventional universities become 'dual-mode' institutions and offer some courses through distance education, the mega-universities will need to understand what special strengths they bring to the form of education that they have pioneered. We examine the situation of the mega-universities in the next chapter.

CHAPTER 3

THE COMPETITIVE POSITION
OF THE MEGA-UNIVERSITIES

3.1 THE MEGA-UNIVERSITIES DEFINED

We define a mega-university as a distance-teaching institution that has over 100,000 active students each year in tertiary education courses. There were ten such institutions in 1995 (ICDL, 1995). Table 3.1 lists them and Table 3.2 is a first attempt to compare basic data for these institutions. We urge caution, however, in using Table 3.2 for comparative purposes. Data is hard to obtain for some institutions and figures for budgets and numbers of students and staff are not necessarily calculated on a consistent basis.

This definition of mega-universities combines three criteria: distance teaching; tertiary education; and size. Each criterion is intentionally restrictive. First, we noted earlier that distance teaching and classroom teaching are coming together in many institutions. Although distance education is now becoming very widespread, we have limited our definition of mega-universities to institutions whose main function is to offer this form of education. Second, although tertiary and secondary distance education institutions in the same country may have much in common, both the profile of the student body and the nature of degree-level study make the tertiary sector distinctive. Finally, setting a cut-off at 100,000 active students is arbitrary. Some institutions not on the ICDL (1995) list may have already reached this threshold (e.g. Payame Noor University, Iran (Hossaini, 1995:114)). Furthermore, the definition of 'active students' varies between the mega-universities. What is the justification for making this group of institutions a special object of study?

It is not that all these institutions are very similar to each other. A mega-university may resemble certain institutions outside the group more than it resembles other mega-universities. Spain's

COUNTRY	NAME OF INSTITUTION	FOUNDED	ABBREV.
China	China TV University System	1979	CTVU
France	Centre National d'Enseignement à Distance	1939	CNED
India	Indira Gandhi National Open University	1985	IGNOU
Indonesia	Universitas Terbuka	1984	UT
Korea	Korea National Open University	1982 (1)	KNOU
South Africa	University of South Africa	1873 (2)	UNISA
Spain	Universidad Nacional de Educación a Distancia	1972	UNED
Thailand	Sukhothai Thammathirat Open University	1978	STOU
Turkey	Anadolu University	1982	AU
United Kingdom	The Open University	1969	UKOU

Notes:
1. As the Korea Air and Correspondence University
2. As the University of the Cape of Good Hope

Table 3.1
The mega-universities

Abbrev. name	Students in degree programmes	Annual intake	Grads. per year (est.)	Budget $US million	% of budget from (7) Fees	% of budget from (7) Grant	Unit cost (8)	Academic staff (f-t)	Academic staff (p-t)	Total staff (f-t)
CTVU	530,000 (1)	77,000	101,000	1.2(3)	0	75	40	18,000	13,000	43,000
CNED	184,000 (1)	184,000	N/O	113 (1)	60	30	50	1,800	3,000	3,000
IGNOU	242,000 (1)	91,000	8,000	10(2)	30	68	35	216	12,800	1,000
UT	353,000 (2)	70,000	3,000	2.5(5)	66	34	15	791	N/O	1,492
KNOU	196,000 (2)	90,000	10,000	48(1)	62	38	10	174	2,649	678
UNISA	130,000 (2)	60,000	10,000	128	39	60	50	1,348	1,964	3,437
UNED	110,000 (1)	N/O	1,500	(6)	60	40	40	700	N/O	N/O
STOU	300,000 (2)	80,000	13,000	32	49	23	30	429	4,000	2,136
AU	567,000 (2)	100k+	14,000	15(4)	76	6	10	579	680	(9) 498
UKOU	150,000 (2)	50,000	17,000	300	31	60	50	815	7,376	3,312

Notes:
N/O = not obtained
1. 1994 figure   2. 1995 figure   3. Central (CCRTVU) unit only
4. 771 billion Turkish lira   5. 1990 figure (NIME-UNESCO, 1994) 18,000m Rp. in 1993/94
6. 8,000m Pesetas (1990)   7. Student fees/Government grants
8. Unit cost per student as percentage of average for other universities in the country (approx.)
9. In Open Education Faculty only (f-t academic staff figure for whole University)

Table 3.2
The mega-universities: basic data

UNED, for example, has more in common with the slightly smaller German FernUniversität than it has with the China's TV University system. The UKOU may have more similarities with Quebec's Télé-université than it has with France's CNED.

The reason for grouping the mega-universities together is that individually and collectively they have achieved a double breakthrough. By simultaneously increasing student numbers dramatically and lowering costs sharply they have created a rare discontinuity in the evolution of higher education. The change they have introduced is of kind rather than degree. Crucially, this development could help to satisfy some of the burgeoning demand for tertiary education in the next century at a cost that individuals and governments can afford.

This chapter begins with a brief review of features that the mega-universities share and common trends in their development. The review provides a background for summary analyses of the current status of each of the ten institutions which identify the particular challenges that each faces. This second part of the chapter ends by relating the challenges they have in common to the features that they share. The third part of the chapter then outlines a framework for identifying the competitive advantages and weaknesses of the mega-universities. Its purpose is to show where, in the teaching and administrative operations of these institutions, new technologies might be applied to best effect.

The mega-universities are a vital resource for the future so it is important to strengthen them. Although these institutions have created a revolution in tertiary education by teaching at a distance on a large scale, each institution is only too aware of its own weaknesses. Looking at the mega-universities as a group may yield useful insights for repairing those weaknesses.

In the coming years new teaching technologies, and their use by conventional universities, will require the mega-universities to be clear about their own competitive strategies. If these institutions are unclear about their strengths and weaknesses they could well adopt new technologies in ways that dissipate the advantages of access and cost that they have achieved to date.

3.1.1 The mega-universities: common features

A first attempt to identify the distinguishing features of some of the mega-universities was made by Rumble and Keegan (1982:204). Keegan (1994) pursued the topic a decade later. More recently the heads of most of the mega-universities met in Birmingham, England at the 17th World

Conference of the International Council for Distance Education in 1995 and identified, in discussion, some common features of their institutions. The following similarities are relevant to our study.

3.1.1.1 Prominence in national policy

Governments created their mega-universities with clear policy goals in mind, above all to increase access to higher education at low cost. They also charge them with specific national tasks, especially now that they are the largest universities in their countries. Three examples illustrate this element in the mega-universities' role. The Korean government has asked the Korea National Open University to operate a cable TV channel as part of Korea's information superhighway policy (Han, 1995:104). A task of the University of South Africa is 'the infusion of the whole institution with the spirit of our new found democracy' (Wiechers, 1995:190). The Chinese government has asked China's TV University system to provide tertiary education for technicians in rural enterprises (Wei and Tong, 1994:126). Furthermore, since Spain and the UK regionalised the funding of higher education, UNED and the UKOU are, in a sense, the only national universities in their respective countries.

In competitive terms this close involvement with national policy may constrain the development options of the mega-universities. On the other hand, it may give the institutions greater opportunities than most universities enjoy to influence government policy on a range of issues.

3.1.1.2 Access to communications facilities

Many mega-universities have privileged access to communications facilities, especially those controlled or regulated by government. The partnership between the UK Open University and the British Broadcasting Corporation is a well known example. Sukhothai Thammathirat Open University and Anadolu University also have access to their national broadcasting networks and Universitas Terbuka has a special arrangement whereby Indonesia's post offices act as admission points (ICDL, 1995).

In competitive terms this assistance in accessing media and networks that reach people all over their countries is clearly an advantage. There may, however, be a danger that mega-universities could use such media more for their availability than for their effectiveness. Furthermore, as me-

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dia and communications networks multiply and government involvement in this arena decreases, the institutions will have to act more independently in securing access to such networks.

3.1.1.3 Linkages to the rest of tertiary education

Although, in their early days, the mega-universities were often consciously distinct from the rest of their countries' tertiary education systems, they are now integral to those systems. The Indira Gandhi National Open University has, in addition to its distance teaching role, a mandate as an apex body for the promotion, co-ordination and maintenance of standards in distance teaching in all Indian universities (ICDL, 1995:5). In 1992 the UK Open University joined a common funding regime with all other UK universities and took over the validation function of the Council for National Academic Awards (CNAA) (Daniel, 1995:402). Through this post-CNAA activity the UKOU is the degree awarding body for many thousands of students in some fifty conventional tertiary institutions.

All signs are that integration between distance teaching universities and other universities will continue to deepen. The percentage of students simultaneously enrolled at Athabasca University, Alberta (a distance teaching university) and one or other of the region's conventional universities has risen from 14% to 40% in less than ten years (Powell and McGuire, 1995:455). This trend will undoubtedly affect the mega-universities and oblige them to develop facilities for processing high volumes of credit transfer applications if they have not already done so.

In competitive terms the advantage of close links with the rest of the tertiary system is that it increases the awareness amongst all students of what the mega-universities have to offer. A disadvantage is that may constrain curricular innovation by pushing the mega-universities to concentrate on distance versions of the courses already offered widely in conventional institutions. Of course, some mega-universities (e.g. CNED and UNED) already teach curricula defined at the national level for all institutions.

Most mega-universities have made major contributions to academic publishing in their countries, especially where they operate in a language not widely spoken outside the country. Thus Anadolu University has greatly increased the volume of academic material available in the Turkish language and Sukhothai Thammathirat Open University has done the same in the Thai language.

3.1.1.4 Students

The mega-universities all have very large numbers of students although there are differences in their student profiles. At the UK Open University, for example, most students are working adults who study part-time, whereas in the Chinese TV Universities they are mostly adults being paid to study full-time. Other Asian mega-universities enrol significant proportions of school leavers. The overall trend, however, is towards a similar, but diverse, student profile across the mega-universities. Those institutions that focused on adults are now attracting more young students (Powell and McGuire, 1995:455), whereas the mega-universities created for young school-leavers now have a majority of students in employment with a higher median age (Park, 1995:327). Their common characteristic is to attract students whose needs are not well served elsewhere.

In competitive terms it is helpful for the mega-universities to appeal to students across the age range. However, at a time when all universities are paying more attention to adult students the mega-universities need to protect their traditional appeal to such people.

3.1.1.5 Curriculum

There are some similar trends in the evolution of the curricula of the mega-universities, notably the move to a more vocational focus. A clear example is the Indira Gandhi National Open University which has changed its academic profile significantly since 1990. It has moved its focus away from degree programmes in the liberal arts towards diploma and certificate programmes in applied subjects. These changes, however, mirror general trends in university programming, both in the countries concerned and around the world.

A key competitive advantage of the mega-universities is the economies of scale that flow from teaching large numbers of students. This makes it particularly important for these institutions to be active in subject areas of high demand. The role of the mega-universities as instruments of government policy is also relevant here. In 1992, for example, the UK government asked the Open University to develop a teacher training programme for mature graduates in subjects and regions where there was a teacher shortage. By 1995 the Open University enrolled more teacher trainees (2,500) than any other UK institution.

3.1.1.6 Cost-effectiveness

Rumble and Keegan (1982:220) noted that 'distance teaching universities can be cost-effective in comparison with conventional universities but that this may not necessarily be the case'. They added that 'with the exception of the UKOU, none of the DTUs (distance teaching universities) covered in this book have yet proven their ability to produce graduates at an average unit cost significantly below that of conventional universities in their country'.

Since that time many studies have established the superior cost-effectiveness of the mega-universities, but not necessarily of smaller distance teaching institutions, still less of the distance programmes of conventional universities. For example, a government review of the UK Open University in 1991 compared its costs per graduate with those of three other institutions. The UKOU's costs were significantly lower: between 39% and 47% of the other universities' costs for ordinary degrees; between 55% and 80% for honours degrees (Department of Education and Science & The Open University, 1991:67; Department of Education and Science, 1991).

Loing (1993a) states that the cost of education in France through the Centre National d'Enseignement à Distance (CNED) is half that of conventional methods.

For the China TV University system Wei and Tong (1994:113) report that the average cost per student is '43 to 51 percent of conventional colleges and universities, though this calculation is not especially reliable'. These figures, taken from Wu Xiaobo (1993:76), may be compared with those of Ding Xingfu (1993:95) who argued that the per student costs of the CTVU system were between 25% (humanities) and 40% (science and engineering) of those of the conventional universities.

The mega-universities should not only maintain but enhance their cost-effectiveness to remain competitive. Governments are requiring efficiency gains from all tertiary institutions in some countries. In others discontinuities in state funding are always a possibility.

3.1.1.7 Operating systems

There are considerable similarities between the operating systems of the mega-universities. Rumble and Keegan (1982:222) distinguish two major operating sub-systems, for courses and students, and note the importance of logistical and regulatory functions. We find more helpful a variant of this analysis which, by analogy with a three-legged stool, sees the mega-universities

resting on systems that support three outcomes: good learning materials; effective student support; and efficient logistics. In a later section we use a more detailed approach, developed by Porter (1985) and known as the 'value chain', to identify the key activities of the mega-universities.

In classroom teaching, and in some distance teaching programmes of conventional universities, the same individual is responsible for all three of these areas. In mega-universities there is division of labour. Materials design and production is centralised and carried out by multi-skilled teams. The organisation of two-way communication with students in the form of individual tuition or group meetings is a distinct and major task. Finally, the division of labour and the complex interactions of distance teaching make the components of the system highly interdependent. Organising the flow of information and materials efficiently is a basic requirement.

New technology can contribute to the enhancement or degradation of each of these three key elements. We shall return to them later in the analysis of competitiveness.

3.1.1.8 Quality and recognition

The reputation that the general public accords to universities of any kind combines several factors. First, in most countries, there is a strong correlation between the reputation of an institution and its age. Second, people tend to equate quality with exclusivity of access. Third, educational systems with small classes and plenty of human interaction are well regarded.

These elements of reputation, taken at face value, provide a challenge to the mega-universities. They are mostly young institutions set up with the explicit purpose of breaking the perceived link between quality of education and exclusivity of access. Furthermore, they enrol very large numbers of students. Although some mega-universities give closer personal tutorial attention to students than conventional universities (Rickwood, 1993:13), the size of the mega-universities, as well as the term 'distance education', make it hard to get that fact across.

The low status of correspondence study a generation ago is still a handicap. Indeed, in 1970, just when the era of the mega-universities was beginning, Jessica Mitford (1970) published an article in the *Atlantic Monthly*, 'Let us now appraise famous authors', that was a devastating exposé of the racket then masquerading as one of the best-known US correspondence schools. She herself

later described entertainingly how that article caused a flurry of regulation of the correspondence teaching industry (Mitford, 1979).

For the mega-universities to acquire good reputations, both in academic circles and with the general public, is a process which rightly takes time. Substantial progress has already been made, for which other mega-universities tend to give the UK Open University much of the credit because it has performed well (Daniel, 1995). The national processes of quality assessment introduced in the UK in 1993 have helped. They ranked the UKOU in the top third of UK universities for its research and in the upper decile for the quality of its teaching.

Other mega-universities are also making good progress. In 1992 the Indian University Grants Committee commended the programmes of the Indira Gandhi National Open University as equivalent to those of other universities. The Sukhothai Thammathirat Open University won the award for institutional excellence of the Commonwealth of Learning and the International Council for Distance Education in 1995.

There remain, however, many problems of performance to be tackled. Park (1995:329) reports that 90% of students admitted to the Korea National Open University drop out after they try one or two semesters. His view is that 'educational services for students can not be satisfactorily provided and consequently many students are dissatisfied with the quality of KNOU's education'.

The question for this study is whether new technology could help the mega-universities improve their performance and their reputation. It is also possible that certain technologies can add glamour to an institution. For example, CNED, by conducting satellite video conferences with secondary schools, has done something to modernise its old-fashioned image. Ultimately, however, only strong performance in the central function of teaching students will give institutions a secure reputation.

3.1.1.9 International roles

Many of the mega-universities have significant and growing international roles. Anadolu University has a centre in Germany to serve the large Turkish community there. Other institutions have a broader reach, not only serving expatriates from their own country overseas but also attracting a wider clientele. CNED (France), UNED (Spain), UNISA (South Africa) and the Open University

(UK) all number their overseas students in thousands. IGNOU (India) is actively developing an international reach.

3.2 THE MEGA-UNIVERSITIES: CHALLENGES FOR INDIVIDUAL INSTITUTIONS

Each mega-university is a large and complex institution and whole books have been written about some of them (e.g. Perry, 1976; Wei and Tong, 1994). The purpose here is not to attempt summary descriptions of the ten mega-universities, which have been provided recently by the ICDL (1995). In this section we try instead to highlight, for each institution, key issues likely to influence its competitive strategy, especially where new technology could affect the way those issues are addressed.

3.2.1 The China TV University System (CTVU)

The CTVU is the world's biggest learning system. Known in the country by its acronym in Chinese, DIANDA (Keegan, 1994:7), this system is made up of the central unit (the China Central Broadcasting and TV University (CCRTVU)), and four other institutional layers. (This is a common structure for national organisations in China). The CCRTVU produces courses for nationwide use, sets the examinations and standardises their marking. It does not enrol students. That is the responsibility of 44 Provincial TVUs, under which there are 575 Regional CTVU Colleges (also known as 'branch schools'), 1550 Education Centres at county or company level (also known as 'work stations'), and some 30,000 tutorial groups (Wu Xiaobo, 1993:74). Keegan (1994:17) has delineated the functions of the different levels in the system.

He also notes (1994:11) that DIANDA is only one of three large distance education systems in China, the others being the correspondence university system and the self-study/university examination system.

The DIANDA system admits 300,000 students annually to programmes which had a total enrolment of 850,000 in 1993 (Keegan, 1994:8). There were 530,000 active students in degree programmes in 1994. The 1,500,000 students who have graduated to date represent 17% of China's graduate output at this level over the last decade. DIANDA's high graduation and pass rates reflect the fact that most of its students are paid to study full-time. Ma (1987) reported that 77% of graduates were later employed in jobs matching their CTVU specialisations and that 86% of employers rated the employees as very good.

However, Wei and Tong (1994:109) noted that DIANDA's enrolments declined in the early 1990s following the imposition of admission quotas by the government. They feared this policy would damage the cost-effectiveness and impact of the system. It now appears that the move to a socialist market economy has softened the quota policy. Xie Xinguan (1993), the president of the CCRTVU at the time, reported that DIANDA aims to have 1,000,000 active degree students by the year 2000 with much larger numbers taking non-degree courses (where there are no national quotas). He noted, for example, that 20 million farmers were receiving 'preliminary and intermediate education of practical interest' offered by Liaoyuan TV School, a CTVU associate. Sin Fu (1992) found that the Education Centres, which are key partners in the system, have made the CTVU place greater emphasis on job training and continuing education to meet their requirements. It is the task of the Provincial TVUs to produce courses of special interest to their own region. The output of the Sichuan TVU, for example, rivals that of the CCRTVU (Hawkridge and Chen, 1991:145)

DIANDA is unique amongst the mega-universities in adopting the remote-classroom approach to distance education. The current teaching systems of the nine other mega-universities originated in the correspondence tradition. Keegan (1994:14) described the Chinese approach as follows:

> 'The student attends at work from Monday to Saturday but goes to the company education centre and not to the factory. The study programme lasts from 8.30 to 12.00 and from 1.30 to 4.30 and consists of three TV lectures per day by satellite from the CCRTVU in Beijing, plus face-to-face lectures in the company's education centre in groups of 20, during which the tutors go through the textbooks, then students do assignments and the tutor gives evaluation and feedback. The students have to attend'.

Hawkridge and Chen (1991:135) reported that 'television served mainly to transmit 'talking blackboards', not even 'talking heads'... the TVUs provided no correspondence tuition, and students had to depend on whoever was available locally to provide meagre tutorials'. McCormick (1985:4) noted that 'the textbooks do not always match the programmes, are not designed specifically for self-study and are not available everywhere in China'. Nevertheless, 'TVU students spend much time using the texts to prepare for traditional written examinations... Being a TVU student is serious work, particularly if you have been released on basic pay by your work unit, as a privilege' (Hawkridge and Chen, 1991:137).

To put the television programmes in context, the CCRTVU provides the same number of TV hours of output as the UK Open University but has only ten producers to the OU/BBC's fifty. Xie Xinguan (1989:11) noted the urgency of 'detailed planning before materials production is started if the courses are to have cohesion in approach and content'.

Wei and Tong (1994:109) have provided a thoughtful perspective on the problems and trends facing DIANDA. Developing this huge learning system in a country undergoing radical political and economic changes is perhaps the greatest challenge of educational planning in the world. These authors flag a number of issues.

They welcome the curricular reform under way. Uniform academic fields, majors and specialties have been replaced by single courses of national interest on which the Provincial TVUs can build. Furthermore, the development and production of these 222 core courses is a much more collaborative process than previously. They believe that the involvement of ministries, Provincial TVUs and conventional universities will provide extra resource and enhance the quality of the instructional materials. The recent collaboration between DIANDA and the Self-Study/University Examination system, with a reduction in the latter's drop-out rate, is another welcome development. The introduction of a credit accumulation and transfer system was overdue, because not all DIANDA students are able to complete in exactly three years. Wei and Tong (1994:124) find it bizarre, however, that the DIANDA courses do not transfer readily into the regular four-year undergraduate programmes of the other universities.

Future goals are the extension of DIANDA, which is still primarily an urban network, to the rural areas and an increase in television transmission time. By the end of the century the China Educational TV Station (CETV) will have four channels giving 70 hours a day of transmission. These transmissions carry many programmes, besides those of DIANDA, but the increase from two to four channels will do something to ease the transmission bottleneck.

However, the key issue for our present study brings together three elements: the cost-effectiveness of the system, the coherence of its organisation, and the evolution of the remote-classroom approach.

Wei and Tong (1994:112-115) analyse carefully why costs per student in DIANDA are going up. First, as noted earlier, government policy has reduced the student base by admission quotas on regular students and tighter limits on those auditing courses or studying part-time. Second,

DIANDA had seen a sharp decrease in enrolments in expensive subjects (e.g. engineering) and found itself with the wrong subject mix. The current re-development of the curriculum is, however, expensive. Meanwhile, conventional universities are showing more curricular flexibility. A third component of increased costs has been brisk real estate development in the Provincial TVUs and Regional Colleges. As the authors put it: 'This trend of turning universities without walls into ones with walls also becomes a threat to cost-effectiveness' (1994:115).

This leads directly to the organisational issue. Can the DIANDA structure, which dates from the era of tight central planning, cope with the increasing autonomy of the provinces and regions? It is clear that the Provincial TVUs and Regional Colleges now have many opportunities to go into business on their own account. This trend will affect the integrity of DIANDA's remote-classroom teaching methods and the role of the CCRTVU.

A decade ago McCormick (1985:5) queried whether the tendency of the Provincial TVUs to build up facilities and staff was 'a threat to the distance learning concept'. This trend would make these institutions look like an interconnected set of conventional institutions and DIANDA would become more like an external degree programme than an integrated distance learning institution. Wei and Tong (1994:111) return to this question, observing:

> 'although China's TVUs enjoy a high reputation for taking advantage of modern technologies to convey instruction to learners at a distance, recent policies for the presentation of instruction in China's TVUs rely too much on group tuition, which is likely to turn the positive factors of distance education into negative impacts, since neither the quantity nor the quality of CTVU faculty can meet the requirements of such a heavy workload and the sheer versatility of the subject fields. Besides, more and more in-service trainees find it very difficult to attend all of the group learning activities expected of them. Some Chinese distance educators wonder what the difference is between distance education with considerable group tuition and classroom teaching with the aid of modern technologies'.

This is a good statement of the main challenge facing the Chinese mega-university.

Finally, Hawkridge and Chen (1991) note that there is enormous scope for improving the management of the whole DIANDA system. Basic cost and student data are often lacking, for which bad experience with early computer systems is only partly to blame.

3.2.2 The Centre National d'Enseignement à Distance (CNED), France

France's Centre National d'Enseignement à Distance is the largest distance teaching institution in Europe and a veteran amongst the mega-universities. It is a state institution under the authority of the Ministry of Education. CNED comprises eight institutes in Grenoble, Lille, Lyon, Poitiers, Rennes, Rouen, Toulouse and Vanves with a headquarters at Poitiers which is linked to a satellite video transmission and production centre (ICDL, 1995:3). According to its former head, Loing (1993b):

> 'CNED is an old institution, created 54 years ago as a small correspondence school for children
> driven away from school by the war; it worked and developed as such for at least 40 years, us-
> ing printed paper conveyed by mail as its only medium. Today it has ceased being only a pri-
> mary and secondary school, and caters mostly for adults at university or high level vocational
> training; yet even now printed paper remains our main teaching tool with a yearly output of 700
> million pages for 350,000 students'.

Unique among the mega-universities in its curricular diversity, CNED offers some 500 programmes ranging from primary school to postgraduate courses. Each component institute within CNED is charged with the responsibility for a particular set of these programmes. CNED has grown rapidly in recent years. 80% of its students are adults (average age 35) and half of them are doing university-level work (CNED, 1994a). The staff number about 6000, which includes 1800 full-time and 3000 part-time teachers. One role of CNED is to provide employment for teachers who are no longer able, for health reasons, to function in the classroom.

CNED's methods put it firmly in the correspondence tradition. However, its relationship with students is less intense than at some other mega-universities. This is partly because many of its students are taking CNED courses in order to prepare for examinations set by other bodies. CNED offers much less tutorial support than, say the UK Open University, and in some courses students must pay a supplement to have assignments marked. Perhaps for these reasons CNED used to seem a rather dull institution. However, it has taken advantage of the 'flattering image of modernity' of distance education (CNED, 1994b) to project itself more attractively in the last decade. An article in *Le Monde* captured the beginnings of these changes well:

> 'Le Centre National d'enseignement par correspondance, saisi enfin par la modernité, est en
> train d'effectuer une mutation spectaculaire qui le place, dans bien des domaines, parmi les ly-

cées ou les universités les plus performantes. Le temps du télé-enseignement, abritant, dans une bureaucratie poussiéreuse, des enseignants dépressifs ne sera-t-il bientôt plus qu'un (mauvais) souvenir?... Aujourd'hui ce géant bouge. Naguère formaliste, somnolent, un peu revêche – n'avait-on pas rayé ses coordonnées parisiennes des derniers annuaires parce que... le télé-phone dérangeait trop? – le voici occupé à se faire un nouveau visage et fourmillant de projets' (Betbeder, 1987:54).

Betbeder described a first wave of change that focused on the curriculum and the use of technology for support functions. Access was enhanced by making admission requirements more flexible and by extending the timetable with summer courses. Some tutorial groups were introduced. The curriculum for adults was completely recast. These changes were facilitated by new uses of technology. Electronic publishing speeded the production of revamped courses. Computerised registration supported expansion of student numbers and greater flexibility.

A second important change occurred in 1993 when the headquarters of CNED moved from Vanves (Paris) to Futuroscope near Poitiers. Futuroscope is a new *technopole* (technology park) that is being developed, with strong political support, as a centre for the communications and media industries. Prominent within it is a successful theme park, focused on communications and the moving image, that attracts millions of tourists. The relocation of the CNED directorate from a Paris suburb to a new building between the Futuroscope theme park and a 'teleport' with full satellite communication facilities was a powerful symbol of change. By forcing a redefinition of the relationships between the headquarters and the eight component institutes it was also a catalyst for more profound changes within CNED.

One expression of this was the creation of a central enquiry handling system called Télé-Accueil. There is now a single national telephone number for enquiries. A trained team in Poitiers, backed by a specially developed computer system, can handle over 10,000 phone calls per day in an impressive manner. A call may be forwarded to the particular CNED institute responsible for the programme of interest to the enquirer. However, the Télé-Accueil *téléacteur* retains ownership of each call until it is concluded to the enquirer's satisfaction.

CNED developed this system after extensive discussions with the French companies and organisations that handle the largest number of telephone enquiries. In 1994 the number of incoming calls to Télé-Accueil rose by 250% to over 800,000. At the peak of the student recruitment season

11,650 calls were taken in a single day by 57 *téléacteurs* working simultaneously (CNED, 1994a:100).

Télé-Accueil is a good example of the sophisticated use of technology by a mega-university in its support operations. For students and the public, however, it is the use of technology for teaching that captures attention. This is the third wave of change at CNED, repeatedly stressed by successive directors (e.g. CNED, 1989:19; Moreau, 1994). Most issues of the CNED magazine carry stories about particular technologies (e.g. satellites, visiophone, fax) and how they might be used in distance education.

The reality appears to be that CNED is using its most glamorous technology, satellite video transmissions, to enrich, rather than fundamentally to change, its traditional correspondence teaching methods. Loing (1993b:154) attributes CNED's technological choices to two key factors. First, there was almost no educational television in France until 1994. Second, France has a high quality telecommunications network and was a world pioneer of popular telematics with its Minitel videotex system.

Satellite video transmissions are used to deliver programmes of lectures or debates to a reception network of some five hundred points which are mostly secondary schools and colleges. Individual video transmissions may reach an audience of up to 10,000 students (most of whom are not registered CNED students). Questions are asked during the broadcast either by telephone (through Télé-Accueil) or fax. These video transmissions are described as 'tools of motivation' which break down geographic isolation (Aténa, 1993). Students do not receive credit for them and, because they are mostly scheduled during the day, CNED's adult students do not have ready access to them. CNED uses a similar approach for some international activities, such as its *Ecole Francophone de Droit*. For smaller and more interactive sessions CNED uses slow-scan 'visio' conferences which it considers to be complementary to the video transmissions.

A second operational use of technology at CNED is videotex. The Minitel system, which may soon reach 10 million homes, carries a database of CNED's programmes and courses and allows students to register. Minitel can also be used as an electronic mail and bulletin board system by students and teachers. Use of a special code allows employers who are sponsoring staff on CNED vocational courses to check on their progress.

Finally, CNED has experimented with fax in its tutorial operations. Secondary students surveyed felt that the 4-week turnaround of assignments through the post was too slow and half of them said they would be prepared to pay for the costs of fax. When fax machines were loaned to some 70 students as an experiment there was 'extraordinary interest and renewed energy raised in students' and the average rate of return of corrected assignments was 24 hours. Loing's (1993b:137) report implied a Hawthorne effect but concluded this approach was worth pursuing.

In summary, CNED is in a brisk phase of development. Its new site at Futuroscope symbolises its readiness to use new technologies. CNED seems particularly aware of the threats and opportunities inherent in the increasing regionalisation of France and the adoption of distance education techniques by other institutions. It is putting strong emphasis on partnerships. One example is the 4500 training agreements it has made with French companies. Another is the strengthening of its relationships with the other institutions of the French education system through its video conferences. The virtue of 'hybrid teaching', which combines face-to-face and distance methods, is a recent theme of CNED publications (CNED, 1995).

CNED's current strategic plan (CNED, 1994b), which was produced after a review of its activities by an international management consultancy, calls for CNED to be more attentive to the changing needs of its users. Continuing education and overseas markets are particular foci for developments which call for a rapid expansion in university-level courses to be developed in collaboration with other French universities. The strategy places strong emphasis on new teaching technologies and notes the collaborative research network that CNED has organised to advance this work. CNED is a shareholder in the new French educational TV network, *La Cinquième*, and believes that radio has an important part in its future. It is also working with the French postal service to speed deliveries of course materials and assignments.

This dynamic phase of development is clearly putting some strains on the bureaucratic administrative framework within which CNED has traditionally worked. The plan asks for greater institutional freedom in three key areas: 1) to create commercial subsidiaries, 2) to set fees and, 3) to have greater control over its staffing.

3.2.3 The Indira Gandhi National Open University (IGNOU), India

In only ten years IGNOU has achieved remarkable success in a complex environment. India's tradition of higher distance education goes back to 1962 when the University of Delhi created a

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School of Correspondence Courses (Ansari, 1992:34). By 1980 twenty universities were offering such courses as a sideline to their campus operations. However, these developments were disappointing in both quantity and quality to the policy makers who had encouraged them. The Education Commission of 1964-66 had suggested that by 1986 one third of all higher education enrolments should be through correspondence courses and evening colleges. In the event only 13% of HE enrolments were in distance education by 1992 (Yadav and Panda, 1995). The correspondence courses were mostly of poor quality and provided minimal student support. The universities used the profits from their correspondence courses to subsidise campus operations.

By the 1980s, however, Indian policy makers could see successful examples of single-purpose distance teaching universities in a variety of other countries. They decided to try again. The state of Andhra Pradesh created an open university in 1982 and the central government established IGNOU in 1985. The aims were both quantitative and qualitative. India's *Eighth Plan* (1992-97) envisaged that 50% of the increase in HE enrolments should study by distance education. The forecast was an increase of 1.5 million enrolments. The implication for IGNOU was that enrolments would reach 250,000 by 1997. The annual intake would be 100,000. However, less than a third of these students would take bachelor's courses. Over two-thirds would enrol in programmes related directly to employment.

This major reorientation of IGNOU's programming took place before it had fully implemented an extensive undergraduate programme. It reflected a growing realisation that for Indian higher education the challenge was not to promote access and equity, but to avoid squandering money on the production of unemployables (Ansari, 1993).

The other part of IGNOU's qualitative function is to be an apex body with a national mandate for the promotion, co-ordination and maintenance of standards in distance education. This mandate covers the five state open universities and the correspondence programmes of the conventional universities. IGNOU is approaching this task in a circumspect fashion through a Distance Education Council which emphasises partnership rather than regulation. It has created a Staff Training and Research Institute in Distance Education in order to enhance professional expertise throughout India and convince academics of the importance of quality. Not surprisingly, in view of the history, the prospect of having to improve their correspondence provision is not always welcomed by the conventional universities.

Our interest is mainly in IGNOU's own distance teaching activities. The daunting challenge of serving a student body of nearly a quarter of a million is, however, only part of IGNOU's broad and politically sensitive brief.

Annual purchases of 1100 tons of printing paper show that IGNOU has its foundations in the correspondence tradition. It would like to use other media more but external constraints limit the options. IGNOU has access to only three 30-minute slots of nationally broadcast television each week and no access to national radio coverage. According to former vice-chancellor Kulandai Swamy (1994), 'as long as (radio) is not available the spread of distance education will suffer from a crippling handicap'. The obligation to use one of IGNOU's 229 study centres, which tend to be in the towns, may explain why 79% of IGNOU's 1992 entry cohort came from urban areas. However, the proportion of new entrants from the Delhi area has dropped from 40% to 15% in only three years (British Council, 1993; Takwale, 1995). The broadcast media would facilitate study for rural people. The production of audio-cassettes by IGNOU is decreasing because academics see less point in producing them if students must go to study centres to use them.

For this reason IGNOU and the Indian Space Research Organisation have conducted satellite experiments for both teaching and staff development. One-way video and two-way audio communication was established between IGNOU headquarters and ten of its regional centres over a ten day period in 1993 (Chaudhary, 1995; Sengupta, 1995). The evaluation was favourable and an operational system is now being implemented.

Like other mega-universities IGNOU is finding technology increasingly important in its support operations. Materials distribution is being computerised and there is already extensive use of information technology in student administration (Kulandai Swamy, 1995). Pillai and Naidu (1991:75) argued that IGNOU needed to standardise its credit structure, course registration and student number counting procedures. As they put it, 'unless the University is able to assess the student numbers that it is serving at a given time, considerable resources will be earmarked for the delivery of certain services which may not be required at all'. This seemingly elementary point is a crucial performance factor for mega-universities. Forecasting the academic choices and behaviour of large numbers of part-time students is not easy, especially when changing curricula make projections from historic data unreliable.

IGNOU is developing well. With 242,000 students and a new intake of 91,400 it is already close to the projections of the *Eighth Plan* for 1997. As in some other mega-universities, IGNOU's full-time complement of 216 academic staff seems tiny in relation to student numbers. It does, however have 12,800 part-time staff. Naidu (1993) found that IGNOU was highly competitive with conventional institutions on cost. He did a useful calculation of the impact of drop-out on cost competitiveness. This showed that even if one assumed a drop-out rate of zero from conventional university colleges, IGNOU would have to lose 60% of its students before losing its competitive edge.

Naidu (1993:73) also pointed out that there is a limit to the economies of scale that mega-universities can achieve. In IGNOU's case a plot of average cost per student against student numbers starts to flatten out at around 140,000 students. Beyond this figure the average cost per student decreases very slowly. IGNOU should remain cost effective with over 200,000 students if it can handle the challenges of scale.

Naidu's work provides useful background to the anxieties expressed by consultants who have worked with IGNOU under a multi-year project funded by the UK Overseas Development Administration. One fear is that IGNOU may lose cost effectiveness by offering too many courses and allowing the numbers of students taking each course to fall. Another fear is that IGNOU's academic, administrative and operating systems are not yet sufficiently robust to cope effectively with present student numbers.

These are real concerns. The evidence suggests, however, that IGNOU is acting on them. For example, academic audit and evaluation units are now in place. Each year sees increasing professionalism and depth in the IGNOU administration. The importance it gives to the staff development function (Sengupta, 1995) is evidence of good intent.

Our study focuses on the use of new technology by the mega-universities. In that context the striking feature of IGNOU's planning documents is their focus on making the current system work better rather than looking for solutions in new technology. However, IGNOU also places great importance (Takwale, 1995) on the development of OPENET, an open educational network that now links IGNOU with its sixteen regional centres and three state open universities. OPENET is a wide-area network for voice, data and images. One use, following the computerisa-

tion of all administrative activities within IGNOU, is to allow the flow of administrative, financial and management data. Another is as a teleconference facility for staff and students:

> 'The main service available through this network is a wide range of certificate and degree/diploma programmes and also the extension programmes delivered through team teaching with cooperation from different institutions and organisations' (Takwale, 1995:3).

This development, which will lead IGNOU to blend both the correspondence and remote-classroom traditions of distance education in its future work, will be of interest to all the mega-universities.

3.2.4 Universitas Terbuka (UT), Indonesia

The Universitas Terbuka (Terbuka is Bahasa Indonesian for 'open' or 'open learning') is an institution that brings together, in a telling manner, many of challenges facing the mega-universities.

UT was created rather hastily in 1984. Indonesia had used the windfall revenues from the 1970s oil boom to expand primary and secondary education. In the early eighties the growing number of secondary school leavers threatened to swamp the conventional universities but the country was then in recession. Creating a distance teaching university was a way of taking the pressure off. However, the commitment to the project was less than total (Zuhairi, 1994:150), which made UT a fragile plant in its early years. For example, although it is one of Indonesia's 45 state universities it was set up by presidential decree rather than by act of parliament. Not until 1992, with the publication of a development plan, did UT acquire full status within the Indonesian tertiary system.

The speed of UT's creation led to organisational problems in the early years. Government created a planning committee in 1983 and teaching began in 1984 with a first cohort of 60,000 students and a full-time staff of 200. Ten years later UT is more settled. Students on the books now number over 380,000 and their profile has changed significantly since the first cohort. UT was created with the primary purpose of providing higher education for the tens of thousands of high school graduates who could not be accommodated by the conventional universities. Today, although their ages range from 19 to 55, 95% of the students are from the working population. A consequence of this changed profile has been a decline in the intake of new students from a peak of 110,000 in 1991, although overall student numbers are still increasing. There are four fac-

ulties: Education (in-service training only); Economics; Mathematics and Sciences; and Social Sciences (ICDL, 1995).

The formal partnership between the University and the Indonesian Post Office symbolises UT's origins in the correspondence tradition of distance education. Students can buy application forms, obtain information about UT and pay their registration fees in any post office. Print-based study modules, which are distributed through 32 local centres, are augmented by audio-cassettes, radio and TV broadcasts and tutorials. Printed material accounted for 96% of UT's instructional media in 1990. UT encourages extra-curricular activities and organises sports and cultural gatherings for students biennially.

Zuhairi (1994:153) has pointed out that because Canadian consultants strongly influenced the development of UT, it was modelled more closely on what was then the British Columbia Open Learning Institute than on other open universities such as the UKOU or IGNOU. In practical terms this meant that UT had no senior academic staff and contracted course writing to academics in other universities. It also relied heavily on services from other bodies: the post offices for its enquiry service, the Universitas Indonesia for its computerised record system and the other universities for its local centres. Its founders conceived UT as a network of participating institutions.

An overview of distance education in Indonesia (NIME-UNESCO, 1994) lists three problems and constraints facing distance education in Indonesia generally: 1) high school graduates prefer conventional universities, 2) 'distance education students attitude and desire towards achievement'; and, 3) institutional capability to provide better service. The same publication lists the major obstacles to the implementation of distance education at UT as: 1) the difficulty of using TV, which is expensive and does not reach students in rural areas; 2) slow postal services; and, 3) poor reliability of the computer network in local study centres. A further challenge is that the national language, Bahasa Indonesia, is a recent arrival in parts of the country and is still developing as a 'full-fledged language' (Brotosiswojo, 1995).

Two recent articles shed light on these statements from different perspectives. Zuhairi (1995) has compared UT with the distance teaching programmes of the University of New England, Australia and Massey University, New Zealand. He states (1995:202) that 'UT has no permanent academic staff who write courses, but contracts academics from established institutions to write courses'.

Although they may play a junior supporting role instead of writing courses, UT reports having 791 full-time academic staff (NIME-UNESCO, 1994:326) which gives it a more favourable staff to student ratio than either the Korean or Indian mega-universities. Zuhairi also notes that UT's local centres, which are inaccessible to some rural students, perform administrative rather than academic duties and offer 'only limited services to students'. After quoting Peters (1983) work on distance education as a form of industrial production, Zuhairi contrasts UT as a 'management university' with conventional universities which are 'political institutions'. Single-mode distance teaching universities are bureaucratic and hierarchical and have a weaker academic culture than the conventional universities that offer some courses at a distance. He found that the two dual-mode institutions he studied had been more ready to experiment with interactive technologies than UT.

Such comparisons between a new mega-university in a developing country and old conventional institutions in rich countries yield useful insights. It is important, however, to bear in mind the resources available to the institutions. Elsewhere Zuhairi (1994:199) reports that some high-technology experiments at UT 'such as telephone conferences, electronic mail and tele-teaching via satellite, have collapsed because of the high cost incurred'.

Djalil et al. (1994) have provided a thorough financial analysis of UT in the context of the Indonesian university system. They compared UT with three representative conventional universities, each with a rather different profile. The results show that UT is an extreme example of the contrasts inherent in the economics of the mega-universities.

First, the proportion of UT's budget from non-government sources is not only much larger than in the other Indonesian universities, but is rising fast. Between 1991-92 and 1992-93 the contribution of UT's student fees and materials sales to its total budget rose from 44% to 66%. At this rate UT has the potential to become independent of government funding. Over the same period the proportion of UT's expenditure on staff salaries dropped from 39% to 28%.

Second, the differences in the costs per student borne by the government in the different universities are dramatic. The unit cost to the state for each student at UT is between 0.8% and 2.8% of the cost at the campus universities.

Third, comparisons based on costs per graduate are still favourable to UT even though it has a low graduation rate. In 1992-93 there were only 2,743 graduations in a student body of 165,204

(Djalil et al., 1994:34). Using these authors' data we can calculate that the total cost per graduate at UT is 35% of the average of the three other universities. The cost per graduate to the state is 29% of the average at the other institutions.

These figures highlight the opportunity that the greater use of technology provides to UT and to other mega-universities with low graduate completion rates. It seems unlikely that the integration of new technologies will bring down further the costs per active student. These are already very low, both absolutely and especially in terms of costs to the state. However, if use of technology could improve graduate completion rates, the competitiveness of UT would increase, both in economic and reputational terms.

Other evidence indicates that there is plenty of scope for increasing student satisfaction with UT's offerings. Iwanaga and Takahashi (1991) surveyed the first class of UT graduates. They found that although the respondents were very proud to have graduated, there was almost universal agreement that UT needed to 'expand the library function', make the printed materials easier to comprehend' and to develop 'more ingenious contrivances for the tutorial schedule'. Motik (1989) reported that UT's tutorial programme was not fully effective and did not meet students' expectations. However, a later study by Hiola and Moss (1990) presents a more encouraging picture.

Two rather different lessons emerge from the UT experience. The first, expressed simply by Zuhairi (1994:170) is that 'management is crucial in an open university'. UT discovered the hard way that teaching tens of thousands of students at a distance requires well designed and robust operational systems. It also discovered that making the study regime more flexible in response to student comments only creates chaos if the administrative systems cannot support the added complexity. Zuhairi suggests that Indonesia has a poorly developed planning culture because it won independence by force, not by an orderly process. He also quotes the founding rector, Setijadi, who said that those creating UT had to 'do first and plan later' because of the political imperative to get UT going.

The other lesson is that the notion of a 'management' university, which simply brings together in new ways the resources already within the tertiary education system, may be flawed. UT now seems to appreciate the virtues of academic leadership and collegiality. Its 1992-2000 development plan will use three broad strategies: 1) internal consolidation through the management of

growth; 2) improving transparency in decision making in order to gain support from staff and students, and 3) the use of participative decision making processes.

3.2.5 The Korea National Open University (KNOU), Korea

The Korea Air and Correspondence University (KACU) was created in 1972 as a branch of Seoul National University offering a two-year junior college programme (ICDL, 1995). By 1982, when it became an independent university, it had evolved into a five-year university. In 1992 it began to align itself on the four-year programmes that had become standard in Korean universities and in 1994 it adopted a new name: the Korea National Open University.

KNOU has three broad objectives: 1) to provide opportunities for high school graduates; 2) to facilitate professional updating, especially in modern science and technology; and 3) to contribute to the welfare of the nation.

In 1995 KNOU had an enrolment of 196,000 students and an annual intake of 90,000. Two-thirds of the students are under 30 and 55% are women. There is a full-time staff of 678, including 174 academics, and a part-time staff of 2,649 academics (Han, 1995). This is the context for any criticisms of KNOU's teaching system. A full-time academic staff of 174 for a student body of 196,000 is a small ratio even by mega-university standards!

KNOU's principal teaching media are textbooks and radio programmes. KNOU had only one hour of TV broadcasting per day in 1992 (Soon Jeong Hong, 1992). Half the courses offer a five-day classroom session during the course and there is some use of 'self-organised study groups'. KNOU only corrects one assignment for each course.

A comprehensive report on distance education in Asia and the Pacific listed 'low social recognition of distance education' as the major obstacle for implementing distance education in Korea (NIME-UNESCO, 1994:456). According to the same source KNOU's five-year development plan includes: 1) moving to four-year courses and adding Master's and Ph.D. programmes; 2) re-organising the curriculum to benefit working students; 3) 'setting an exemplary model for the nation for the so-called multi-media approach in education; pioneering in arenas of educational technology by introducing such innovative communication systems as the CATV, ISDN VAN and the like, into the actual fields of education'; 4) obtaining sufficient classroom facilities and teach-

ing staff to operate 'qualitative schooling sessions'; and 5) solving the problems of assessing student achievement, 'which rely too heavily on computer-processed marking'.

KNOU is a particularly interesting case for our study. It hopes to shed a poor reputation and become an exemplary model partly through the use of technology. It is ironic that in the objectives listed above the commitment to new technology precedes a commitment to remedy the shortcomings of the old technology of computer-processed marking.

The low reputation of KNOU seems linked to poor performance as measured by high drop-out rates. Up to 1981 the average drop-out rate was 70% and it was claimed (KACU, 1983) that 'this reflects the high standard of teaching that the KACU has stringently maintained', also noting that KACU graduates had 'outstanding success' in the qualifying exams for the four-year universities, their pass rate being 22% compared to 7% for conventional junior college graduates. Cost comparisons were also favourable to KACU: $300 per graduate compared to $675 at the conventional colleges (Harwood and Kim, 1986). Since 1983, however, it has become less fashionable to equate high drop-out rates with high standards. A decade later, as noted in section 3.1.1.8., Park (1995) attributed the 90% drop-out rates at KNOU to its inadequate educational services.

There seems to be a real danger that KNOU will expect too much of new technology, in particular that it can compensate for levels of staffing and staff training which simply may not reach the critical mass that a student body of KNOU's size requires. Soon Jeong Hong (1992), after explaining why KNOU's resources would not allow tutoring on the UKOU model, makes the following statement:

> 'While it is unrealistic to depend on personal tutoring, it is quite possible to use telephone, fax
> and even computer for tutoring purposes in KNOU since the telephone and other technological
> equipment are well organised in Korea'.

Can technology reduce the human time that effective tutoring requires? This is an important question for our study. Some evidence suggests that telephone and e-mail may be more demanding on tutors' time since student usage is greater.

The two papers from KNOU presented at the 1995 conference of the International Council for Distance Education provide an interesting contrast in analyses and prescriptions for KNOU. Han (1995) is resolutely optimistic about the 'new age of distance education practice which brings high interactivity and individualised learner-centred education by introducing teleconferencing

and multi-media systems'. He does add, however, that 'developing high quality courseware for these new media systems should always be our concern'.

Park (1995) concentrates on this last point, echoing the findings of Soon Jeong Hong (1992) that KNOU course materials were very poor teaching materials because of low readability, a non-interactive style and a lack of self-assessment questions. He believes that improved educational services to students require a larger staff whatever the technology. Fortunately KNOU's full-time staff complement increased from 552 to 664 in the two years before KNOU got its own cable TV channel in 1994.

3.2.6 University of South Africa (UNISA)

The University of South Africa (UNISA) is the oldest of the mega-universities. It began as the University of the Cape of Good Hope in 1873 as an examining body for affiliated university colleges. In 1916 it was renamed the University of South Africa and moved to Pretoria. By the end of World War II these colleges had become autonomous universities and in 1946 UNISA started to provide distance education to off-campus students (ICDL, 1995). It also assumed the guardianship of the black university colleges until they in turn became independent (Wiechers, 1995).

In 1995 UNISA had 130,000 students, over one-third of all university enrolments in South Africa. Male and female are almost equally represented in UNISA's student body, with 54% female students. Nearly 36% of students are resident in Gauteng and the ethnic breakdown in 1995 was: 47% African; 40% White; 4% Coloured; 9% Asian. Over 80% of students are employed and the average age is 31. Almost 38,000 of UNISA's students are school teachers. Applicants who do not have secondary school matriculation are awarded conditional matriculation and restricted in the number of courses they can take in their first year as undergraduates. UNISA was open to all races throughout the apartheid era.

Linguistic diversity is a special challenge for UNISA. Although it operates in both Afrikaans and English, neither is the home language of 47% of its students. Of the remainder 32% have English and 18% have Afrikaans as home languages. 82% of students choose to study and correspond with UNISA in English.

In 1995 the overall staff numbered 3,437 of whom 1,410 were academic staff. The academic staff were 93% white and 47% female. The service or unskilled staff were 100% non-white and 92% male (UNISA, 1995).

In comparison with other mega-universities UNISA offers a very wide range of courses at under-graduate and postgraduate level. 2,265 papers or modules were available in 1995, nearly all of them in both Afrikaans and English (the majority being written in Afrikaans and then translated into English).

UNISA teaching derives from the correspondence tradition of distance education and has been described as follows (SAIDE, 1994):

> 'The basic teaching method at UNISA is for an academic member of staff in Pretoria to teach a course to students distributed throughout the country. He or she will do this primarily by writing printed study guides and tutorial letters. Some study guides are designed to stand alone, while others are wrap around guides which accompany textbooks. Courses are heavily print-orien-tated because it is believed that this is the medium most accessible to students. In addition, how-ever, audio-cassettes are distributed for many subjects, and UNISA also buys air time on Radio 2000 for use in several subjects.'

Although there are four regional administrative centres with some library facilities, students re-quiring academic assistance must visit, write to or telephone the academic at Pretoria who is re-sponsible for their course. It is a contractual requirement that UNISA academic staff be in their offices from 8 a.m. to 1.30 p.m. each working day so that students can contact them. There are also limited teleconferencing links with the regional centres. An interactive video link, Picturetel, allows Pretoria staff to hold sessions with students in Cape Town. A number of discussion classes are held across the country annually.

As the above description makes clear, course authoring and tutoring at UNISA have been the re-sponsibility of individual academics. However, the notion of course teams is now being intro-duced. In September 1995 there were 62 course teams engaged in designing new courses. A lim-ited local tutorial support network based on part-time staff is also being expanded (Minnaar, 1995). The older, more individual methods, combined with a relatively large academic staff (com-pared to other mega-universities) allowed UNISA to offer a considerable number of courses. Wiechers (1995:191) talks of ' a superabundance of courses and papers as well as strict adher-

ence to traditional organisation and structure'. This approach also explains why, uniquely among the mega-universities, posts at UNISA are eagerly sought after by academics who want to concentrate on research. UNISA has the best research library in Southern Africa and awarded 78 doctorates in 1992.

Its production of degrees at other levels is more controversial. According to statistics published by SAIDE (1994) the graduation rates, six years after first enrolment, vary by programme as follows: B.Ed – 36%; B.Sc. – 5%; B.Comm – 10%. Critics of UNISA claim that it has very high wastage rates, especially among black students with low educational qualifications on entry. However, an independent study by van Enckevort and Woodley (1995) suggests that UNISA's completion rates are not 'greatly out of line with those of other distance teaching universities'.

UNISA provides higher education at lower cost to both the government and the student than other South African universities. Its state subsidy per full-time equivalent student is set at about 60% of that received by the other universities. The total fees cost of a degree to a UNISA student is 40% of the fees charged elsewhere.

Although UNISA is the oldest of the mega-universities it faces more wrenching contemporary changes than any of them. A recent paper by its current Principal is entitled 'Managing the transformation of the University of South Africa' (Wiechers, 1995). Some of those now in power in South Africa are ambivalent about UNISA. On the one hand it was one of the more liberal institutions of the apartheid regime. However, it was part of that regime and some suspect that its failure to provide local tutorials was less a result of poverty (it has about the same student numbers as the UKOU with half the budget) than a desire to prevent students getting together and causing trouble. This ambivalence is nicely expressed in the example of President Nelson Mandela. He is a UNISA graduate but he studied in jail. He is a supporter of UNISA.

The challenges faced by UNISA are the mirror image of those faced by mega-universities such as Universitas Terbuka. UT has no problems of political acceptability but needs to be better organised. UNISA is a model of good organisation. Operations are smooth and efficient and management information is comprehensive and timely. However, UNISA is part of South Africa's national task of 'wiping out the ravages of the past' (Wiechers, 1995:190) which will require:

'not only .. the reform of a system of distance education... (but also) the total absorption of all those elements of liberalisation, democratisation and socialisation which are the essential characteristics of a successful transition from authoritarian rule.'

By mid-1995 UNISA was resolutely engaged in two processes of change. The first, which it calls transformation, aims to infuse its governance structures, management processes and organisational ethos with the spirit of the new South Africa. The second, labelled renewal, addresses the need to improve its practice of distance education. Particular attention is being given to enhancing the quality of course materials through the use of course teams and the strengthening of support to students through tutorial provision and learning centres. The curriculum in the School of Education is being reformed away from the theories of 'fundamental pedagogics' which appeared to support the ideology of apartheid.

UNISA is conducting tentative experiments with new technologies for the purpose of getting closer to its students. For the moment, however, more direct approaches to this challenge, such as the creation of networks of learning centres, are the main focus (Ngengebule, 1995). It is encouraging to see that in creating these centres UNISA has allied itself to the SACHED Trust. SACHED was one of UNISA's sternest critics during the apartheid years and used to organise its own tutorials for UNISA students in an attempt to repair this weakness in the teaching system.

UNISA is worried that the use of new technologies will drive its costs up towards those of the conventional universities. However, it does not want to increase fees to students and it is unlikely that the government will align its subsidies per student with those of the campus universities. UNISA expects to have 290,000 students by 2010 on current projections so maintaining the economy of its teaching system is a priority. The most pressing imperative is ideological rather than technological. In adapting to a new national environment UNISA has captured the idealism that inspires other open universities. One of its new participative bodies has declared that the goal of UNISA is to create:

'a *vita academica* which centres round the adult learner and creates an environment of lifelong learning through systems of adult basic education, student support and interactive means of teaching technologies. Furthermore, this vision of our *vita academica* acknowledges the existence of all other institutions of higher learning and foresees a very broad co-operation with them to bring about living systems of dual-mode teaching' (Wiechers, 1995:191).

3.2.7 Universidad Nacional de Educación a Distancia (UNED), Spain

UNED, the national university for distance education in Spain, was founded by Act of Parliament in 1972. It is one of only three of the institutions in our study (UNED (James, 1982b), CTVU and UKOU) that were the subjects of chapters in Rumble and Harry's book, *The Distance Teaching Universities*, (1982). This is a reminder of how recently and how quickly the mega-universities have grown.

In creating UNED the government had three groups of students in mind: those unable to begin or complete higher education; those living in remote areas; and those ambitious for more qualifications. All the mega-universities reflect their national context. UNED is an integral part of a national system of higher education that is Napoleonic in concept (James, 1982b). This means it operates under central government authority that lays down a national curriculum for higher education and employs university staff within the civil service. An interesting current challenge for UNED is that the system is becoming less Napoleonic as responsibility for universities is devolved to regional governments. This leaves UNED as the only 'national' university.

A frequent feature of Napoleonic systems is high drop out from the conventional universities. Villaneuva (1980:56) reported that fifty to seventy percent of registered students dropped out of Spain's other universities at that time, with only 15% completing the *Licenciado* degree (equivalent to a four-year honours bachelor's degree). In the years following UNED's creation it was the intake of students, rather than the output of graduates, that measured the expansion of Spanish higher education.

In this context the criticisms levelled at UNED on the occasion of its tenth anniversary were wide of the mark. Connell (1983) claimed UNED had 'aped the set-up of the existing universities in course content and method'. Evans (1983) noted that 3000 graduates was a slender output from 60,000 student registrations. James (1982b) stressed that UNED was intended to be like the other universities of Spain in curriculum and organisation. Given the nature of the *Licenciado* degree its output of graduates should more properly be compared to the 2000 honours graduates rather than the 40,000 ordinary bachelor's degrees produced by the UK Open University in its first decade .

However, the UNED leadership did make changes as the University began its second decade. Whilst young students continued to need the *Bachillerato* that is required by all Spanish universi-

ties for admission, UNED promoted a preparatory admission course for students aged over 25. No pre-requisites were required for the Open Distance Education programme that offered individual courses in the continuing education area.

In the 1990s the demand for UNED's courses remained buoyant without the need for advertising. By 1993-94 enrolment was over 130,000, of which 110,000 were in degree programmes and the remainder in continuing education. Median age of students was 29. Completion rates were as good as those in the conventional universities.

Many of the interesting comparisons made by James (1982b) between UNED and the UK Open University remain valid more than a decade later. He found that UNED's costs per student were about one-third those of the UKOU. The proportion of UNED's costs borne by student fees was more than twice the proportion at the UKOU. At that time the UKOU had fewer academic staff than UNED but a much larger non-academic staff. It appears that definition of the curriculum by government makes course development and production much cheaper. UNED staff often commission academics from other universities to write the courses and the physical production of materials is a simple process. This enables it to operate over a wide range of subjects and to continue to expand the curriculum quickly. UNED now offers some 600 courses in 16 degree programmes and a further 180 continuing education courses.

UNED faculty have the responsibility for course preparation and are required to spend a session of four hours per week tutoring students by telephone. There is emphasis on co-operation with all other Spanish universities, collaboration with community organisations and decentralisation. Many of UNED's 58 study centres are sponsored by community and industrial organisations which also pay the salaries of the part-time tutorial staff based there. Instead of mailing course materials to students' homes, UNED distributes them in bulk to the study centres for collection.

Print is the main instructional medium but, with only recent access to television broadcasting, UNED has made extensive use of radio. Contreras and Moreno (1993) describe radio as a medium with tremendous possibilities and note that UNED's two and a half hours of daily programming are 'the most important cultural contribution provided by any means of communication in Spain, and particularly the radio'. They argue that new technologies give radio a bright future in distance education. UNED is also extending a video conference service to a total of fifteen study

centres and has made electronic mail facilities available to the whole University community (ICDL, 1995:13).

Using technology to enrich the activity of study centres is a strategy that is also being adopted by Sukhothai Thammathirat Open University in Thailand. It will be interesting to see whether this does anything to resolve the fundamental paradox of study centres in either country. In both Thailand and Spain students cite lack of contact between themselves, tutors and other students as the greatest problem with distance education. Yet attendance at study centres is relatively sparse (James, 1982b:30; Nilvises, 1990).

Recently García-Aretio (1995) has assessed the strengths and weaknesses of UNED as a 'macro-institution'. Like many writers from the Napoleonic academic tradition he assumes that any form of distance education must be second best to 'the ideal personal student-professor classroom relationship'. Nevertheless, he finds that UNED's advantages of openness, flexibility, effectiveness and economy make a longer list than its drawbacks. He calculated that costs per student-course at UNED were 41% of those in conventional universities while costs per graduate were 53%. The possibility of combining work and study (83% of UNED students are employed) is particularly important.

On the debit side García-Aretio lists: limited interaction with professors; slow feedback because of the post; difficulty of organising examinations; and the high number of drop outs (43%) from one year to the next. The latter is often 'the result less of the difficulty of the subject matter than of inadequate guidance or the failure of Headquarters professors and local tutors to provide initial and ongoing motivation'. He also notes that as student numbers continue to grow and the curriculum to diversify, enrolment and *in situ* examination processes are becoming increasingly complex.

He expresses one of the fundamental challenges facing all the mega-universities as follows (1995:93):

> 'The production and distribution of teaching materials for large numbers of students and the management and co-ordination of the activities of students and their respective tutors scattered throughout the country entail the application of procedures calling for process rationalisation, division of tasks and mass production. This can detract from the flexibility of the organisation as systems must be rigidly programmed and relations among course designers, tutors, etc. and pu-

pils highly structured; this is detrimental to flexibility and attention to personal needs. Macroinstitutions find this problem difficult to solve.'

3.2.8 Sukhothai Thammathirat Open University (STOU), Thailand

In 1995, at the 17th World Conference of the International Council for Distance Education (ICDE), Sukhothai Thammathirat Open University (STOU) won the ICDE and Commonwealth of Learning joint Award of Excellence in the institutional category. This confirmed the common view that STOU is the most successful of the larger mega-universities. Like several other mega-universities STOU owes its success partly to its extremely able founding Rector, Dr Wichit Srisa-an.

Thailand established STOU as a national university by Royal Charter in 1978. Its objectives are to promote: lifelong education; the expansion of educational opportunities for secondary school graduates; personnel development and the training of skilled manpower; the development of economic and political doctrines; and democratic values. Some 20% of STOU's revenue now comes from the government. Nearly all the remainder comes from student fees (ICDL, 1995).

The total enrolment in degree programmes is around 300,000 with an annual intake of 80,000. If the count includes students in single course 'certificate of achievement' programmes and short training programmes then STOU reaches more than half a million people each year (NIME-UNESCO, 1994:720). STOU's annual graduating class numbers 13,000. Two-thirds of the students are aged between 21 and 30 with less than 10% under 21. Three-quarters of the students are from rural areas. In 1994 full-time staff numbered 2000, of which over 500 were in the academic and academic support category. STOU also employs about 4000 part-time professional and academic staff.

STOU offers a wide range of programmes: 15 certificates; 47 bachelor's degrees; and 3 master's degrees. The University operates an integrated multi-media teaching system consisting of face-to-face tutoring (10-15 hours per course per semester), printed materials, correspondence media, audio/video cassettes and broadcasts on television and radio. About 1,100 TV programmes are broadcast per year using three daily slots between 1800-1930h. Each week there are 150 twenty-minute radio programmes. Thailand has an efficient postal service and STOU is thoroughly integrated into the country's regional networks. This allows it to provide numerous contact points for students: regional centres (7); local study centres (78); special study centres for Health Sciences

(63); local study centres for Agricultural Extension and Co-operatives (7); 'STOU corners' in provincial libraries (75) and an area resource centre in southern Thailand.

STOU rapidly achieved respectability within the national academic community, partly through the involvement of outstanding academics from the other universities in its activities. Like other mega-universities that operate in a national language not widely spoken outside the country, STOU has developed an important role as an academic publisher (Asian Development Bank, 1987:335):

> 'Another factor that has greatly contributed to an increase in the public's recognition of the University's academic quality is the extensive use of its printed texts by students, both undergraduates and graduates, of various conventional universities. Hence, in addition to helping overcome the deficiency in Thai-language textbooks, STOU has also played a significant role in the production of high-standard course materials for nation-wide use.'

Despite its success STOU lists obstacles to its future development (NIME-UNESCO, 1994:725) that are familiar to other mega-universities:

> '(1) Financial support for new development infrastructure; (2) Inadequate number of personnel in media and courseware production and revision of existing packages. Full-time academic and non-academic staff are overloaded; (3) Decreasing of air-time for broadcasting educational television programmes; (4) Lack of innovative and devoted personnel; (5) Shortage of communication and educational technological infrastructure; and (6) Insufficient points for delivery systems.'

The funding of STOU has been described by Chaya-Ngam (1994). Although STOU has the largest student body in Thailand it receives the least state support, about one per cent of the government's higher education budget. More problematic for planning purposes is that the state contribution is not a block grant but an itemised contribution applicable only to certain of STOU's expenditures. For example, in 1993 the state paid 20% of the costs of buying broadcast air time but did not contribute at all to tutorial costs.

The magnitude and methodology of state funding is an important consideration in the development of a competitive strategy by a mega-university. As we shall see in the next section, a key concept in competitive advantage is value to the buyer. The mega-universities have to address two important buyers, the individual student and the government. These two clients may per-

ceive value in different ways. Students are already the main buyers (i.e. they contribute more than half the operating funds) for most mega-universities and are likely to become so for the rest. Nevertheless, the pattern of government 'buying', especially if it is through a line-item grant structured to reflect the historic spending patterns of conventional universities, can easily distort the development strategies of the mega-universities. There is always a temptation to choose those developments for which the government might give funds. Conversely, it requires firm institutional will to pursue strategies that do not attract state funds.

In this context the telling example at STOU is the development of graduate programmes. Teswanitch and Thanavibulchai (1993) argue the general case for more equitable funding to STOU. Silphiphat and Tamey (1993) take up the particular case of graduate studies. The Thai government covers 80% of the costs of graduate study in the conventional universities but only 4% of the costs at STOU. The result, naturally, is that graduate students at STOU have to pay 96% of the costs of their tuition (the other universities charge 40% and presumably cross subsidise other programmes). This example holds two general lessons for the mega-universities. First, they should use their influence to change the behaviour of the government buyer in the direction of equitable funding methodologies. Second, they must pay particular attention to the value as perceived by the student buyer, who will usually be paying a higher share of the cost than in a conventional university. Interestingly an STOU staff member, Yenbamrung (1992, 1994), has studied the characteristics of the 'emerging electronic university' and its cost-effectiveness to American students. These issues will have an important influence on future strategies of the mega-universities.

STOU's own technology strategy is aimed at increasing its ability to broadcast television programmes and to enhance counselling, tutoring and training for its students. For this purpose, as reported by ICDL (1995:15):

> 'STOU is harnessing the latest multimedia communications technology for... the University's distance teaching system. STOU is developing educational communications systems through the transmission of one-way educational video via satellite, and two-way audio transmissions by way of the telephone network. This system will enable students to view instructional programmes via satellite and to consult their teachers by telephone. The University plans to install cable TV and telephone networks and satellite dishes throughout the Kingdom, providing students with free educational services'.

The aim of increasing the quality and availability of tutorials flows from studies such as that of Nilvises (1990) which showed that only about 10% of STOU students attended tutorials in the 1980s. Pakdiratn (1990) has provided a detailed rationale for STOU's plans to develop interactive communication through telecommunication.

3.2.9 Anadolu University (AU), Turkey

Strictly speaking Anadolu University (AU) is a dual-mode institution. The other mega-universities are exclusively engaged in distance teaching, although the UK Open University also validates the degrees and awards of a range of conventional institutions. AU teaches some programmes using conventional methods at its campus in Eskisehir. Distance teaching is the preserve of its Open Education Faculty (OEF). However, distance teaching began with the foundation of AU in 1982 and the student numbers in the OEF (823,370 in 1995, of which 567,000 at degree level) have always dwarfed those in the University's other programmes (17,190 in 1995). Nevertheless, the OEF receives less than half of AU's budget. 76% of the OEF's budget is student fees, 6% a government grant (Öz-Alp, 1995).

The beginnings of distance education in Turkey in the 1970s have been described by Ozdil (1979). In 1974 the Ministry of Education set up an experimental teachers' training college dedicated to the use of educational technology. By 1975 it was becoming an embryonic structure for a future open university. In that year, however, a ministerial decree shut it down on the grounds the infrastructure was needed for other purposes. Attempts to introduce distance learning later in the decade appeared to come to nothing. Ozdil (1979:5) commented:

> 'Our experience has shown that all hasty attempts at introducing distance learning when this is dissociated from the whole educational system, lacks clear-cut objectives, well-defined methodologies, minimum of integrated and skilfully operated technological hardware and software devices, well-trained and efficiently organised staff cognisant of the merits of accumulation of experiences and without carefully planned experimentations are bound to end up in frustration.'

In fact, the foundations of distance learning at Anadolu University were beginning to be laid (McIsaac et al., 1988). The Eskisehir Academy of Economics and Commercial Science was home to the only developed media and broadcasting capability outside the state broadcasting corporation. In 1978 its president proposed that the Academy become the centre for a programme of distance education in Turkey (Büyükersen, 1978).

By the end of 1970s Turkey was in turmoil and the military took over the government. In 1982 there was a new constitution and a new Higher Education Act which created a powerful Council for Higher Education (YÖK) to regulate the universities. YÖK told all the universities that they could develop distance education programmes. The Büyükersen report was implemented at the Eskisehir Academy which became Anadolu University the same year.

The recasting of the university system under a military regime caused deep apprehension in the academic community outside Turkey. Savran (1987) described a period of human rights abuses and 'educational sabotage' in a publication that was given wide circulation by academic staff unions in western countries. However, he did not suggest that the new commitment to distance education was in any way suspect. (In neighbouring Iran the Shah's regime had set up a distance teaching university called the Free University in the 1970s with the declared aim of dispersing students from campuses where they might cause political trouble. The Khomeini regime shut down the Free University when it came to power. However, in 1987 Iran created Payame Noor University (PNU), a new distance teaching institution. If its enrolment estimate of over 400,000 students by the year 2010 proves accurate (Zohoor and Alimohammadi, 1992), PNU will soon join the ranks of the mega-universities.)

Whatever the motives of the Turkish military, the creation of Anadolu University and its Open Education Faculty led to a dramatic expansion of tertiary education. In ten years the number of university students in the country doubled (Demiray and McIsaac, 1992). Between 1983-84 and 1991-92 the proportion of the national student body enrolled at AU rose from 13% to 46%. The change recorded by these authors finds echoes in the stories of several of the mega-universities:

> 'From an early sceptical reception in 1982, the Open Education Faculty has achieved a position of respectability in Turkish higher education. It would be of interest to explore the political and social elements which combine to create the current receptive environment for implementing open education as an integral component of the higher and adult education system. The success of the projects is most certainly tied to the efforts of one man, Yilmaz Büyükersen, and his team.'

In the early years it seemed that the familiar problem of high drop out and low graduation rates might be a problem for AU. Tekin and Demiray (1989) analysed the performance of the first intake of 29,249 students in 1982-83. By 1985-86 some 9,946 of this cohort were senior students

and 768 had graduated. They reported a graduation rate of 8% for Economics and 7% for Business Administration noting, of course, that many of the senior students would go on to graduate in later years. By the time Ozgu (1989) reported the graduation rate had risen to 24%. Since those studies the graduation performance of AU has been substantially improved by its teacher training programmes. In 1986 the OEF offered such programmes for 130,000 primary teachers and 54,000 secondary teachers. 133,126 of them registered and by the end of the programme 119,942 had graduated, a graduation rate of over 90% (Demiray, 1990).

The enrolment of these teachers (followed by thousands of nurses in the early 1990s) reinforced a trend in the AU student profile that we have seen in other mega-universities. The proportion of students in employment rose from 35% in 1982 to 61% in 1986. When it opened AU aimed its programmes primarily at school leavers. Ten years later it was taking a special interest in students aged over 45 (Demiray, 1992).

AU's cost performance appears to be good. Already in 1983-84 Ozgu (1989:21) reported that public expenditure per student at the OEF was 17% of the corresponding conventional faculty and was set to drop further as numbers increased. Put another way, the OEF served 25% of all Turkish students with only 2% of the public funds allocated to higher education. Costs to students were one quarter of those in conventional universities. This no doubt contributed to the high level of satisfaction with the OEF expressed by the 1984 student cohort in response to an independent survey (Ozgu, 1989:10).

AU became Turkey's centre for distance education because of its leadership in educational technology. Not surprisingly therefore, it has shown considerable interest in multi-media technologies even though print remains by far the most important teaching medium. AU has conducted pilot projects using satellite television to augment the 200 programmes it broadcasts each year on terrestrial state television. Its staff have studied the potential of video cassette recorders and video education centres (Tekin and Barkan, 1988; Demiray et al., 1988). AU students have also taken part in international computer conferences (Gunawardena, 1992; McIsaac, 1992).

3.2.10 The Open University (UKOU), United Kingdom

Although CNED and UNISA have longer institutional histories, most observers regard the UK Open University as the pioneer of modern distance education at university level. For this reason research on its activities has been considerable, resulting in an abundant literature. Here we shall

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simply summarise salient features of the UKOU's development and examine its strategy for the future. The UKOU's first and third vice-chancellors have described its creation and early development (Perry, 1976) and provided a summary of its achievements over twenty-five years (Daniel, 199ɔ).

The founder of the UKOU, Labour politician Harold Wilson, had two ambitions for the institution. First, he wanted to make university study more accessible so that ordinary working people could study part-time from home. Second, he determined to use the broadcast mass media to bring university thinking to a wide audience. In announcing the idea in 1963 Wilson talked of 'nationally organised correspondence courses and a University of the Air', but by the time the institution received its Royal Charter in 1969 a planning committee (Open University Planning Committee, 1969) had recommended that it be called the Open University. The name would highlight ends rather than means.

At the UKOU's inaugural ceremony its first chancellor expressed the aims of the University as being 'open as to people, open as to places, open as to methods, and, finally, open as to ideas' (Daniel, 1995:400). That remains the UKOU's mission statement.

Between this ceremony and the start of teaching in 1971 Britain had a change of government. Margaret Thatcher, the incoming Secretary of State for Education, had to defend the infant UKOU against colleagues in the Conservative party who would have strangled this Labour project at birth. One of her arguments was that the UKOU had the potential to bring down the costs of higher education.

A quarter of a century later the UKOU can claim considerable success in achieving the objectives set by its founders. Openness to people led to a 1994 student body numbering 150,000 in degree credit courses and a further 50,000 working on non-assessed packs. Moreover, on almost any measure (e.g. gender, disability, ethnic origin, socio-economic background), the UKOU student body comes closer to reproducing the composition of the population at large than those of other UK universities.

In respect of openness to people the UKOU's most radical break with tradition was to eliminate all academic pre-requisites for entry. In 1995 the proportion of new UKOU students without the conventional entry qualifications for UK universities was higher than ever. Each year this category accounts for one-third of the graduates of the UKOU, supporting Harold Wilson's conviction that,

with proper teaching and support, access to success in higher education can be greatly expanded.

In the light of the aspirations of certain other mega-universities (e.g. Universitas Terbuka and UNISA) to move to a more participative style of management, another feature of the openness of the UKOU to people is noteworthy. Students and staff have a central role in a participative governance structure which includes a 1,000-member Senate. Most people associated with the UKOU see this as a considerable strength. They would argue that whilst it may take longer to reach decisions with such structures, those decisions are implemented with greater speed and effectiveness because they are widely owned.

The ambition to be open as to places has led the UKOU to become an increasingly international institution. In 1995 there were some 13,000 students taking UKOU courses outside the UK with the largest concentrations in the other countries of the European Union, the former Soviet bloc, Hong Kong and Singapore. In these overseas operations the UKOU has tried to reproduce, either directly (in the countries of the European Union) or through partnerships (in the other territories) the local tutorial support that has always been a feature of its UK operations. New technologies, notably electronic mail and computer conferencing, call into question this expensive and complex pre-condition to expansion. In 1995 the UKOU initiated a review of its international activities. A key question will be whether to offer its courses worldwide with electronic support or to continue to develop through local partnerships in particular jurisdictions.

The broadcasting of TV and radio programmes on the terrestrial channels of the BBC remains the most visible expression of the UKOU's openness to methods as far as the general public is concerned. In 1994 these broadcasts amounted to 706 hours of transmission time on TV (152 on radio). The TV figure increased further in 1995 because the UKOU contributed programmes to the *Learning Zone*, a new BBC all-night educational service. A feature of broadcasting is that the drop-in audience of general viewers greatly outnumbers the student audience for UKOU programmes.

Less visible to the general public have been the newer teaching and learning media that the UKOU has added in the twenty years since its foundation. In an earlier section we called these the personal media because they rely on student-owned equipment such as audio and video cassette recorders and personal computers. Since the late 1980s a growing number of UKOU courses

have required students to have access to a computer at home. In 1996 this number will exceed 30,000. 12,000 of these students (up from 5,000 in 1995) will also be networked from home to the UKOU and to each other. Some at the UKOU believe that this convergence of computing and communication changes radically the nature of the personal media. They call these the new combinations the knowledge media. We explore the implications of the knowledge media for the mega-universities in the next chapter.

Openness to ideas is the *raison d'être* of any university. The UKOU has fulfilled this idea through a commitment to research and through its practice of developing courses in teams. This gives the UKOU's courses an intellectual vitality not always found in distance teaching.

The reform of UK higher education that took place in 1992 continues to set the context for the future development of the UKOU. Prior to 1992 government allocated public funds to the UKOU directly, though its Department of Education and Science, whereas buffer bodies (e.g. the Universities Funding Council) were responsible for distributing public funds to the other universities. The 1992 Higher Education Act gave the forty polytechnics university status and brought all the UK's two hundred higher education institutions into a common funding framework. The UKOU became the largest university in the new system.

This reform gave a considerable boost to the development of the UKOU because the funding methodology adopted by the Higher Education Funding Council for England allocated growth monies preferentially to the most cost-effective institutions. Furthermore, from 1993 the UK government froze the expansion of places for full-time study and directed such funds as were available for growth to the part-time sector (Peters and Daniel, 1994). The UKOU accounts for some 40% of all part-time higher education in the UK. Moreover, in each subject category the cost to the taxpayer of a full-time equivalent student at the UKOU is around 40% of the average for the other institutions. The combination of these factors has meant that for 1994 and 1995 the UKOU's percentage grant increases have been among the highest in the UK system.

So much for the cost element of cost-effectiveness. What about effectiveness? One feature of the present UK funding structure is a national system for the assessment of teaching quality by subject area. This process completed its first cycle in 1995. Six of the eleven UKOU subject areas assessed were awarded 'excellent' ratings, a proportion that put it in the top 10% of universities na-

tionally. Furthermore three of the subjects so rated, Music, Chemistry and Earth Sciences, were areas where distance education would not appear to enjoy a natural advantage.

Within the international distance teaching community student retention and completion rates are considered more significant performance indicators than judgements by national funding bodies. On these criteria the UKOU is also a good performer. The UKOU offers newly registered students the opportunity to try out a course for three months before confirming their registration. It uses these 'finally registered' students as the baseline for its own statistics on completion. In order to make comparisons with other institutions, however, it is necessary to start from the UKOU's 'initially registered' students. If this is done the OU course pass rate for new students is 56.5% compared to 30.8% at UNISA and 36% at both the Open University of the Netherlands and Athabasca University, two smaller distance teaching universities (van Enckevort and Woodley, 1995).

Looking at graduation rates reveals greater differences. van Enckevort and Woodley (1995:17) looked at the status in 1993 of those who entered as new students of the UKOU or UNISA in 1984. They found that 31% of UKOU students had graduated and another 3% were still studying. The comparable figures for UNISA were 12% and 7%. The authors comment:

> 'Graduation rates for other distance teaching universities are hard to come by, both because of
> definitional problems and the lack of published statistics. However, from our own knowledge
> and from personal communications with fellow researchers our "guesstimates" of the long-term
> (i.e. 10+ years) graduation rates are as follows: Athabasca (3-6%), OU Netherlands (5%),
> Fernuniversität, Germany (4-7% among part-time Economics students).'

The UKOU's higher graduation rate has beneficial consequences for its reputation. It produces some 4% of all UK graduates and has awarded over 160,000 first and higher degrees since its establishment. More than one UK adult in four knows someone who is studying or has studied with the UKOU and over 90% of adults have heard of it (Open University, 1995a).

What are the strategic challenges facing the UKOU, especially as far as new technology is concerned? The University has strategic and development plans, labelled *Plans for Change* (Open University, 1994a) that are updated annually through its governance structure. The 1995 version lists specific goals under nine headings in order of priority. They are: Quality of learning experience; Curriculum enhancement; Admission and Retention; Expansion; Efficiency; Resilience; Quality Assurance; Research; and International and national activity. It also states the strategic

aim of operating 'at the forefront of educational and technological developments relevant to large scale distance education'. In pursuit of this aim the overall plan subsumes a development plan for 'exploiting audio-visual, personal computing and multi-media material and for exploiting computer communication for learning purposes'. Special priorities are the use of educational technology to support students with special needs and the introduction of the personal computing policy (formerly the home computing policy) for students.

The challenges facing the UKOU arise from its success and are, in some instances, the mirror images of the challenges facing some other mega-universities. Two examples are the production of materials by course teams and the tutorial support system. Several other mega-universities are adopting these approaches because they lead to better courses and more successful students. However, the course team approach can be lengthy and expensive. One of the common criticisms of the UKOU made in the Funding Council's teaching assessment programme, even where it rated the UKOU's teaching in a discipline as excellent, was that courses took too long to produce and risked becoming dated during the course lifetime. The tutorial support system is a key element in the UKOU's success. However, as we noted above, this system is difficult and costly to reproduce in other countries where the UKOU might like to offer its courses.

This means that the UKOU is eager to discover, in particular, whether the knowledge media can help to speed course production and provide tutorial support that is less geographically bound. As an institution that became famous for the application of technology and the media to higher education the UKOU also has a strong interest, for strictly reputational reasons, in staying ahead in such applications.

3.2.11 The Mega-universities: common challenges

Section 3.1.1 identified some of the common features of the mega-universities. What do the preceding accounts of individual institutions tell us about the common challenges they face?

3.2.11.1 National policies

Each mega-university has a prominent role in the national higher education strategy of its country. The preceding accounts suggest, however, that governments could derive even greater benefit from their mega-universities by reviewing their policies in two specific areas and moving to output oriented funding policies.

The first specific area is regulation. CNED and STOU are examples of mega-universities that could serve their societies better if government gave them greater freedom to manage their affairs. CNED needs the latitude to develop its own fees strategy and staffing policies. STOU should be freed from the line-item allocation of its state grant. Second, some governments have such excessive expectations for the cost advantages of their mega-universities that they force them to operate suboptimally. This is especially the case for UT and KNOU which cannot be expected to perform well at their current staffing levels. More generally, given the convergence of distance and conventional methods, governments should cease applying different funding formulae to them. Instead, starting from the present historic base, they should allocate growth monies to those institutions, of whatever type, that can deliver most cost-effectively the higher education outputs sought by government.

3.2.11.2 Access to communications facilities

All the mega-universities, without exception, express a strong wish to have greater access to satellite and/or terrestrial broadcasting for TV and/or radio.

3.2.11.3 Links to other institutions

Mega-universities are, inevitably and rightly, deeply embedded in the institutional networks of their countries. This review suggests, however, that to conceive a mega-university simply as a means of managing and co-ordinating the activities of existing bodies and agencies is short-sighted. At a minimum a mega-university needs to have a direct relationship with the students for whom it exists and sufficient staff to give it reasonable independence of action. Failure to meet this condition appears to be a source of weakness for both the Chinese and Indonesian mega-universities.

3.2.11.4 Students and curriculum

A number of the mega-universities (e.g. CNED, IGNOU, UNISA, UNED and UKOU) are trying to become better oriented to the needs of their students. All are extending their programming into vocational areas as a result of government or customer pressures. Broadening the range of courses on offer is putting strains on the course development process.

3.2.11.5 Cost-effectiveness

The CTVUs, KNOU, UT and UNISA are among the mega-universities that operate at low costs per enrolled student but acknowledge the need to put greater emphasis on teaching effectiveness and student retention. Teaching focused solely on content exposition is a common academic problem but the mega-universities that contract out much of their course preparation experience it acutely. UNISA is experimenting with the development of courses in teams. KNOU hopes that teaching with new media will yield greater emphasis on course design. KNOU, UNED, UNISA and STOU also hope that new communications facilities will make it easier to provide the improved tutorial and student support they want to offer.

3.2.11.6 Operating systems

Good logistics are vital to the success of a mega-university. CNED, UNED and UT are all seeking ways of speeding up mail communications. They and a wider group of institutions look forward to improved computer networks.

3.2.11.7 Quality and recognition

The experience of the last twenty years indicates that distance education can free itself from the low status associated with correspondence education. Institutions in both east (STOU) and west (UKOU) have acquired good reputations even though other mega-universities in the same regions complain that the culture is unfavourable to distance education. STOU and the UKOU have a number of common features which help to explain their success: good course materials, tutorial and regional support networks, a rich media mix, significant graduation rates, appropriate staff numbers and the culture that goes with a sense of academic community. The mega-universities with a reputation to build should note these characteristics.

3.2.11.8 International roles

All t   ga-universities are aware of their international potential, whether it be to serve their own nationals living in other countries or to operate more widely in a major world language. Technology has a particular role to play in helping institutions take advantage of these opportunities.

3.3 ELEMENTS OF COMPETITIVE ADVANTAGE OF THE MEGA-UNIVERSITIES

The preceding section has examined the current achievements of each of the mega-universities and identified some key developments that might improve their performance further. However, in order to discover how the mega-universities might use new technologies to increase their competitive advantage we must place their development in the wider context of a changing competitive environment.

A decade ago Daniel (1984) reviewed the future of the distance teaching universities in an international perspective and identified some emerging challenges to their continued success. Rumble (1992) expressed concern over the 'competitive vulnerability' of these institutions as many conventional universities began to teach at a distance. Keegan (1994) responded to Rumble with a summary of the competitive advantages of the distance teaching universities and stressed that size was a key factor in competitiveness.

These authors focused on changing patterns in the supply of distance courses and treated the distance teaching universities as a group, despite their many differences. Our purpose is to analyse the competitiveness of a smaller set of institutions, namely the mega-universities. There are some notable differences even between these but they do share the key feature of size and, with the exception of the Chinese TV university system, are all heirs to the correspondence tradition of distance education.

Michael Porter (1980, 1985) has provided a general framework for analysing the dynamics of the competitive advantage of organisations. A strength of his work is that it bridges the gap between strategy formulation and implementation. The preceding section has shown that the mega-universities are complex organisations. They must be able to translate their overall competitive strategies into the specific action steps needed to gain competitive advantage. It is instructive to review the mega-universities within Porter's framework.

In so doing we recognise that the mega-universities are non-profit bodies in the public sector. The notions of competitive advantage and superior performance are, however, as real for them as for firms in the private sector. Indeed, many of them now depend more on student fees than on funds from the state. For this reason we shall usually adopt Porter's terms (e.g. buyer, industry, profitability, firm) rather than substituting the more complex vocabulary of the public sector.

3.3.1 Competitive advantage: key concepts

The competitive advantage of an organisation grows out of the value that it creates for its buyers, either in terms of low prices or unique benefits. The successful organisation is able to capture some of the value it creates for its buyers, thus remaining profitable. Competitive strategy is the search for a favourable position within an industry on these criteria. We make the assumption that the relevant industry for the mega-universities is the education and training sector of their home countries. It is not appropriate to consider distance education as a distinct industry. Governments usually fund it alongside other forms of education and distance students gain equivalent qualifications.

An important consideration for the mega-universities, as for all tertiary education institutions in the state sector, is that they are serving two types of buyers, the government and the student (sometimes including the student's employer). The relative financial importance of these two buyers varies between the mega-universities. Governments are now minority providers of funds for most of the mega-universities . Nevertheless, it is important to give value to the state buyer. If a government thinks that its mega-university is not adding value to the national community it can make life difficult in various ways.

We address the issue of value to the buyer more fully in section 3.3.5, simply noting here that the two principal buyers, student and state, may judge value in somewhat different ways. Furthermore a state's funding mechanisms may not be entirely consistent with its declared criteria for value. For example, the system of state funding for the UKOU encourages it to be a low-cost provider but not the lowest-cost provider (Daniel et al., 1994:17).

The state's role is an instance of Porter's fundamental principle that the competitiveness of an organisation depends as much on the structure of its industry as on its own attributes. The five competitive forces that determine industry profitability are:

- the bargaining power of buyers

- the bargaining power of suppliers

- the threat of new entrants

- the threat of substitute products and services

- rivalry among existing firms.

The structure of the education and training industry has changed considerably in recent decades. For the mega-universities four important favourable trends have been:

- growth in demand from working adults for part-time education

- readiness of governments to invest in education

- development of communication media, both mass media and personal electronic devices

- availability of computing systems to support complex logistics.

Other trends have created a more competitive industry:

- conventional universities offer more part-time and distance courses

- business and industry have expanded in-house training schemes

- government funding formulae encourage competition between institutions.

Judgements about the overall attractiveness of the education and training industry must be local to each country. However, the mega-universities, by their size and relationship to government, may have more opportunity to influence the structure of the industry than most other institutions. IGNOU, whose Distance Education Council is charge with co-ordinating all higher distance education in India, is a notable example.

Within its industry an organisation can seek competitive advantage in two ways: cost leadership and differentiation. To be a low cost provider an organisation must exploit all sources of cost advantage. That often means offering standard products without frills. Seeking advantage through differentiation means finding a niche in the industry where the organisation can offer something unique that buyers will value.

A third generic strategy for competitive advantage is focus. This can be either a focus on cost advantage or a focus on differentiation in a particular target segment of the industry. Both variants depend on differences between the target segment and other segments of the industry. This may mean buyers with unusual needs or special requirements for production or service delivery.

3.3.2 Competitive success of the mega-universities

This analysis helps to explain the success of the mega-universities. Most were built on a strategy of differentiation focus. Their purpose was to serve a limited segment of the clientele for higher education, namely adults who wished to study without leaving their work and places of residence. This strategy had two benefits. First, this has proved to be a rapidly growing clientele. Second, to serve these people the mega-universities developed techniques of distance education derived from the remote-classroom tradition (in China) and the correspondence tradition (elsewhere). These techniques yielded economies of scale. The result today is that within their national higher education systems the mega-universities have the competitive advantages of both differentiation and cost leadership.

Interestingly, both strategic ambitions were present when the UK Open University was set up. Harold Wilson, who launched the idea, wanted to increase access to higher education for working adults (differentiation). Margaret Thatcher, who saved the infant institution when her political colleagues might have strangled it, wanted to use it to reduce the costs of higher education (cost leadership).

Combining cost leadership and differentiation gives an unusual degree of competitive advantage, creating an unstable situation that may not last. According to Porter (1985:19) there are three conditions under which such a favourable situation occurs:

a) *Competitors are 'stuck in the middle' without a clear strategy.* This is often true of conventional university competitors who differentiate into distance education without much attention to activity costing. The mega-universities should expect, however, that these competitors will eventually develop a clearer generic strategy.

b) *Cost is strongly affected by market share or relationships.* It is easy for mega-universities to take for granted the economies of scale, derived from large market share, that give them their cost advantage. Three trends threaten that advantage: updating courses more often; offering more courses (with fewer students per course); and using a more expensive mix of media. Important interrelationships (such as that between Universitas Terbuka and the Indonesian Post Office) also contain lessons. Mega-universities should be looking to establish partnerships with potentially important future suppliers before competitors get in first. CNED

(France) has done this through its association with the telematic town of Futuroscope. KNOU (Korea) has acquired its own cable channel

c) *An organisation pioneers a major innovation.* The mega-universities did introduce a major innovation that gave lower cost and differentiation at the same time. However, the ideas of distance education are simple and easy to communicate. Even if they were not, the mega-universities facilitate the transfer of know-how by hiring tens of thousands of their competitors' staff as part-time academics. Fortunately for the competitiveness of the mega-universities it is easier to design a large distance education system than to implement it effectively. Twenty years ago the technologies required to produce multi-media course materials were barriers to new entrants. Today desk-top publishing and cheap video equipment have lowered this barrier. The logistical challenges of providing tutorial support to students and assessing their work remain more of a barrier, especially once student numbers in a course exceed the capacity of a single academic.

The implications for the mega-universities are they must pursue all cost reduction opportunities that do not sacrifice differentiation and all differentiation opportunities that are not costly. They must present a moving target to competitors by investing continually to improve their position. For the mega-universities to continue to achieve competitive advantage by combining cost leadership and differentiation may create internal tensions. The qualities that help an organisation maintain cost leadership are frugality, discipline, tight controls, minimal overheads, economies of scale, attention to detail and dedication to the learning curve. These may not sit well with the qualities that foster differentiation such as creativity, innovation, individuality and risk-taking. Sustaining both cultures within their organisations is a challenge for the leaders of the mega-universities.

Blurring the institution's generic strategy is not the way to rise to this challenge. Porter (1985:25) insists that the organisation's generic strategy must be at the heart of its strategic plan. Industry leadership is the effect, not the cause, of competitive advantage. Sustaining competitive advantage means choosing a generic strategy.

The tensions generated by pursuing cost leadership and differentiation will be felt particularly strongly by the mega-universities as they try to apply new technologies in support of these strategies. Effective use of information systems and technology for logistics will require the qualities

that support cost leadership. Taking the leadership in applying the knowledge media for teaching and learning will require the innovating qualities that create differentiation. The people with these different skills must work in tandem just as the equipment and software for both logistics and learning should appear seamless across the institution.

3.3.3 The Value Chain

Competitive advantage cannot be determined by taking a holistic view of the organisation. A firm's performance is the result of many separate activities, each of which can contribute to its relative cost position or be the basis of differentiation. Porter (1985:33) has coined the term 'value chain' to describe the disaggregation of an organisation into its strategically relevant activities. Value chains for firms in the same industry may differ in 'competitive scope'. This is the case for the mega-universities, which deploy their human, financial and physical resources differently from conventional universities and have achieved competitive advantage by doing so. In examining value chains we shall concentrate on the nine mega-universities that have developed from the correspondence tradition. The value chain of China's TV universities is rather different.

There is a generic value chain for all firms that is represented in Figure 3.1. Porter distinguishes five primary value activities: inbound logistics; operations; outbound logistics; marketing and sales; and service. There are also four support value activities: procurement; technology development; human resource management; and firm infrastructure.

In attempting to construct a value chain for the mega-universities in the correspondence tradition we have used data for the UKOU. The breakdown of the UKOU's work into value activities would have much in common with a similar analysis of the eight other correspondence-based mega-universities. There would, however, be some variations in the activities included (e.g. CNED does not tutor or examine most of its students).

We are indebted to the work of many colleagues in putting together the OU's value chain. Until recently it would have been difficult to represent the UKOU in this way because the notion of activities, as distinct from organisational units, was poorly developed. A change in its funding regime in 1993 obliged the UKOU to calculate the costs of its activities in relation to the individual courses the University taught (Peters and Daniel, 1994). Table 3.3 which we have derived from earlier work of the UKOU Finance Division, breaks down the operation of the whole University into forty activities (within the four main functions of teaching, research, institutional manage-

ment and student support) and lists their associated costs as percentages of total costs. It also shows the staff (full-time) and non-staff costs for each activity as a percentage of the total costs in these categories.

Another strand of this work was developed by Bowen (1994) as part of the preparation of a paper on 'Technology strategy for academic advantage' for the UKOU Senate. Bowen's aim was to bring business strategy and academic strategy together. In this connection he juxtaposed Porter's value activities with the Open University Strategic Plan (Open University, 1994a) in what he called a 'fishbones' analysis in order to determine where the application of technology would have the most useful effects.

Also helpful was a functional analysis of the Open University produced by the Scoping Study Team charged with laying down the structure of the University's information systems strategy (Open University, 1993). This combines the breakdown of activities with an analysis of information flows. It serves to highlight the linkages between activities that provide further levers for competitive advantage (Porter, 1985:75).

We found that allocating the UKOU activities in Table 3.3 to the nine categories in Porter's generic value chain did not produce a very discriminating analysis. Nearly half the activities, measured by cost, fell into the category of 'operations'. We have therefore developed a generic value chain that is more helpful to an analysis of the mega-universities. It is based on the functional analysis of the UKOU carried out by the Scoping Study Team as a basis for the University's information systems strategy.

This analysis identifies two types of support activities:

• direct, plan and manage the institution

• provide institutional infrastructure services.

We have made these functions, along with Porter's 'Human Resource Management' the three support activities in the generic value chain.

For the primary activities we have simply taken the five other functions identified by the Scoping Study Team, namely:

• carry out research

- develop educational materials, courses and programmes

- provide educational services logistics

- carry out marketing and sales

- provide educational services.

The resultant generic value chain for the mega-universities is represented in Figure 3.2. Distributing the activities listed in Table 3.3 between the primary and support activities in this value chain is relatively straightforward. When this is done it is easy to see how the UKOU's spending is divided between the different categories of value activity. We present the results of this analysis in four ways.

Figures 3.3, 3.4, 3.5, and 3.6 show the percentage of activity, by cost, in each category. Following a method of presentation used by Porter, the area of each horizontal or vertical bar (for support and primary activities respectively) in relation to the area of the whole diagram represents the costs of those activities as a proportion of the UKOU's 1991 budget. The breakdown is done in four ways.

Figure 3.3 shows the total costs. Figures 3.4 and 3.5 show the full-time staff and non-staff costs for the activities. Figure 3.6 shows the total costs again but breaks them down into staff (full-time) and non-staff costs for each category of activity.

3.3.4 The Value Chain and Cost Advantage

The value chain is the basic tool for pursuing cost advantage. Indeed, cost analysis is important even when seeking differentiation. Differentiation tends to raise costs and will not yield the desired value for the buyer unless its cost is controlled. The approach is to analyse the costs of each value activity, concentrating on the most costly activities and those whose costs are increasing most rapidly. For the UKOU Figure 3.6 provides a starting point for such an analysis. Comparing this diagram with similar representations of the value activities for lower cost mega-universities such as UNISA and UNED would show clearly where the UKOU was incurring its higher costs.

Cost behaviour depends on cost drivers. These are structural causes of the cost of an activity and they may be under the firm's control. Porter (1985:70) identifies ten major cost drivers:

- economies or diseconomies of scale

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	ACTIVITY	PERCENTAGE OF COSTS		
		STAFF	N-STAFF	TOTAL
T1	Curriculum planning	1	0	1
T2	Planning new teaching systems	1	0	0
T3	Academic quality control	1	0	1
T4	Course production - undergraduate	8	1	4
T5	Course production - higher degrees	1	1	1
T6	Course production - non-degree	1	1	1
T7	Course production - support	13	25	20
T8	New student systems	0	0	0
T9	Learning materials distribution	2	3	2
T10	Tuition and counselling	3	10	7
T11	T & C staff management	4	2	3
T12	Residential schools	6	13	10
T13	Continuous assessment	4	8	6
T14	Examinations	3	2	2
TT	SUB-TOTAL TEACHING	48	66	58
R1	Develop research plans	1	0	0
R2	Pursue research opportunities	0	0	0
R3	Research: inst/teaching development	4	1	2
R4	Research non-teaching related	7	2	4
R5	Research support	3	2	2
RR	SUB-TOTAL RESEARCH	15	5	9
M1	Prepare inst. devt. strategies	1	0	1
M2	PR, general promotion, etc.	2	1	1
M3	Develop marketing plans	0	0	0
M4	Secure funding base (Gov't, etc)	0	0	0
M5	Staffing plans & policy devt.	1	1	1
M6	Governance and committee support	1	1	1
M7	Physical infrastructure	4	12	8
M8	Budgetary management, etc.	4	1	2
M9	Purchasing activity	1	0	0
M10	Audit activities and procedure	0	0	0
M11	Produce management information	2	0	1
M12	Staff recruitment & management	4	1	2
M13	Market and promote courses	2	2	2
M14	Market and sell to non-reg. students	1	0	1
M15	Develop & maintain major systems	2	1	1
M16	External income generating projects	1	0	0
MM	SUB-TOTAL INSTITUTIONAL MGT.	26	20	23
S1	Student systems policy & plans	1	0	1
S2	Student registration, etc.	3	2	2
S3	Info. advice, support to customers	4	4	4
S4	Collect fees	1	0	0
S5	Award financial assistance	0	2	1
S6	Award accreditation	1	1	1
SS	SUB-TOTAL STUDENT SUPPORT	10	9	10
E1	External duties	1	0	0
TT	GRAND TOTAL	100	100	100
	OVERALL BREAKDOWN	43%	57%	100%

Table 3.3
Breakdown of costs by activity for the UK Open University (1991)

Porter's Generic Value Chain
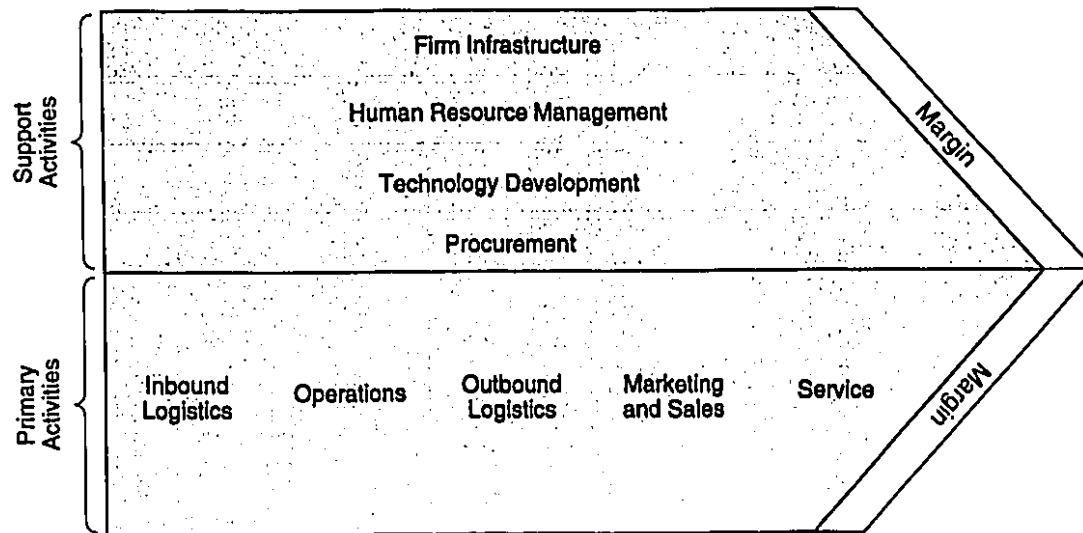
Figure 3.1

A Generic Value Chain for the Mega-Universities
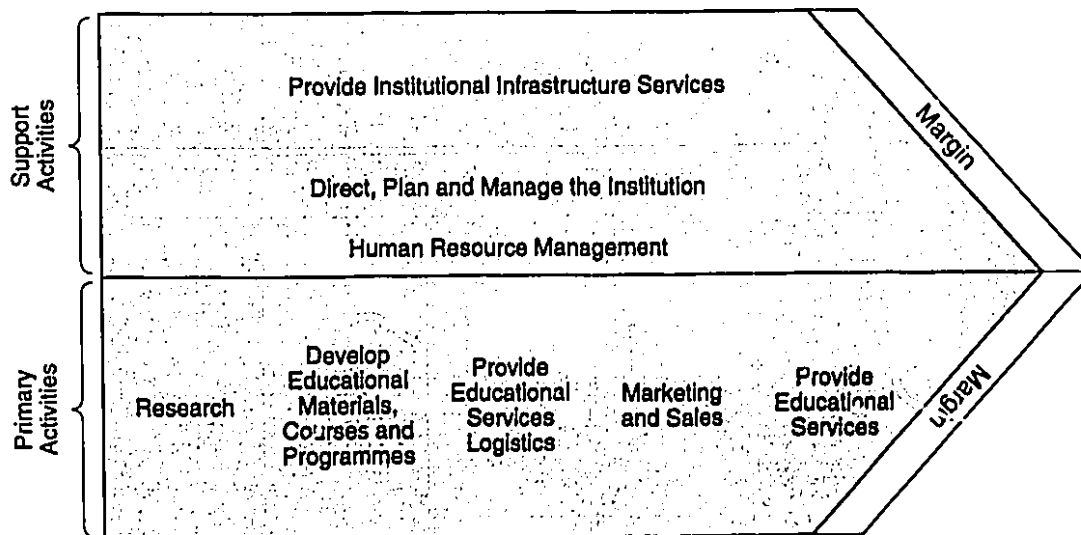
Figure 3.2

**Breakdown by Total Cost in each Activity Category
(UKOU, 1991)**

Figure 3.3

**Breakdown by Full-Time Staff Costs in each
Activity Category (UKOU, 1991)**

Figure 3.4

Breakdown by Non-Staff Costs in each Activity Category (UKOU, 1991)

Direct, Plan and Manage the Institution

Support Activities

Provide Institutional Infrastructure Services

Human Resource Management

Primary Activities

Research

Materials Development

Logistics

Marketing

Educational Services
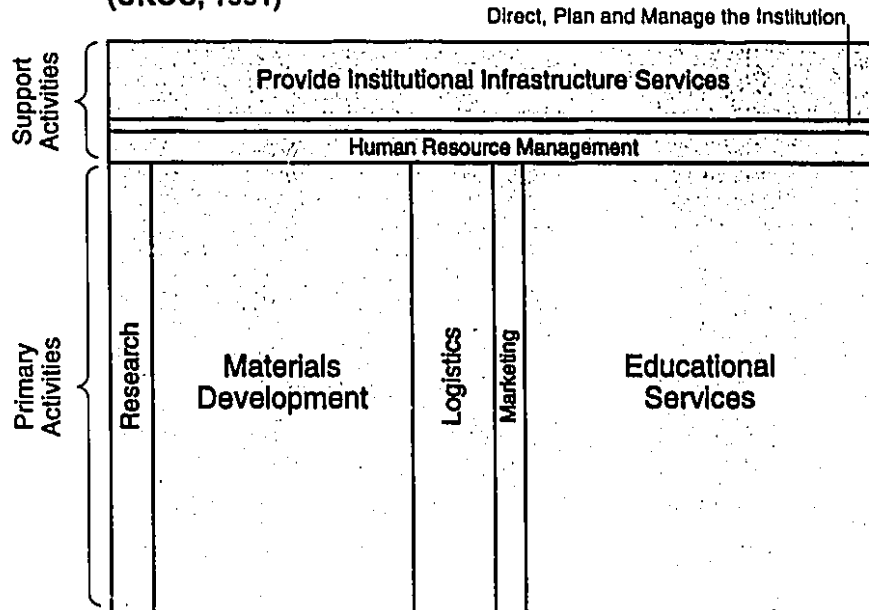
Figure 3.5

Breakdown by Total Cost with each Activity Category Divided into Staff and Non-Staff Cost (UKOU, 1991)

Support Activities

Provide Institutional Infrastructure Services

Direct, Plan and Manage the Institution

Human Resource Management

Primary Activities

Research

Materials Development

Logistics

Marketing

Educational Services

▦ Full-Time Staff Costs
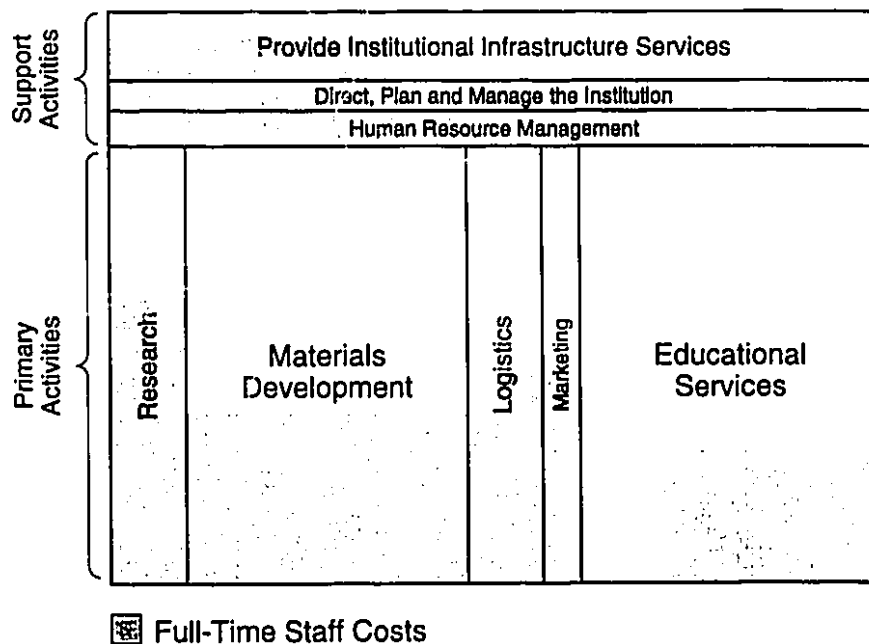
Figure 3.6

- learning

- pattern of capacity utilisation

- linkages (between value activities)

- interrelationships (e.g. sharing value activities across units)

- integration (in-sourcing)

- timing

- discretionary policies

- location

- institutional factors (e.g. regulations, staffing structures).

We comment on three of these by way of example. First, the mega-universities claim to benefit from economies of scale. While this may be true of their operations as a whole, all are likely to have some value activities that show diseconomies of scale. Second, discretionary policies are determined, in some mega-universities, by diffuse and participative decision making processes. It is easy for such processes to promulgate policies, in the name of quality, that raise costs more than they raise the value to the buyer. Third, the timing of their entry to the market, as first movers, made it possible for the mega-universities to establish a brand name for distance education at lower cost than later competitors.

Often, of course, several cost drivers operate within a particular activity. From this it follows that an organisation can gain a cost advantage in two ways: 1) by controlling cost drivers, and 2) by reconfiguring the value chain, which is now known as reengineering (Hammer and Champy, 1993). Having identified a potential route to cost advantage it should be tested for sustainability. There should also be a check that any erosion of differentiation that goes with the cost advantage is acceptable.

3.3.5 The Value Chain and Differentiation

Like cost advantage, differentiation can occur in any value activity in the value chain. The most important differentiation is that which buyers value. There is a tendency for differentiation to in-

crease costs and this must be watched. By analogy with cost drivers Porter (1985: 124) has identified drivers of uniqueness. These are:

- policy choices (e.g. the UKOU's elimination of pre-requisites)

- linkages (e.g. using the Internet to link student and university activities)

- timing (e.g. CNED's image as a video conference pioneer)

- location (e.g. study at home)

- interrelationships (e.g. the UKOU agreement with the BBC)

- learning and spillovers (e.g. mega-university differentiation spills over to competitors through part-time staff)

- integration (e.g. in computer systems)

- scale (e.g. large mega-university student numbers allow them to offer local services in person throughout their countries)

- institutional factors (e.g. a relationship with a union that allows the definition of job descriptions specific to a mega-university).

As the mega-universities make choices about differentiating through technology the question of what is valuable to the buyer will be fundamental. Like any educational institution the mega-universities aim to create competitive advantage for the buyer through their courses. As media evolve the mega-universities will be relying on their students to acquire various technological devices for use at home (e.g. video cassette recorders, computers) so that they can take advantage of the new possibilities. Ideally the student will see the use of this home equipment for coursework as a way of getting more value from the purchase and not as an onerous imposition.

Differentiation is an area where buyer perceptions of value are crucial. The signals that an institution sends to buyers through its reputation, its image and the appearance of its product should reflect this. Some of the mega-universities are now signalling their intention to lead in the application of new technologies to home study. It seems that one key category of their buyers, namely their governments, are pleased to see this development. The same may be true of their students. However, the costs that technology-rich teaching strategies will place upon students should make the mega-universities blend signals and reality carefully.

Porter identifies various potential pitfalls in a differentiation strategy and it is easy to imagine the mega-universities tumbling into several of them as they introduce new technologies into the teaching and learning process. The pitfalls are:

- uniqueness that is not valuable (e.g. will students value computer-mediated conferencing once the novelty has worn off?)

- too much differentiation (e.g. enthusiastic academics simply confusing students with too many media)

- too big a price premium (e.g. will the mega-universities be able to maintain economies of scale with new technologies?)

- ignoring the need to signal value (e.g. adult students may be sceptical about the benefits of, say, CD-ROM based courses)

- not knowing the cost of differentiation (this would be particularly dangerous in the two largest cost areas of the value chain, materials development and educational services)

- focus on the product instead of on the whole value chain (e.g. technology may present advantages for the mega-universities in their internal operations as well as in activities involving students directly)

- failure to recognise buyer segments (e.g. the heterogeneous student bodies of the mega-universities will pose a challenge for any strategy to change teaching technologies).

All this suggests that the mega-universities should pay very close attention to their buyers and to their buyers' own value chains in developing technology strategy. Attention to the costs of differentiation will also be vital. Activities that do not fit with the chosen differentiation strategy may have to be abandoned.

3.3.6 Technology and Competitive Advantage

Technology is a major lubricant of competition. Changes in technology transform the structures of industries and are great equalisers. Although the education industry has traditionally been rather impervious to technological developments this may now be changing. Certainly there is an expectation of change in distance education, the segment of the industry targeted by the mega-universities.

Technology is not important for its own sake. It is only important if it affects competitive advantage and industry structure. Many 'hi-tech' industries are less profitable than their 'low-tech' counterparts. Today technology is pervasive in all firms and almost any technology can affect competitiveness.

The value chain is the tool for understanding the link between technology and competitive advantage. By technology we mean procedures and systems as well as machines. Every activity in the value chain uses technology to combine purchased inputs and people to produce output. This applies as much to support activities as primary activities. Today information technology permeates the value chain. For this reason Porter (1985:168) found it helpful to distinguish between information technology and office/administrative technology because office functions are easily overlooked. This distinction is hard to sustain today when, in many organisations, all employees have similar workstations on their desks and are linked to the same rich systems environment.

This trend serves to remind us that technology is a major source of linkage within the value chain. For the mega-universities, as we noted above, the interdependence of the university's technology with the student's technology is an increasingly important linkage between two value chains.

Technology affects competitive advantage if it affects the firm's relative cost position or differentiation. It is likely to have an impact on both, since technology influences cost and uniqueness drivers and is also influenced by them. The mega-universities have used information technology in a sophisticated manner to support their complex logistics. Links with broadcasting organisations made the mega-universities proficient at teaching through television and radio.

3.3.6.1 Tests of sustainable advantage

Four tests determine whether technological change will give sustainable competitive advantage:

a) The change itself lowers cost or enhances differentiation sustainably.

b) The technological change moves cost or uniqueness drivers in the firm's favour.

c) Pioneering the change yields 'first mover' advantages over and above the benefits of the technology itself.

d) The technological change improves industry structure.

3.3.6.2 Technology and industry structure

For the mega-universities it is particularly important to consider the impact of technological change on industry structure. Broadly speaking, we are dealing with the specific application to education of widely available technologies. How other institutions use them in education will determine whether industry structure changes in damaging ways. Technology can affect industry structure by its impact in a number of areas:

a) *Entry barriers.* We already noted that current methods for the physical production of course materials have reduced scale economies.

b) *Buyer power.* Before very long a well-equipped student may be able to access from home the electronic offerings of a large number of educational institutions.

c) *Supplier power.* The multiplication of broadcast TV channels may decrease the power of state broadcasting authorities. For the moment, however, our survey of the mega-universities shows that these suppliers still have the power to frustrate ambitions for more air time.

d) *Substitution.* The development of multi-media educational materials by a range of public institutions and private-sector suppliers will enable the mega-universities to buy components of courses for less than the cost of developing them in-house.

e) *Rivalry.* The Internet has given thousands of individuals and institutions the chance to dabble in the business of supplying distance education. The entry barriers are low but, fortunately, so are the exit barriers. This segment of the industry seems unlikely to structure itself in a manner inimical to the mega-universities.

f) *Industry boundaries.* Technological change will expand the boundaries of the distance education segment of the education and training industry. It has already done so geographically. By enhancing the quality and attractiveness of courses it will bring more customers into the market. Another effect is the widening set of interrelationships between distance education and the media, computing and communications industries. These changes in structure present more opportunities than threats to the mega-universities.

g) *Industry attractiveness.* The above list suggests that the distance education segment is seen as a particularly attractive segment of an attractive industry. This is bringing in new players but if the mega-universities are clear about where their competitive advantages lie this should not damage them.

3.3.6.3 Issues in developing a technology strategy

In designing a technology strategy as part of its competitive strategy a mega-university should ask the following questions:

a) *What technologies should it develop?*

The next chapter will identify technologies that could help the mega-universities achieve priority goals, taking into account the implications of the value chain.

b) *Should it seek leadership in these technologies?*

In most areas the mega-universities will seek to be leaders in the application of technologies rather than developers of the technology itself. This type of leadership role is straightforward for the non-teaching functions. CNED, for example, can already claim to be a leader in the large scale use of telephone technology for enquiry handling. The UKOU is a leader in the use of electronic publishing technology.

In the teaching function the situation is more complex because the mega-universities will have to rely on equipment owned by the student. In general this will be trailing-edge hardware rather than leading-edge hardware. However, the time gap between leading edge and trailing edge is closing. Furthermore, what counts is less the hardware than the way it is used. The mega-universities should aim to lead in the large scale use of domestic electronic technology for the purposes of higher education. The earlier point about signalling is also relevant. The image of some of the mega-universities is closely linked to the successful use of media in higher education. To lose this image would be to lose an element of competitive advantage.

c) *How should it obtain the necessary technologies?*

It will be simple for the mega-universities to obtain some of the new technologies they will wish to use in future (e.g. software). Others, such as satellite broadcasting, CD-ROM and in-

teractive broad band networks, they will want to develop on the basis of interrelationships. This is a complex area, not least because of uncertainty amongst the industries concerned about how patterns of use will develop. It would appear to be essential for the mega-universities to maintain dialogue with key suppliers of technologies of potential competitive advantage to them. In this context the advantages of maintaining the role of what Porter (1985:186) calls a 'first mover' appear to be considerable.

When a firm elects to be a first mover in a new technology it often has to educate its buyers and help them with switching costs. This policy has been pursued for some years by the UKOU which subsidises the acquisition of computers by students who could not otherwise afford them. More recently it has equipped the executive members of its student association with computers and communications equipment at home so that they can conduct the business of the association by computer conference. In this way the UKOU accelerates the take-up of new technologies by students and gains experience in applying them effectively on a large scale.

3.6.7 Formulating a technology strategy

In summary the following steps are required to turn technology into 'a competitive weapon rather than a scientific curiosity' (Porter, 1985:198):

a) Identify all the distinct technologies and sub-technologies in the value chain.

b) Identify potentially relevant technologies in other industries or under development.

c) Determine the likely path of change of key technologies.

d) Determine which technologies and potential technological changes are most significant for competitive advantage and industry structure.

e) Assess the firm's relative capabilities in important technologies and the cost of making improvements.

f) Select a technology strategy, encompassing all important technologies, that reinforces the firm's overall competitive strategy.

g) Reinforce business unit technology strategies at the corporate level.

These steps provide a useful context for the next chapter in which we shall suggest how technology can be used to best effect in helping the mega-universities remain competitive.

CHAPTER 4

COMPETITIVE ADVANTAGE:
THE ROLE OF TECHNOLOGY

The purpose of this chapter is to determine how their use of technology, and particularly the knowledge media, could help to sustain the competitive advantage of the mega-universities. Section 3.2 outlined some strategic challenges facing these institutions and section 3.3 drew on Michael Porter's work to create a framework for assessing how changes might enhance or weaken the competitive advantage of the mega-universities. We now bring these two analyses together.

For Porter (1985) the fundamental element of competitive advantage is to provide value to the buyer. The mega-universities have two primary buyers, the student and the state, with students' employers as a third potential buyer. The essential value all these buyers seek from a mega-university is that students learn effectively from courses and programmes that teach important content and skills.

In principle the mega-universities start from a position of strength in supplying such value because the effectiveness of their programmes should rise with student numbers. Conventional universities find it difficult to maintain teaching effectiveness when student numbers rise without a commensurate increase in resources. The mega-universities, however, have the advantage of an industrial economic structure with economies of scale and division of labour. The more students take a course, the greater the investment that can be made in the production of course materials. The marginal cost of providing a set of materials to each additional student is low. Furthermore, rising numbers facilitate regional tutorial provision by creating higher concentrations of students in any given locality. The concomitant weakness is that since mega-universities are less cost-effective at small volumes there is an incentive to limit curricular diversity by concentrating on courses with high enrolments.

Combining Porter's conclusions about the ingredients of competitive advantage with the ambitions of the mega-universities themselves suggests a list of six key priorities:

1) to improve teaching effectiveness and course design;

2) to introduce or enhance tutorial support to students;

3) to expand TV and radio broadcasting;

4) to find the right balance between cost, time and quality in course production;

5) to improve logistics; and

6) to develop more participative governance processes.

Competitive advantage results from a combination of cost leadership, differentiation and focus. We note, in this context, that the analysis of value chains in section 3.3.3 showed that the development of learning materials and the provision of educational services (which cover the first four of these priorities) account for much the largest part of mega-university expenditures (Figures 3.3 to 3.6). We shall examine each of these six priorities in turn.

4.1 TEACHING EFFECTIVENESS AND THE KNOWLEDGE MEDIA

What are the elements of effective university teaching and will the knowledge media help to supply them? In her important book, *Rethinking University Teaching*, Laurillard (1993) points out that since most research on teaching has been done in ᵕ iools, attempts to apply the results to universities do not usually take into account the specific nature of academic learning.

The essence of academic learning is that is has a second order character. As Laurillard (1993:5) puts it:

> 'The central idea is that academic learning is different from other kinds of learning in everyday life because it is not directly experienced, and is necessarily mediated by the teacher. Undergraduates are not learning about the world directly, but about other's descriptions of the world, hence the term 'mediated'.'

Elsewhere (1993:26) she adds:

'Everyday knowledge is located in our experience of the world. Academic knowledge is located in our experience of our experience of the world. Both are situated, but in logically distinct contexts. Teaching may use the analogy of situated learning of the world, but must adapt it to learning of descriptions of the world.'

This means that academic knowledge has to be abstracted or represented formally in order to be useful by being generalisable. It follows that teaching must situate knowledge in real world activity but also create artificial environments that allow the learning of precepts, or descriptions of the world.

In the article where he launches the term 'knowledge media', Eisenstadt also argues that teaching, and especially teaching through the media, too often starts from an impoverished view of what knowledge is:

'Now is knowledge the answer to what fits onto CD-ROMs, what "sits" on a file server, or what "travels" down the information highway? Most emphatically not! Knowledge is an emergent property which transcends the fixed-size-and-space concepts of media and information, just as it transcends the notion that you can impart it to students by "filling" them up from the teacher's "vessel". ...knowledge is a dynamic process, a vibrant, living thing, resting on shared assumptions, beliefs, complex perceptions, sophisticated yet sometimes crazy logic, and the ability to go beyond the information given. "Knowledge" is the correct abstraction for describing what people communicate to one another. "Content" is not.' (Eisenstadt, 1995)

From such standpoints university teaching cannot be simply exposition. It must be a rhetorical activity. This means that dialogue is essential and the ideal teaching and learning process is a one-to-one discussion. It cannot, however, be just any one-to-one discussion. Laurillard (1993:89) shows that the much vaunted Socratic dialogue is actually deficient as mediated learning because it aims to find truth through philosophical enquiry rather than to help the student come to an understanding of what they know. Nevertheless, even if we substitute an ideal tutorial dialogue for the Socratic dialogue, this kind of one-to-one teaching would hardly seem to be a promising starting point for the improvement of teaching effectiveness in the mega-universities.

Such a conclusion would be unduly pessimistic. The mega-universities indeed have several advantages over conventional universities. First, because they have a large student body and significant resources for course development, these institutions can invest in studies to find out where

students are starting from and what they bring to learning. The mega-universities that are open universities (i.e. do not have pre-requisites for admission) have the further advantage of an idealistic commitment to take responsibility for the students' learning. Moreover, all mega-universities have the benefit of being set up as learning systems and, if teaching is mediated learning, then their use of various media must also be an asset. Finally if, as Laurillard holds (1993:4), the solution to the problem of university teaching lies in a new organisational infrastructure and not in guidelines on how to teach, the mega-universities should be well placed to create that infrastructure.

After stressing the importance of both finding out what students bring to learning and appreciating the complexity of the process of coming to know something, Laurillard reviews traditional methods of developing a teaching strategy. The first, instructional design, she finds deficient because neither Gagné's (1977) original work first published in 1965, nor that of successors such as Romiszowski (1988) have more than a tenuous link with any empirical base. 'Gagné's approach is essentially a logical analysis of what must be the case, rather than an empirically grounded theory' (Laurillard, 1993:72).

The second method, Intelligent Tutoring Systems Design, has similar weaknesses because the assumptions on which such systems are based 'derive from logical analysis, not from empirical studies of students'. 'It is a theory that begins and ends in the mind of the researcher' (1993:77). The third method, Instructional Psychology, generalises widely from a limited experimental base. She argues that the studies on which it is based are 'suggestive rather than prescriptive, and do not promise ever to be more than that' (1993:82).

Laurillard finds most promise in Phenomenography, the final methodology she reviews. The term 'phenomenography' was coined by Marton (1981) to mean 'descriptions of the phenomena'. Knowing the alternative ways that students conceptualise key phenomena, which include the concepts of reality they have already acquired, is clearly helpful to teachers. Although this method generates qualitative rather than quantitative data and descriptions rather than explanations, it does have the advantage of focusing on the form of interaction between teacher, student, and subject matter. For this reason she believes it 'offers the best hope for a principled way of generating teaching strategy from research outcomes' (1993:64). This shift in focus, from what the teacher should do to how they must set up the interaction, is consistent with the crucial role of dialogue in academic learning. The notion of teaching and learning as a conversation links

Laurillard's conclusion to the work of Gordon Pask who formalised it in his conversation theory (Pask, 1976).

We have outlined the development of Laurillard's thinking because it appears to provide the clearest lens through which to examine the claims made for all teaching media, including the knowledge media. She concludes that the learning process must recognise the special character of academic knowledge and be a dialogue between teacher and student that is:

Discursive - teachers and students must agree learning goals, make their conceptions accessible to each other, and give mutual feedback

Adaptive - the teacher should alter the focus of the dialogue in the light of the emerging relationship between their own and the student's conception

Interactive - the student must act to achieve the task goal and the teacher must provide feedback so that something in the world changes as a result of the student's action.

Reflective - the teacher must help students link feedback on their actions to the topic goals at every level.

If this type of interactive contract seems somewhat legalistic, Laurillard comments that 'democracy is a serious business'. The essence of the process is that it describes a form of interaction between teacher and student, rather than action on the student. It is also intended to be self-improving.

Figure 4.1 reproduces the conversational framework in which Laurillard identifies the activities necessary to complete the learning process. She then examines a range of media and makes judgements about whether they lend themselves to each of these activities. The results of her analysis are reproduced in Table 4.1. She stresses (1993:105) that, 'I have selected the main types of educational media and divided them into their canonical forms, the orthodox, unadulterated way of using each one'.

Laurillard made this analysis of the teaching and learning qualities of this particular set of media before the term 'knowledge media' was coined. Indeed, it was only after 1993 that expressions such as the information superhighway, the Internet, the World Wide Web and CD-ROM came into common parlance. Have these new developments added new media to Laurillard's list that deserve the attention of the mega-universities?

TEACHER   **MEDIUM**   **STUDENT**

Teacher operating at level of descriptions

❶ T describes conception

S describes conception ❷

❸ T redescribes conception in light of S's conception or action

S redescribes conception in light of T's redescription ❹

Student operating at level of descriptions

❺

T adapts task goal in light of S's description or action

T reflects on action to modify description

S adapts action in light of T's description

S reflects on interaction to modify description

❿

⑫

⑪

Teacher sets up conditions of 'world' within which student can act

❻ T sets task goal

S acts to achieve task goal ❼

❽ T's world gives feedback on action

S modifies actions in light of feedback ❾

Student operates at level of action within the Teacher's world

Figure 4.1
The 'conversational framework' identifying the activities
necessary to complete the learning process

(after Laurillard, 1993 – reproduced with permission)

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Eisenstadt (1995) introduced the term knowledge media to describe the 'convergence of telecommunications, computing and the learning or cognitive sciences'. Even though Eisenstadt's own research is in artificial intelligence, it is clear from the examples he quotes that by the 'learning and cognitive sciences' he means particularly the kind of phenomenographic studies and conversation theory which Laurillard also finds most helpful.

A key supposition in Eisenstadt's description of the knowledge media is that for some media quantitative improvements in performance (e.g. in speed, bandwidth, ease of manipulation) create changes in kind, rather then merely of degree, as far as the user is concerned. As Nikita Kruschev once said about nuclear weapons, 'quantity has a quality all of its own'. For Eisenstadt 'knowledge media are about the capturing, storing, imparting, sharing, accessing and creating of knowledge' and a medium is not just a technical format, such as video or CD-ROM but 'the whole presentational style, the user interface, the accessibility, the interactivity'.

The practical conclusion is that certain media, particularly those which combine a screen and telecommunications, have the potential to mediate more of the teaching and learning activities listed in Table 4.1 than Laurillard indicated when she examined the 'orthodox, unadulterated' way of using them. Putting it another way, increases in telecommunications bandwidth and computing power 'adulterate' some media in ways that are potentially helpful to education.

The word 'potentially' is necessary because Table 4.1 reminds us that much of the potential of the simple media has yet to be exploited by the mega-universities. It shows, for example, that the integration of self-assessment questions into a printed text significantly enriches it as a medium for teaching and learning. The further addition of an audio-cassette, to create audio-vision, creates a multi-media package that fails only three of Laurillard's twelve key activity tests.

4.1.1 Computer-mediated communication (telematics)

A good example of a medium that now has a much richer potential than its orthodox, unadulterated version of the 1980s is computer-mediated communication, often known in Europe as telematics. France was the first country introduce popular telematics when, in the late 1970s, it replaced the traditional telephone directories with a database that subscribers could search from home using a simple terminal. Today's computer-mediated communications systems are much more sophisticated and provide a good example of an increase in quantity leading to a change in quality. Three types of computer-mediated communication are of special relevance to the mega-

S = Student T = Teacher	Print	Audio-vision	Television	Video	Self-assessed questions	Hypertext	Multi-media resources	Simulation	Microworld	Modelling	Tutorial program	Tutoring system	Tutorial simulation	Audio conferencing	Video conferencing	Computer conferencing	Computer supported collaborative work
1 T can describe conception	✔	✔	✔	✔	O	✔	✔	O	O	O	✔	✔	✔	✔	✔	✔	O
2 S can describe conception	O	✔	O	O	✔	✔	✔	O	✔	✔	✔	✔	✔	✔	✔	✔	✔
3 T can redescribe in light of S's conception or action	O	O	O	O	O	O	O	O	O	O	O	✔	✔	✔	✔	✔	O
4 S can redescribe in light of T's redescription or S's action	O	✔	O	O	✔	✔	✔	O	O	O	✔	✔	✔	O	O	✔	O
5 T can adapt task goal in light of S's description or action	O	O	O	O	O	O	O	O	O	O	✔	✔	✔	O	O	O	O
6 T can set task goal	O	✔	✔	✔	✔	O	O	✔	✔	✔	✔	✔	✔	O	O	O	✔
7 S can act to achieve task goal	O	✔	O	O	✔	O	✔	✔	✔	✔	✔	✔	✔	O	O	O	✔
8 T can set up world to give intrinsic feedback on actions	O	✔	✔	✔	O	O	✔	✔	✔	✔	O	✔	✔	O	O	O	✔
9 S can modify action in light of intrinsic feedback on action	O	✔	O	O	O	O	✔	✔	✔	✔	O	✔	✔	O	O	O	✔
10 S can adapt actions in light of T's description or S's redescription	O	✔	O	O	✔	O	O	O	✔	✔	✔	✔	✔	O	O	O	✔
11 S can reflect on interaction to modify description	O	✔	O	✔	✔	O	✔	O	✔	✔	O	✔	✔	O	O	O	✔
12 T can reflect on S's action modify redescription	O	O	O	O	O	O	O	O	O	O	O	✔	✔	✔	O	O	O

Notes:

Hypertext: see section 4.1.1.3

Microworld: A computer program that embodies rules governing the behaviour of defined objects and their interaction with each other, thus creating a 'little world' in which the user can manipulate objects.

Tutorial program: A computer program that presents information, sets exercises for the student, accepts answers in a specified format and gives feedback on those answers.

Tutoring system (also called 'intelligent tutoring system'): This performs the same tasks as a tutorial program but in a different way: generating the information from a database, generating exercises from rules using the information already collected about the student, and generating feedback from both the database and the student record.

Tutorial simulation: A combination of adaptive and interactive media that provides intrinsic feedback through the simulation element and extrinsic feedback through the tutorial element.

Table 4.1
Media Comparison Chart

(after Laurillard, 1993 – reproduced with permission)

universities: electronic mail, computer conferencing, and the Internet/World Wide Web. We examine the implications of each of these technologies in turn but the crucial development is that they have now come together in integrated software packages.

4.1.1.1 Electronic mail (e-mail)

A message is the basic unit of electronic mail. It is a discrete item of text, to which other word-processed files can be attached, that is produced by a sender and addressed to one or more named readers. Messages are usually prepared off-line and the sender goes on-line to transmit them. Each message is routed by the system to the addressee's mailbox on the host computer and waits there to be read when the addressee next logs into the system. The addressee can then read the message, reply to it, forward it to others, delete it, file it or leave it for future attention. Most electronic mail systems also have a bulletin board facility which gives multiple read-only access to messages and documents.

E-mail is already in widespread use for communication within organisations. In 1994 the staff of the UKOU exchanged some 8000 messages a day by this means (Bird, 1994) and in 1995 the University equipped the homes of the elected officers of the UKOU student association with suitable equipment so that they could use electronic mail in conducting the business of the association.

It is easy to imagine the extension of e-mail to the wider student body. Indeed, once students gain the habit of using computer-mediated communication they will expect to be able to use it for their administrative correspondence with the institution. Its major potential in the academic arena is for the submission and marking of assignments. The importance of rapid and relevant comments on students' assignments is the most reliable research result in distance education. Even mega-universities in countries with efficient postal systems, such as CNED in France, would like to improve turnaround times on assignments. What needs to happen to make the electronic handling of student assignments a reality?

The first requirement, which we examine in the next section, is that students and tutors must have the necessary equipment at home and be prepared to use it for this purpose. The second is that a reliable and pedagogically effective handling system be developed. This must start with the reliability of transmission of the electronic messages. Electronic mail still goes astray too often for comfort. In his entertainingly sceptical book about the information superhighway Stoll (1995) reports how he mailed a postcard and sent an e-mail message across the USA every day for two

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months. The sixty postcards all arrived with an average transit time of three days. The average transit time of the fifty-five e-mail messages which reached their destination was 12 minutes, but five never arrived at all. For the UKOU a figure of almost ten per-cent of assignments undelivered would mean the loss of 100,000 student assignments per year on its million-assignment turnover, an unacceptable figure.

Assuming, however, that the delivery of e-mail could be made reliable, techniques would need to be developed to make tutors' comments as useful as possible to students and to allow the institution to monitor the process and capture the marks awarded. The UKOU considers the marking of student assignments to be a critically important function and tutors are expected to comment extensively on students' work. Central staff monitor a sample of scripts in order to verify that the process is being carried out well with common standards of marking. There is no obstacle, in principle, to incorporating these processes in an electronic assignment handling system. Indeed, efficiency gains beyond the simple shortening of turnaround times would probably result.

4.1.1.2 Computer conferencing

Computer conferencing is a development of the basic technology of electronic mail that uses the filing and organising power of a computer to support sophisticated group and many-to-many communication facilities. This has created powerful teaching and learning tools. Indeed, even the infant applications of computer conferencing were described in an early book on the topic as revealing 'a medium which, whilst being essentially one of literary discourse, is also one of interactive, reflective and asynchronous group communication' (Mason and Kaye, 1989:1).

The asynchronous nature of computer conferencing and the simple home equipment required (telephone, basic computer and modem) make it a particularly attractive medium for the mega-universities because it does not impose constraints of time and place on students. In the same book Kaye (Mason and Kaye, 1989:3) claimed that computer conferencing 'will ultimately emerge as a new educational paradigm, taking its place alongside both face-to-face and distance education; at the same time it will change the nature of 'traditional' multi-media distance education'.

Six years later computer conferencing has become sufficiently popular with students and tutors at the UKOU for the institution to make a big investment in expanding its use. In 1995 the UKOU required 30,000 students to have access to a computer of which 5000 needed to have network access. The comparable figures will rise to 35,000/12,000 in 1996 and are forecast to reach

40,000/20,000 in 1997. This is a high rate of growth even though computer conferencing is unlikely to involve a majority of the UKOU's 150,000 students before the 21st century.

A number of articles and reports describe the recent developments in computer conferencing at the UKOU. Selinger (1995) notes its value for communication between trainee teachers who feel 'less isolated by the realisation that they are not alone in their negative as well as positive teaching experiences'. Computer conferencing also provides an efficient means of taking student experience into account in revising a course:

> '...it is the intention to monitor the issues that students refer to most often. This will help determine any re-structuring and re-focusing of the course. The free nature of the medium in which students are allowed to discuss any issues that arise for them will contribute to an increased understanding of beginning teachers' needs and there will be a permanent written record of their evolving concerns'.

A survey of UKOU tutors (PLUM, 1995a) in a new course (THD 204 *Information Technology and Society*), that uses both CD-ROM and computer conferencing, showed extremely positive attitudes to the computer conferencing in this course, despite negative experience with CoSy, a previous conferencing system. This is another example of the technical development of a medium making a large difference to its perceived effectiveness. The UKOU has already used three conferencing systems, CoSy, Wigwam and FirstClass and is now beginning to standardise on FirstClass because of its superior qualities.

However, computer conferencing also raises interesting issues of teaching and learning as well as course design. Mason (CITE, 1995) has reported on the use of computer conferencing in a fourth level UKOU course (A423 *Philosophical Problems of Equality*). The academic in charge of the course believed that computer conferencing did provide an answer to a strategic challenge facing all mega-universities, namely the need to plan courses with fewer resources for smaller populations so that a wider range of topics can be offered. However, she also concluded that 'there is probably a severe limit to the amount of constructive teaching of a subject like philosophy that is possible in a computer conference. ... If we can make conferencing work in less ambitious ways, however, the advantages may be enormous'.

Mason also notes (CITE, 1995:11):

'However, students' use of conferencing has revealed a much less palatable fact, which somehow has never been so 'visible' before: that many students have a very poor understanding of the course materials. It is generally acknowledged that the assessment and examination system in tertiary education is frequently a poor indicator of 'deep level understanding'. The relatively informal context of computer interactions is often much more revealing. While the lack of understanding is indicated by many of the conference messages on A423 was rather disturbing to the course team, there is no reason to believe that this problem is unique to this course - or to this University! It is simply that the medium of conferencing makes it harder to ignore. Student feedback is more public and conferencing is a more sensitive mechanism for revealing students' real thinking.'

Set against the goal of improving the effectiveness of teaching in the mega-universities this feature of computer conferencing is to be welcomed. It does appear to be a medium with high potential for encouraging the adaptation of course materials and teaching to the real experience of students. It is also clear, however, that the effective moderation of a computer conference by a tutor is crucial to its success.

A major worry for the UKOU and any mega-university that seeks to extend the use of computer conferencing (and computers generally) is the readiness of students to acquire the necessary equipment. The UKOU therefore surveys its students regularly about their ownership of various technologies and their attitude to acquiring them.

A survey (PLUM, 1995b) of students who enquired about the course THD204 *Information Technology and Society* but did not register found that few had been put off by the equipment requirements. More simply thought it wiser to avoid an innovative course in its first year of offering. However, students who express an interest in a course related to information technology are not likely to be representative of the wider student body. A survey (PLUM, 1995c) of a large sample of a cross section of all UKOU students revealed that 65% of students had access to a computer in 1995 and that 45% of the remainder would consider buying one if UKOU use increased.

As would be expected in an institution that has 150,000 students ranging from teenagers to people in their nineties, there is a minority of students who do not want to see the UKOU extend the requirement for computer use. Porter (1985) talks of the 'failure to recognise buyer segments' as one of the pitfalls of the introduction of new technology. For the mega-universities to produce

two versions of each course, one using computers and one not, would be very expensive. On the other hand most mega-universities operate on the principle that study should be made as flexible as possible so that people are not excluded. Obviously the long term solution to the problem is for computers to become cheap, easy to use and an asset to any household.

A survey by Haynes (1994) highlights the challenge that the computer industry faces:

> 'Persuading Aunt Maud to get intimate with entire networks of computers is perhaps the industry's biggest challenge. A recent survey by Apple found that 85% of respondents were terrified of computer technology - a figure that suggests the PC user who tried to use his mouse as a foot pedal is by no means alone. For computer-literate PC users, Windows may seem perfectly straightforward; for novices it is an unnavigable nightmare' (Haynes, 1994:25).

The computer industry is, of course, aware of the problem. The same author quoted a senior industry figure: 'At the moment, computers don't have artificial intelligence; they have artificial stupidity'.

The convergence of the media may be helpful in giving the computer a place alongside other household appliances. UKOU data shows that students acquire electronic equipment readily when it can provide entertainment for the family as well as being an aid to study. This was the case, for example, for video cassette recorders, which were owned by 95% of UKOU students in 1995 (PLUM, 1995c:8). A survey of the general population of the UK showed that in 1994 the number of families with children having video game equipment overtook those having a computer. In this context the marketing of computers with CD-ROM drives on the basis of their 'edutainment' value is to be welcomed. However, less than 10% of first year UKOU students owned CD-ROM drives in 1994 (PLUM, 1994).

Another potential source of entertainment is the Internet. Curiosity about this phenomenon may also be an element of motivation for some households to acquire the necessary computing and communications equipment. The Internet and the World Wide Web are also tools of potential interest to the mega-universities.

4.1.1.3 The Internet and the World Wide Web.

The loose confederation of interconnected networks known as the Internet has been in existence for twenty-five years. Its growth began to accelerate when it linked up with public and commer-

cial networks in the mid 1980s. Then a phase of explosive development began in 1993 when special software and new ways of connecting documents allowed users to travel the network with pictures, sound and video, simply by pointing and clicking a mouse. This interactive cyberspace, the World Wide Web, began to attract a wide audience. No communications medium or consumer electronics technology has ever grown so quickly. Usage is difficult to measure because of the decentralised nature of the Internet but Anderson (1995) estimated 20m users in mid-1995 and suggested that by 1997 'the citizens of cyberspace will outnumber all but the largest nations'. Lycos, a firm specialising in Internet search software, estimated that the World Wide Web grew from 4.8m pages in April 1995 to 7m in June (Bacsich, 1995).

The potential of the Internet is linked to two phenomena. First, Moore's Law (named after the founder of Intel) which says that computing power and capacity double every 18 months. Second, Metcalfe's Law (named after the inventor of the Ethernet standard), also known as the law of the telecosm (Haynes, 1994:17), which says that the utility of a network to a population is roughly proportional to the number of users squared. The Internet harnesses both these laws at the same time, which will give it a much greater staying power than the fad of Citizens Band radio to which it is sometimes compared. The Internet's attractiveness for distance teaching universities is that it has the potential to help with the perennial problem of student access to libraries. In theory the student can use the World Wide Web to bring data and information from all over the world right into the home.

The reality is more prosaic:

> 'By comparison with the electronic nirvana of the information superhighway prophets today's Internet is easy to ridicule. Yes, things are difficult to find; yes, 90% of what is available is rubbish. True, information is not the same as knowledge. And quite right; everything takes far too long' (Anderson, 1995:21).

Before examining the tension between information and knowledge and the role that the Internet can play in academic learning we should ask whether these other problems are likely to be solved. Will the Internet survive? The problems are real. After a tour of universities and educational technology companies in North America Bacsich (1995) reported:

> 'Virtually everyone we met was aware of the limitations and problems of World Wide Web and the Internet generally. We tried accessing our own home pages (at the UKOU) from a number of

locations and the speed of access ranged from slow to unusable. However, everyone was sure they could not afford to ignore it, even in not all of them liked it. Most were developing strategies, software or course applications based on the Web; in short they were leading developments, rather than merely following them'.

The challenge facing the development of the Internet is to avoid the tragedy of the commons. Once connection is made to the Internet use appears to be free. Certainly there is no charging based on either of the telecommunications traditions of charging by distance or by time. However, the bandwidth required by users has gone up sharply with the arrival of multi-media. The capacity needed to store or transmit a 700-page book (1m bytes) will handle only fifty spoken words, five medium size pictures or three seconds of video. With multi-media still in its infancy and only 7% of the US population yet connected, it is clear that Internet capacity will need to grow dramatically if it is to respond to growing demand. Anderson (1995:25) discusses how the organisation of the Internet might change (e.g. greater role for the telecommunications companies, payment for priority use) and concludes that the Internet will evolve and muddle through because:

'...ubiquitous, open networking seems as fundamental to civilisation's needs in the first half of the 21st century as ubiquitous, open roads did in the first half of the 20th. The lesson of the Internet is simple and lasting: people want to connect, with as little control and interference as possible. Call it a free market or just an efficient architecture: the power of open networking has only just begun to be felt.'

With their own commitments to ubiquity and openness the mega-universities should find the Internet a congenial partner. However, the manner in which they use it will need careful thought because there are some obvious pitfalls. One is that since most mega-universities are significant publishers they will need to have a clear policy about use of their intellectual property. Once a document is on the World Wide Web there is no chance to control or even monitor its copying or onward use. As Anderson puts it (1995:22): 'For publishers who still see a threat in the photocopier the Internet looks like the end of the world'.

For this reason and the sheer convenience of books and print materials the mega-universities will probably wish to continue to send at least part of their course materials to students in physical

form. For what should the mega-universities use the Internet? The obvious answer is for resource-based learning but that is too easy. To quote Laurillard (1995:206) again:

> '...multimedia designers are now promulgating the idea of the importance of student control over their learning, and there is a sudden interest in 'resource-based learning'. It has a lot more to do with the limits of computers and the complexity of learning than it does with pedagogical high-mindedness. It is a time-consuming process to address students' needs: far easier to make the material available and give them the navigation tools to find their own way through it. But beneath the rhetoric of 'giving students control over their learning' is a dereliction of duty. We never supposed that students could do that with a real library; why should they be able to do it with an electronic one?'

This follows an earlier chapter in which Laurillard examines the claims made for hypermedia and hypertext, which are a key feature of the World Wide Web. Hypertext is text whose interconnectedness is made explicit and navigable. The interconnections are defined by the author (or the user) in the form of links between words (or longer passages) in the document. Clicking on the word makes the connected word appear. 'Words' can also be chunks of audio or video material, hence the extension of the idea to hypermedia.

In her book Laurillard uses the term interactive to mean something that provides intrinsic feedback on the user's actions, such as a computer system that changes its behaviour according to the learner's input. In this sense hypertext is 'no more interactive than writing in the margins of a book' as the system remains neutral to whatever the student does. Because it connects associated items of information hypertext is a good information retrieval system, but this very fact makes it inimical to academic knowledge.

> 'Academic knowledge ... is not reductive; it is unitary, indivisible. In education we want to preserve the relationship between what is known and the way it comes to be known, so the notion of a fragment of information has no place in that kind of analysis. ... If there is any relationship between knowledge and information it is contrastive, the one unitary/holistic, the other elementary/atomistic' (Laurillard, 1993:123).

These reflections suggest that the mega-universities have an important teaching task in helping their students get value out of the World Wide Web. To the extent that a link to the Internet will be part of the registration package for students of some of the mega-universities in the future

they will be free to browse it at their will. They will find that like the real world, the on-line world contains too much information to make sense of. It will be up to the mega-universities to help them make sense of all this information by providing a gateway service. This will lead students to important sites and provide navigation assistance. If this is done well the institutions may well find a further market for such a service in the rest of higher education.

The most important World Wide Web sites for the mega-universities will likely be the ones they maintain themselves. It is too early to forecast the format of such sites because the capabilities of the Internet and the Web are still evolving. 1995, for example, saw the development of real-time audio broadcasting over the Internet. The market leader, Progressive Networks' RealAudio, sold its first 100,000 player licenses in three months. Audio-cassettes and audio-vision are teaching media whose effectiveness in distance education is well-established. The idea of having a bank of course related audio items available on the Internet might well be attractive for the mega-universities. Ironically the UKOU adopted the lecture format, one of the oldest academic methods, for its first high profile venture into audio on the Internet. This was a lecture on Fractals delivered worldwide on October 11, 1995.

4.1.1.4 Summary: the mega-universities on-line

Electronic mail, computer conferencing and access to the Internet are already available as integrated software packages. Turning these information technologies into true knowledge media will require determined work by the mega-universities. Their greatest initial asset is that they satisfy the desire of distance students to communicate with each other.

As more individuals have good and productive experiences with computers and user interfaces continue to improve the present fear of computers among some students will likely disappear. Furthermore the price of adequate personal computing equipment is unlikely to rise in real terms. Most importantly, however, Cairncross (1995) predicts that early in the 21st century the price of telecommunications will fall dramatically and cease to vary significantly with distance. If it happens this will present remarkable opportunities for computer conferencing. A mega-university could maintain a network of tutors all over the world and encourage each to augment their general tutorial competence with specific skills for teaching particular concepts. Students could be directed to particular sub-conferences to get help in areas of difficulty from tutors experienced in dealing with the various problems encountered in learning that concept.

A rich on-line environment also has implications for the whole process of developing and maintaining courses that we shall address below.

4.1.2 Stand-alone multimedia

The UKOU and most mega-universities already call themselves multimedia distance teaching systems. Until now, however, the various component media of those teaching systems have come on separate supports. It is now possible to combine several of the media that deliver a particular set of course materials on a single support, CD-ROM being the leading current technology for this purpose. One conclusion is that the mega-universities should be arranging to keep all their intellectual assets (print, diagrams, audio, video, software) in digital form so that they can readily be re configured for new delivery systems.

In principle, anything that can be put on a CD-ROM can be downloaded to a personal computer over an appropriate connection from a distant server. In practice, the idea of providing students with CD-ROMs specifically made for their particular course is likely to prove attractive. In a substantial survey of multimedia technologies directed at business readers Hagel and Eisenmann (1994) suggest that 'networked multimedia applications will tend to lag behind those that are "standalone" - that is can run on a single PC or video game console'. This is likely to be even truer outside North America where it is a safe working assumption that it will be at least a decade before 90% of homes has access to interactive broad band facilities. (In the UK overall telephone ownership is only just over 90% of households and this figure falls to below 50% for disadvantaged groups. Serving such groups is part of the mission of the UKOU and the other mega-universities.)

The CD-ROM market is another infant business where the present products are primitive compared to what is likely to come. One weakness is the limitations of most home versions of personal-computer technology, which can make viewing pictures or video or listening to sound from a CD-ROM somewhat irritating. The other shortcoming arises from the inexperience of those who authored and published the first CD-ROMs. Reviewing the titles then available *The Economist* (1994) found that the best CD-ROM adaptation to date was the Oxford English Dictionary. This was partly because of the quality and quantity of the data (which it shared with the printed edition). However, what 'sets it apart and makes the choice of CD-ROM much more than just a means of storage, is the addition of an unusually flexible, bespoke searching programme

that enables the user to isolate almost any variable ... and conduct on a whim, with perfect accuracy, arcane analyses that might otherwise have taken months'.

Early results from experimentation with CD-ROMs in the UKOU also lead to the conclusion that students value highly the facility to search text. In terms of Laurillard's taxonomy of media, CD-ROMs that allow sophisticated searches are a genuinely interactive medium. Until the capacity of both CD-ROMs and home computers increases substantially, institutions may be wise to devote most of their course-related CD-ROMs to text and graphics rather than video.

4.2 TECHNOLOGY AND TUTORIAL SUPPORT

The considerable differences between the mega-universities on the criteria of student retention and achievement have no single cause. It is generally true, however, that student performance and satisfaction correlate well with the richness of the media mix that the institution employs and the personal support it gives to students. These measures, in their turn, are closely related to the resources available to the institution. The desire to provide more tutorial support to students is explicit in the plans of UT, KNOU and UNISA, whilst UNED and STOU intend to use video conferencing to enrich the work of their study centres. To the extent that resources.for these developments may have to be found by cutting back on other activities the cost-effectiveness of tutorial provision is a key factor. Can technology help?

It is too soon to expect automated tutorial systems to play a significant role in the teaching strategies of the mega-universities. In her discussion of adaptive media, which include tutorial programmes, tutorial simulations and tutorial systems, Laurillard (1993:162) writes:

> 'Tutoring systems would be the acme of all the educational media, if they existed. They address
>
> all aspects of the learning process I have defined as being necessary. They are difficult to de-
>
> velop and contribute more to progress in AI (Artificial Intelligence) than they do to education.'

This suggests that although the mega-universities should follow these developments and experiment with tutorial simulations in some of their courses, they should base their tutorial provision on people. How do they select the tutors and how can technology help the tutors?

Most of the mega-universities were set up in order to remedy a shortage of university-trained people in their country. It followed that university-trained people who could act as tutors were also in short supply, especially in rural areas. For this reason, and in order to help establish their

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academic credibility, some mega-universities (e.g. IGNOU) turned to distinguished academics in local universities to organise regional tutorial services. Other mega-universities simply judged that tutorial provision was not practical or affordable.

It is now time to review these assumptions because the rapid development of higher education in all countries, and indeed the growth of the mega-universities themselves, have produced a much larger pool of potential tutors. Not surprisingly, the former students of a mega-university can make excellent tutors because they understand from experience the challenges facing other students. In the UKOU's operations in Russia and the countries of the former Soviet bloc, where its management courses are taught in local languages, all tutors have to take their course as a student before being appointed to tutor it. This ensures that they are not only familiar with the content, but also have first hand experience of the UKOU teaching system.

The technologies most often mentioned as helpful, once a network of tutors is in place, are computer-mediated communication, the telephone and video conferencing. We examine each in turn.

4.2.1 Tutoring by computer

The context for the use of computer-mediated communication in the mega-universities was described in section 4.1.1. There is a palpable enthusiasm for this medium among students as the following comments testify (both are from messages sent over the UKOU conferencing systems):

> 'I consider the effects of the use of computer-mediated communication for disabled study to be no less than revolutionary. It can change the life of a disabled student by increasing the motivation to study and giving him/her access to other students in a way never before possible. Telephone tutorials have been used by the UKOU to help overcome the isolation, but they are for a limited period, whereas CoSy can be used at any time during the day or night and gives the opportunity for equal say.'

> 'I would much rather be browsing through FirstClass than working. I keep telling myself I will only use it at weekends when the phone charges are cheaper but the lure is too strong. I wonder if it's because like you I'm an OU graduate and it's such a novelty being able to contact other students as easily as we can now. We've had to study on our own for such a long time that this 'freedom' is a luxury that other students may not quite understand.'

An academic in the UKOU's teacher training programme gives an example of a student giving such useful help to another that the staff incorporated it into the course:

'A Post Graduate Certificate in Education student in Newcastle, two weeks into her first teaching practice, put out a cry for help (on the computer conferencing system) as she'd lost her voice. Within the hour someone from Bristol came back to say she had the same problem BUT her sister was a speech therapist and had sent her two pages of advice! This was attached. (We now put that in the course materials.)'

All the experience with these systems suggests that the work of the tutor who moderates the conference makes a great difference to its effectiveness. Clearly tutors will need training for this role. It is also clear that computer conferencing is demanding on tutors. However, the systems do allow tutors to save time. For example, instead of explaining the same point separately to a number of students when marking their assignments, the tutor's explanation can be posted on the system and students who need it can be referred to it.

4.2.2 Tutoring by telephone

One-to-one tutoring by telephone is a well established practice in distance education in countries that have a developed telecommunications infrastructure. It seems likely that this will be the situation for all the mega-universities in the first decade of the next century. Furthermore, if Cairncross' (1995) prediction is right, and telecommunications charges drop sharply and become essentially independent of distance, then tutoring by telephone will become an option for all institutions.

George (1994) has described how over 2000 students of the UKOU in Scotland are in contact with their tutors only, or mainly by phone; and that groups of these students use over 200 hours a year in audio conferencing. These group telephone tutorials, where students join each other and the tutor by teleconference from their homes, are of particular interest. Like a computer conference they give some economies of scale to the tutor's work while allowing the students to learn from and support each other. The skills needed for successful telephone tutoring are well documented and can readily be acquired (Parker, 1984). Experience shows that a good face-to-face teacher is almost invariably a good and effective telephone teacher (George, 1994:82). In an interesting innovation, the UKOU is now experimenting with group telephone tutorials for lan-

guage instruction (French) and intends also to use the telephone for assessing students' oral language skills.

4.2.3 Video conferencing

The focus of mega-university interest in video conferencing is as a means of enriching the work of study centres by connecting them to tutors in other locations. IGNOU, STOU and UNED are planning such developments. Bates (1994) has reviewed educational applications of video conferencing technology in North America and his results suggest that institutions should proceed cautiously. There does seem to be a conflict between suppliers, who are eager to provide the video equipment and the telecommunications bandwidth that it requires, and educators who may not find this a cost-effective teaching and learning technology.

Students do consistently prefer an electronic classroom at a local site to having to travel to another centre. However, Bates found that the instructional preparation time for video conferencing was usually grossly under-estimated because teaching and learning methods had to be radically changed to exploit fully the potential of the technology. Indeed, in many of the projects he reviewed 'it was difficult, given the extra cost and lack of exploitation of the visual medium, to see the justification for using video conferencing rather than audio conferencing'. He concludes:

> 'None of the projects reviewed provided firm evidence that two-way live video-conferencing was more effective than one-way video plus two-way audio, or even the distribution of video tapes for individual use. Indeed, there was some evidence that mature students who were working preferred flexibility to live video interaction, if the latter meant that they had to be in a certain place at a certain time.'

The mega-universities might do better, given the advantage of their size, to focus their video interests on broadcasting (see 4.3 below) rather than on setting up video conferencing networks.

4.3 EXPANDING TV AND RADIO BROADCASTING

Our study has revealed that all the mega-universities want to expand their TV and/or radio broadcasting. This finding is surprising in view of Bates (1982) conclusion that there was a move away from broadcasting in the twelve distance teaching institutions he studied. The reasons for this trend were: 1) the broadcasting organisation was separate from the distance teaching organisation, which therefore had limited control over the product; 2) transmission time was inad-

equate in quantity and quality; 3) the institutions could not be sure of reaching their intended audience by broadcasting. Bates found that the cost of broadcasting was not a factor in the decision to use it less. He concluded that the main reason was simply academic distrust of the medium.

Why is broadcasting popular again? First, only one of the twelve institutions surveyed by Bates was a mega-university (the UKOU). Size colours the institutional attitude to broadcasting simply because a large institution has more bargaining power with the broadcaster and a greater incentive to reach a large audience. Transmission time is still a problem today but the growth in the number of channels and the development of cable and satellite systems will shortly ease this difficulty. Examples are KNOU, which now has its own cable channel; the UKOU, which is part of the BBC's new all-night educational programming and CNED which is involved with France's new educational TV channel. The potential of broadcasting to reach any intended audience is now high in most countries for terrestrial broadcasting but very variable for cable and satellite.

A mega-university planning to expand its broadcasting must be clear about what it is trying to achieve through this medium. In particular, it should clarify what audience(s) it is trying to reach. If the purpose is simply to reach a student audience, as in the Chinese TVU system, then the growth of channels is a good thing because it makes more airtime available. If part of the purpose is to reach the largest possible general, non-student audience the ideal situation is to have enough channels to allow the institution to have good air time, but not to have the audience diluted between too many channels.

Institutions should be clear about the return they expect on their investment in broadcasting because educational television does not make money. This return on investment could be a combination of student learning, the creation of a sense of community among students, enhancing the institution's reputation with the general audience, recruiting future students, meeting national educational goals, etc.

In this context research on the drop-in audience for UKOU terrestrial broadcasts may provide pointers to other mega-universities. Acaster and McCron (1994) reported that in 1993 five million people (more than 10% of the UK adult population) saw at least 15 minutes of UKOU television in a three week period. However, this figure had dropped to 3.7m by 1994 because, although the UKOU's audience share at its transmission times had gone up, some transmissions had been

moved to less popular times. The one million viewers who saw more than one UKOU programme were very positive about them. They claimed to watch because they found the subjects interesting and said they were looking for educational, rather than simply informative programming. Compared to the people watching other channels at the time the UKOU audience was older and more male.

The same survey also found that students at all levels appreciated the programmes more than people who were not involved in study. The most common complaint from viewers was that it was difficult to get information about the schedules of UKOU programming to help in planning their viewing. This complaint was made with even more force about radio broadcasts. Few of the drop-in TV audience had ever heard a UKOU radio broadcast because they had no idea where to look for them among the many networks. Students show a clear preference for audio cassettes over radio broadcasts for course-related purposes. This means that mega-universities must be lucid about their radio strategy, following the example of UNED in Spain.

The survey data on the UKOU's terrestrial broadcasting may have some validity for transmissions on cable and satellite television. Institutions generally expect production for cable/satellite TV to cost less than terrestrial broadcasting. However, if they seek a substantial drop-in audience (the UKOU attracts between 5 and 12% of the audience of the four UK terrestrial channels for its broadcasts) there will be pressure to level up the production values – and the production costs – towards network standards. This appears to be happening, for example, in the Mind Extension University satellite/cable channel in the USA. It seems likely that this activity requires a net subsidy from the universities that use the channel (i.e. the costs of using cable/satellite are not fully covered by the fees and state grants that enrolled students bring).

The need for clarity about purpose and costings will be particularly important as mega-universities expand satellite broadcasting outside their own territories as part of their growing international reach.

4.4 COURSE PRODUCTION: BALANCING COST, TIME AND QUALITY

The value chain analyses for the UKOU (Figures 3.3 to 3.6) show that course materials production is the most costly activity in staff time that the institution carries out. Any attempt to enhance competitive advantage must address this key process. The goal is not, however, simply to reduce costs. Some mega-universities, such as UNISA, have low development and production costs but

are unsatisfied with the quality of the resultant courses. The UKOU is generally satisfied with the quality of its courses but finds that they take too long to produce and it does not produce enough of them. The aim must be to produce courses in a manner that gives an optimal balance of cost, quality and development time. In terms of Porter's analysis the mega-universities should seek to achieve both differentiation, in the sense of courses that are more attractive, effective and stimulating than conventional offerings, and cost leadership.

It is also apparent that the use of new technologies, such as computer conferencing and the Internet, will change the format of mega-university courses. Until now the common practice has been to develop materials that cover the whole content of the course and to run the course for a number of years. The speed of change in many areas of knowledge was already putting strain on this process by requiring regular revisions to the materials. Now, with the ability to provide extra material direct to students through computer conferencing and the Internet, the notion of course materials will become much more dynamic. The future will see more flexible curricula and more independent work by students. The examples given earlier of computer conferencing show that this medium will help the process by making student feedback much more explicit and useful in course revision.

4.4.1 The role of the course team

The evidence indicates that the team approach to course development yields courses that are superior to those produced by individual academics, especially where the academic is in another university and working under contract. This evidence, which comes both from student achievement and the judgements of other academics about the intellectual vigour of the product, suggests that developing courses in teams is worth some added cost. The challenge is to render course team activity more effective at producing good courses quickly at reasonable cost.

This is not, therefore, process reengineering in the sense of Hammer and Champy (1993), which seeks order of magnitude reductions in costs and for that reason has acquired a reputation for being simply a euphemism for down-sizing (see, for example, *The Economist*, 1995). All mega-universities, except the Chinese TVU system, already have small academic staff complements. The aim should be to produce more courses without a commensurate increase in staff rather than to reduce the size of the faculty. Nevertheless, some of the principles of Hammer and Champy's work are relevant.

To the extent that moving to teams rather than hierarchies is a key principle of reengineering, the course team is a ready-made locus for change. If courses are to become more dynamic entities whose content and methods will evolve over their lifetimes, a first step is to make the course team explicitly responsible for the course throughout its life. This would be a change from present practice. At the UKOU, for example, the large production course teams essentially disband once the course is ready. One, or at most a few individuals are charged with becoming the 'maintenance' course team, whose job is to monitor the offering of the course and prepare the student assessment material required annually. UKOU academics feel this work has low status.

New technology, especially computer conferencing, would facilitate the notion of a 'lifetime course team' by giving academic staff easy access to students. If a course directed students to resources on a rapidly changing database like the World Wide Web the team would be obliged to stay close to these changes. Furthermore, a more proactive course team would be able to save money and enhance teaching effectiveness by more sophisticated use of computer-assisted assessment.

An important general goal, which Laurillard (1993:206) has highlighted, is to get a better match between the effectiveness of the media mix for the student and the time spent developing each medium by the course team. She estimates, for example, that UKOU students distribute their study time between the media of print, video, computer, tutorial and essay in the proportions 10:1:2:1:3. The academic development time for that distribution of teaching would be equivalent to 60:10:10:1:1. This means that writing print and setting essays use academic time most efficiently. This may not, however, use the students' time most efficiently for learning gain.

Another issue is that current technologies, and especially the knowledge media, do not lend themselves to the sort of centralised production facilities that were appropriate for TV and radio broadcasting. This is a helpful development in that it puts academics closer to the production process and reduces the academic distrust that Bates (1982) found for the broadcast media. It may also help to reduce the tension between efficiency for the academic and efficiency for the student described in the previous paragraph. This decentralisation of media development carries the danger, however, that mega-universities will lose economies of scale in the use of media and may well confuse students by using different systems (e.g. for computer conferencing) from course to course. This suggests that the mega-universities should take a proactive stance by putting in place shells, templates, and software standards that would carry over from course to

course. There is also much scope for sharing production resources and this can also facilitate the transfer of know-how, technology and good practice from one course team to another.

Just as information technology has been a key factor in process reengineering in industry, so it could play a helpful role in enabling the 'lifetime course team' to do its expanded job. If course teams are given the challenge of having courses in the hands of students within a maximum of two years of the decision to offer the course, they will need enhanced project management tools. Up-to-date management information on the progress of the course project, widely available to team members, is a key requirement. Another is an electronic publishing system, possibly linked to computer conferencing software, that gives team members instant access to each others' work. A common technique of reengineering is to tackle tasks in parallel rather than sequentially. Preparing course materials in this manner will place considerable demands on the coordination of the process.

The challenge of producing good courses faster and cheaper with new media is considerable. It is encouraging that a common finding from industrial reengineering experience is that carrying out processes more quickly almost always saves money. Achieving the objective of faster course development will require disciplined work planning within the mega-universities. At the UKOU, for example, course production was much faster in the early days because the members of each course team were involved in fewer other activities than now. Focusing the work of academics on a smaller number of tasks in any time period seems crucial.

4.5 BETTER LOGISTICS

A consequence of their quasi-industrial structure is that the mega-universities rely on relatively larger administrative and operational systems than conventional universities. Porter showed that in seeking competitive advantage it is just as important to use technology well in support operations as in teaching.

In this context the literature on reengineering, and particularly its emphasis on the role of information technology in making it possible to recast processes completely, is highly relevant. We shall comment on information systems, the use of the telephone, and the transmission of materials and assignments between the institution and its students.

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4.5.1 Information systems strategy

By the standards of most businesses the mega-universities are very complex operations. Not only are they selling a wide variety of 'products' to a large 'customer' population distributed all over their country and beyond, they also have to organise an elaborate 'after sales service' which involves multiple transactions with each customer. Sophisticated administrative computing systems are fundamental assets to the mega-universities. The institutions should take advantage of each advance in information technology to improve their competitive advantage and raise the barriers to entry to potential competitors wishing to offer distance education on a large scale.

However, their administrative computing systems are now so vital to the continued existence of the mega-universities that their upgrading is a serious matter. The UKOU is currently spending some $US16m on a five year programme to renew its systems. After beginning this work in 1992 with the idea that the main task was to move from a mainframe system to a distributed system, the institution realised that far more was at stake. It recommenced the process with a complete review of its information systems strategy using a rigorous methodology (PRINCE) developed by the UK government's computing agency. It was this work that gave rise to the scoping study used in section 3.3.3 to construct the value chain for the UKOU. This fundamental analysis of the information flows within the organisation should provide a secure basis for the development of a suite of systems to support the institution's operations.

The first major product of this process is the main student record system, CIRCE (Corporate and Individual Records for Customers and Enquirers), which will be introduced early in 1996. The introduction of such a system provides an institution with many opportunities to review its processes and make efficiency gains. A similar process (GAEL 2) is underway at CNED.

4.5.2 Administrative use of the telephone

The teaching opportunities created by the progress of telecommunications have been explored in section 4.2.2. There is also a general trend in all countries for people to turn to the telephone for their administrative dealings with organisations. CNED has been a leader in responding to this development. We noted in section 3.2.2 that an institution which avoided being in the telephone directory in the 1980s now has an ultra modern system for handling thousands of calls per day.

In contrast the UKOU has only recently realised the importance of updating its practices in this area. A recent internal report (Edwards et al., 1995) was blunt: 'The failure to exploit the oppor-

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tunities offered by the telephone is damaging our relationship with present and potential students and customers and at variance with the University's strategic aims'. The report makes clear that the main obstacle to progress is not the technology but working habits and a national culture that have traditionally treated the telephone as an informal means of communication.

4.5.3 Moving materials

As we noted in sections 4.1 and 4.2, electronic mail and computer conferencing have real potential to speed up the turnaround of student assignments and improve the feedback given to students. Even if problems of intellectual property rights on the Internet are resolved however, it seems clear that the mega-universities will continue to need to ship substantial tonnages of course materials to their students.

There is little that can be said as a general prescription for dealing with this issue, where problems tend to be location specific. They also tend, however, to be time specific, so institutions should keep their distribution mechanisms under constant review. We reported in section 3.2 that UNED distributes materials through its study centres, where students come and collect them. IGNOU adopted a similar strategy, hiring trucks for the purpose, in 1993. The UKOU hired its own courier to deliver materials in Belgium for a period but now uses the regular mail. Because the mega-universities are very large customers, most national post offices work hard to satisfy their needs, including liaison with postal authorities in other countries.

One recent development, which may have applications for some institutions, is the possibility of printing on demand at remote locations (Alexander and Karsh, 1995). Under such a system the document (for example a set of course books) is distributed as a data stream to printers such as Xerox DocuTechs at remote sites where the requisite numbers of copies are printed and despatched. This method could be particularly helpful to mega-universities with substantial student numbers in other countries, where it would eliminate the delays, costs and inconvenience of shipping over national borders.

4.6 PARTICIPATION IN GOVERNANCE

The governance structures of the mega-universities vary considerably, reflecting national cultures. The process for choosing the head of the institution, for instance, can be an election among the

academic staff (e.g. UNED, UNISA), appointment by government (e.g. CTVU, CNED, AU, IGNOU) or appointment by the institution's governing board (e.g. STOU (advisory), UKOU).

In recent decades the tendency of governments has been to curtail, rather than foster, the notions of university autonomy and participative governance. We were surprised to discover, therefore, that two institutions, UT and UNISA, have made it an institutional priority to increase the participation of staff and other stakeholders in the governance of the university. Analysing the governance structures of the mega-universities is not an aim of this study. We simply note that there seems to be some correlation between the success of a mega-universities and the level of participation of staff in governance. This is not surprising, for knowledge-based industries work best with management processes based on teams and consensus rather than on hierarchy and authority.

The purpose here is simply to observe that current technologies can facilitate effective participation in governance where it is sought. Examples are:

• the use of audio conferencing to allow staff based elsewhere than at the central campus to participate in meetings;

• the use of file servers and World Wide Web sites to make university documents available to staff;

• electronic mail, which tends to loosen hierarchical processes;

• organisational development technologies, such as Continuous Quality Improvement or the UK's Investor in People programme, which encourage communication on goal setting at all levels of the organisation.

CHAPTER 5

DEVELOPING A TECHNOLOGY STRATEGY
FOR A MEGA-UNIVERSITY

A key principle of Porter's approach to competitive advantage is that limited progress can be achieved by reviewing an institution's activities in a holistic manner. The search for cost leadership, differentiation and promising niches on which to focus has to be carried out at a detailed level for the activities in the value chain.

In the previous chapter we looked at various technologies, particularly the combinations of computing and telecommunications known as the knowledge media. This suggested that by using some of these technologies in their activities, the mega-universities could gain academic advantage and therefore competitive advantage. We showed in Chapter 2 how the first generation of correspondence teaching had been succeeded by a second generation of multi-media distance education which integrated the mass media and certain personal media into the teaching and learning process. The linking of students through their home computers holds out the prospect of a third generation of supported open learning. The flexibility of asynchronous communication, that has been the great strength of the correspondence tradition, would be preserved. However, ease of communication between students and between students and the institution would be greatly enhanced, students would have access to a rich universe of learning resources, and it would be possible to hold synchronous events as needed.

5.1 PLANNING FOR THE THIRD GENERATION OF OPEN LEARNING: THE UKOU AS A CASE STUDY

The mega-universities will adopt the technologies of this third generation at different times and at different speeds. A crucial factor in their decisions will be the level of economic development of their country and, particularly, the evolution of the national telecommunications infrastructure. In

exploring the practicalities of implementing a strategy for migrating to new technologies we shall focus on the case of the UK Open University. The UKOU projects that 95% of its students will have networked computers by 2004, which is within the time horizon of its current strategic plan. Given that the essential criterion for third generation open learning, namely student ownership of the equipment, seems likely to be met, the institution is planning its future on that basis.

Most of the mega-universities have had to plan and organise their own start-ups in the last twenty years. Making the transition to the knowledge media will be very different for two main reasons. First, whereas institutions could take a 'big bang' approach to their start-up, this will be a gradual transition. Courses using different technologies will run side by side and both must function effectively. Second, as we noted in section 4.4.1, developing courses using the knowledge media does not lend itself to the centralised approach that worked well for the broadcast media. The decentralised nature of knowledge media production is both a strength, because it will give academics a greater sense of ownership, and a weakness because economies of scale and common standards will be harder to achieve.

This implies that the essential challenge is to achieve a good balance between bottom-up and top-down planning. In the document through which the UKOU Senate decided to develop a technology strategy in 1994, the term 'enabling framework' was used to describe the approach.

5.1.1 An enabling framework for technology development

Much of the Senate document (Open University, 1994b) was aimed at creating a common framework for thinking about the role of technology in the UKOU's future. It reviewed the institution's past use of technology, explored the new opportunities available, reported on the expectations of students, examined costs and indicated the next steps to be taken. In some respects, although not presented as such, the paper listed the value activities in the UKOU value chain that could be improved by new approaches.

The Senate gave this paper a more enthusiastic welcome than its authors anticipated, indicating that the academic staff were less cautious about the adoption of new technologies than had been supposed. This support legitimised two more concrete initiatives. First, the UKOU Finance Committee agreed to make an investment of £10m ($US16m) over three years from reserves to give impetus to the adoption of new technology. Second, the tasks of the University's five pro-vice-

chancellors were rearranged in order to create a post of Pro-Vice-Chancellor (Technology Development).

5.1.2 The INSTILL investment

The general purpose of the investment from reserves, known as the INSTILL project (Integrating New Systems and Technologies into Lifelong Learning) (Open University, 1995b) was twofold. First, it gave greater reality, tangibility and legitimacy to the technology strategy. Second it provided some resources to support activities. The INSTILL investment was never intended as the main source of funds for the introduction of new technology. Indeed, the UKOU spends £10m every year on information technology alone. However, given the decentralised nature of the activities it was intended to promote, it was important to have resources on which projects could draw.

Under the INSTILL scheme funds were allocated under seven general headings with considerable flexibility for spending within each heading. The seven areas and amounts were:

1) £1.5m to help create a new unit, the Knowledge Media Institute, whose aim is to be at the forefront of understanding and applying knowledge media to teaching and learning.

2) £3.5m for a new technology recruitment initiative. These funds allowed the UKOU to appoint 33 new academic staff who combined high potential in their disciplines with substantial experience in the use of new technologies in teaching and learning.

3) £0.8m to support satellite and other broadcast projects.

4) £0.8m for technological innovation in course materials, especially the development of CD-ROMs.

5) £1.4m to harness the Internet and electronic communication for academic purposes.

6) £1.0m towards the space requirements of the Knowledge Media Institute.

7) £1.0m to support schemes for loaning computing equipment to students at subsidised rates.

The INSTILL investment was approved early in 1995 and appears to be achieving its objectives. The recruitment initiative came at a good time after years of tight budgets. UKOU officers believe that by advertising the posts together, with an explicit focus on new technology, the competition

attracted a more able field of candidates than if each post had been announced separately. The UKOU has high expectations that these new staff will play a key role in the institution's migration to new technologies. Each will have an association with the Knowledge Media Institute as well as with their own academic unit.

5.1.3 Supporting functions

Although the INSTILL project has had the greater visibility within the UKOU academic community, two other developments of a more immediately practical nature are of equal importance.

The CIRCE project, a £10m redesign of the UKOU's logistical support systems, was outlined in section 4.5.1. One of the challenges in building such a system is to anticipate the sorts of new requirements that might result from the use of the knowledge media in teaching, such as the electronic submission of assignments. The UKOU is counting heavily on CIRCE to support better service to students and customers at lower unit cost.

Equally crucial, in view of the UKOU's ambitious plans to increase computer use and networking amongst students, is the careful planning necessary to make this a good experience for students. The section headings in a progress report (Open University, 1995c) on student computing for 1996 indicate the variety of issues that have to be addressed:

* Student rental (finding firms that will rent computers to disadvantaged students at rates subsidised by the University).

* Student purchase options (finding appropriate modems to recommend).

* Student help desk and student support (hours extended in evenings and at weekends).

* Administrative arrangements for particular courses.

* Networked services (available to the 13,000 students registered in the 25 courses that require networking).

* Network access (the aim being to allow students to access the network for the price of local call).

* Tutor policy (ensuring that tutors have access to appropriate equipment).

* Access technology for disabled students.

- Windows 95 (ensuring that course software runs effectively in this environment because some students will acquire machines with Windows 95).

This list illustrates rather well the difference between the preparations that a mega-university has to make when putting its students on-line and the more limited challenges facing conventional universities and distance education courses with small enrolments.

5.1.4 Setting objectives for technology development

Initiative fatigue among the staff is a danger in a time of rapid change. In order to ensure that the technology strategy is not seen on this light the UKOU's Pro-Vice-Chancellor (Technology Development) has linked her objectives for the year firmly to the nine rank-ordered priorities in the institution's strategic plan, *Plans for Change*, that was described in section 5.2.10. We conclude with a summary of these linkages in Table 5.1. Such an approach helps to ensure a review of the implications of technology for all significant value activities in the institution's value chain.

5.2 CONCLUSION

We have examined the current status and future aspirations of a remarkable group of ten universities that enrol over 2.5 million students between them. These mega-universities are revolutionary in two respects: they have brought down the cost of higher education dramatically and they have made lifelong learning a reality for adults wherever they live and work. However, their roots in the tradition of correspondence education, which are the basis for their flexibility and cost-effectiveness, have meant they have had to struggle hard to acquire a reputation for quality.

The mega-universities that have acquired a good academic reputation have done so partly by integrating audio-visual media and computing alongside printed materials to create a second generation of distance education methods. Some mega-universities are now going through this transition.

For the leading institutions a third generation of methods now beckons, rooted in the possibility of students linking to each other, to tutors and to university services, by telecommunications and their personal computers. The knowledge media promise to insert the two missing links in the chain of distance learning: easy communication with the rest of the academic community and ready access to libraries and resources.

Those mega-universities that master these new technologies will be able to add the competitive advantage of a consistently high quality of teaching and learning to their existing assets of cost-effectiveness and flexibility.

PRIORITY	TECHNOLOGY DEVELOPMENTS
Quality of learning experience	• Increase contact between students, tutors and course teams with telecommunications. • Increase 'guided independent resource-based learning'. • Use interactive multimedia to improve understanding of core topics.
Curriculum enhancement	• Students to emulate professional use of computer applications. • More courses through cheaper course development/delivery.
Admission and retention	• H/w and s/w to improve access for students with disabilities. • Use cable, satellite, networking to widen student range. • Improve advice to students on course choice. • Improve retention and pass-rates with better advice systems and enhanced quality of learning.
Expansion	• Recruit from new groups though improved access and better learning experience. • See whether new technology attracts academically demotivated students.
Efficiency	• Use shells, templates, shared resources to increase productivity of technology-based courseware. • Use computer-based assessment to improve staff productivity. • Exploit desk-top publishing to turnaround materials faster. • Create synergy between academic & administrative systems with respect to use of new technology. • Use externally/collaboratively developed resources for core skills materials. • Better technological infrastructure to give better staff productivity. • More streamlined management systems. • Forward planning of staff resources for materials production. • Better advice to students about their technology purchases.
Resilience	• Expand publishing/marketing of OU materials using new technology. • Increase provision of work-based learning courses. • Maintain cost analyses of production and delivery systems. • Forward planning models for materials/methods development.
Quality Assurance	• Staff development programme for new technologies. • Databases for staff of existing materials and expertise. • On-line communication between course teams and students. • Document how students learn through technology. • Disseminate research and evaluation. • See that funding for new technology promotes good practice.
Research	• Maintain OU in forefront of research on IT in education. • Encourage research on teaching of subject. • Exploit new technology for scholarship and research.
International and national	• Use new delivery/support systems for students overseas. • Use networks for collaborative course development with scholars overseas. • Make OU central focus for development of new technology for open and distance learning in UK. • Promote legitimacy of research on teaching innovation in every discipline

Table 5.1
1995 Objectives of the UKOU Office of Technology Development
matched to priorities in the Strategic Plan

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GLOSSARY OF ACRONYMS

AU	Anadolu University
BBC	British Broadcasting Corporation
CATV	Community Antenna Television
CD-ROM	Compact Disk – Read Only Memory
CETV	China Educational Television Station
CIRCE	Corporate and Individual Records for Customers and Enquirers (UKOU)
CITE	Centre for Information Technology in Education (UKOU)
CNAA	Council for National Academic Awards
CNED	Centre National d'Enseignement à Distance
CTVU	China Television University system
CCRTVU	China Central Broadcasting and TV University
DIANDA	Chinese acronym for CTVU
DTU	Distance Teaching University
GAEL	Logistics information system (CNED)
HE	Higher Education
ICCE	International Council for Correspondence Education
ICDE	International Council for Distance Education
ICDL	International Centre for Distance Learning
IGNOU	Indira Gandhi National Open University
INSTILL	Integrating New Systems and Technologies into Lifelong Learning
ISDN	Integrated Services Digital Network
KACU	Korea Air and Correspondence University
KNOU	Korea National Open University
NIME	National Institute for Multi-media Education
OECD	Organisation for Economic Cooperation and Development
OEF	Open Education Faculty (AU)
OPENET	Open Educational Network (IGNOU)
PC	Personal computer
PLUM	Programme on the Learner Use of Media (UKOU)
PNU	Payame Noor University (Iran)
PRINCE	Information systems development methodology (UK)
SACHED	South African Council for Higher Education Development
SAIDE	South African Institute for Distance Education
STOU	Sukhothai Thammathirat Open University
TVU	Television University (China)
UK	United Kingdom
UKOU	United Kingdom Open University
UNED	Universidad Nacional de Educación a Distancia
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNISA	University of South Africa
USA	United States of America
UT	Universitas Terbuka
VAN	Value-Added Network
VCR	Video cassette recorder
YÖK	Higher Education Council (Turkey)