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New Technologies in Higher Education:

Experiences from Chile and China

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Foreword

In an age of accelerating globalization, technological advances can play a key role in meeting growing demands for enrolment in higher education. The World Conference on Higher Education (WCHE) +5, held in 2003 at UNESCO Headquarters, highlighted that the threshold of 100 million students worldwide had already been crossed, and estimated that by 2020 student numbers would have reached some 125 million students. Yet, at the same time as demand for higher education continues to rise, state budgets for higher education are decreasing. The Internet, e-learning and virtual classrooms can prove vital in enlarging access to higher education in ways that are cost effective and responsive to the needs of today's global knowledge-based societies.

The Internet and e-learning are providing means for learners to access higher education in new ways, anywhere and at anytime. These technological developments have brought opportunities and challenges which must be navigated carefully at the national, regional and international levels in order to maximize the benefits and minimize the risks.

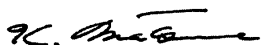
UNESCO, as the only United Nations organization with a mandate in higher education, has been active in providing policy support to promote the provision of quality teaching and learning at the university level. We engage with many forms of higher education, from face-to-face to open and distance learning, using a range of technologies. We have continually encouraged the development of higher education that is relevant to human, social, economic and cultural needs.

In looking for strategies to best harness these new developments, UNESCO has consistently supported South-South cooperation, whereby

developing countries pursue solutions to common development challenges through the exchange of knowledge, skills, resources and technical know-how. South-South cooperation constitutes a solidarity mechanism among developing countries in order to achieve common goals. Most studies on South-South cooperation emphasize the urgent need for countries of the South to learn from each other's experiences in view of their similar socio-economic conditions and to enhance their capacities.

UNESCO's role in South-South cooperation is one of facilitator, innovator and catalyst. In working towards strengthening the South-South cooperation dimension in its work, the transferring of knowledge on proven solutions to common problems is a key priority.

The present volume brings together two case studies on strategies for harnessing ICTs to support teaching and learning in higher education in two different contexts – in Chile and China. By examining two innovative approaches to using new technologies, it demonstrates how ICTs can extend access and increase flexible learning opportunities. Within the framework of facilitating South-South cooperation, this book aims to contribute to the goal of ensuring that technologies are used to support the development of quality teaching and learning to the benefit of all.



Koïchiro Matsuura

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Acronyms

Chapter 1

CNAP	Comisión Nacional de Acreditación de Pregrado (National Commission of Accreditation of Undergraduate Studies)
CONAP	Comisión Nacional de Evaluación de la Calidad de Programas de Postgrado (National Commission of Quality Evaluation of Postgraduate Programs)
CONICYT	Comisión Nacional de Investigación Científica y Tecnológica (National Commission of Scientific and Technological Research)
CRUNCH	Consejo de Rectores de las Universidades Chilenas (Council of Chancellors of Chilean Universities)
CSE	Consejo Superior de Educación (Superior Council of Education)
DIVISUP	División de Educación Superior (Higher Education Division)
ICT	Information and Communication Technology
LAN	Local area network
LMS	Learning Management System
MECESUP	Programa de Mejoramiento de la Calidad y la Equidad de la Educación Superior (Programme for Quality and Equity Assurance in Higher Education)
MOE	Ministerio de Educación de Chile (Ministry of Education of Chile)
Moodle	Modular Object-Oriented Dynamic Learning Environment
PET	Programa Especial de Titulación (Special Degree Programme)
PSU	Prueba de Selección Universitaria (University Selection Exam)
SENCE	Servicio Nacional de Capacitación y Empleo (National Service of Training and Employment)
UNIACC	Universidad de las Artes Ciencias y Comunicación (University of Arts, Sciences and Communication)
WAN	Wide area network

Acronyms

Chapter 2

AHEIs	adult higher education institutions
CADAL	China-America Digital Academic Library
CADLIS	China Academic Digital Library Information System
CALIS	China Academic Library and Information System
CEBSat	Satellite TV video delivery system
CERNet	China Education and Research Network
CNNIC	China Internet Network Information Centre
CCRTVU	China Central Radio and TV University
CRTVUs	China Radio and Television Universities
DIVISUP	Higher Education Division
GDP	gross domestic product
HEIs	higher education institutions
ICT	information and communication technology
MDE	Modern Distance Education
MOE	Ministry of Education
ODL	open and distance learning
OPEN	Open Distance Education Centre
PRTVUs	Provincial Radio and Television Universities
RHEIs	regular higher educational institutions
RMB	Renminbi (Chinese currency, Yuan in unit)
VBI	Vertical Blanking Intervals

Introduction

Globalization – the increased flow of technology, economy, knowledge, people, values and ideas across borders – has had a strong impact on higher education in terms of the quality, access and diversity of educational provision. The innovative use of new information and communication technologies (ICTs) in higher education, for both distance and face-to-face learning, has proven to be an important means for meeting the increasing demands for enrolments worldwide.

Developing countries have been particularly put under strain, as state budgets for higher education have had difficulty keeping up with increasing demands for higher education enrolments. The introduction of new forms of higher education delivery, taking advantage of the use of ICTs – capitalizing on audio, video and/or the Internet as means to deliver education; as well as the development of different educational models through arrangements such as networks of institutions, have proven to be effective and innovative strategies to meet these challenges.

The need for lifelong learning has become increasingly prevalent in the ever more dominant knowledge economy where learners must continually strive to upgrade their skills and qualifications in order to remain competitive in a dynamic global market place.

In this framework, the issues of quality and relevance become key areas. Specifically, greater emphasis is placed on criteria and procedures of ICT-enhanced education that are responsive to the characteristics of the learning processes mediated by new technologies.

This volume aims to provide information on the experiences of two developing countries – Chile and China – in meeting the challenges of the massification of higher education in their respective and varied national contexts. The two case studies illustrate different innovations regarding the use of ICTs in higher education.

The case of Chile provides an overview of different measures to develop human capital to meet the needs of a knowledge-based society. This chapter provides a case study of the Universidad de las Artes Ciencias y Comunicación (UNIACC), and specifically the different use of technologies in the delivery of UNIACC courses.

The case of China outlines the significant actions taken by the Ministry of Education in meeting the challenges of the knowledge-based economy. This chapter provides a case study of the Chinese Radio and TV Universities (CRTVU) system which has some 2.6 million students actively enrolled throughout the country.

Both case studies underline the importance placed upon higher education for social and economic development. At the end of each chapter, a list of policy implications are summarized and, as well, a bibliography and references, a list of web links to further reading are provided.

This document is part of UNESCO's work in South-South cooperation, to support the exchange of knowledge, skills, resources and technical know-how between developing countries to meet commonly experienced problems. It aims to provide support to inform policy-making for governments and institutions faced with similar challenges.

UNESCO higher education action

UNESCO, as the only United Nations agency with a mandate in higher education, has been a key player in the discussions concerning higher education and globalization over the last 10 years. The UNESCO World Conference on Higher Education (UNESCO Headquarters, 1998) which produced the 'World Declaration for Higher Education for the 21st Century: Vision and Action' set the stage for the Organization's actions in higher education. The First, Second and Third 'Global Forum on International Quality Assurance, Accreditation and the Recognition of Qualifications' (Paris 2002 and 2004 and Dar es Salaam 2007) provided a platform for exchange amongst different partners (governments, higher education institutions/providers, student bodies, quality assurance and accreditation bodies, recognition bodies and professional bodies) and aimed to foster debate on the social, political, economic and cultural dimensions underpinning the relationship between globalization and higher education.

Central to UNESCO's standard-setting work in higher education are the six conventions on the recognition of qualifications, five of which are regional and one interregional. These conventions are key standard-setting instruments in higher education, ratified by some 120 UNESCO Member States.

In 2004, UNESCO produced a position paper on '*Higher Education in a Globalized Society*'. This position paper stated the priority to focus the Organization's standard-setting, capacity-building and clearinghouse functions on assistance to Member States in their formulation of appropriate policies and strategies to meet the challenges posed to higher education by globalization.

UNESCO also worked with the OECD to produce the *UNESCO/OECD Guidelines for Quality Provision in Cross-border Higher Education* (2005). These joint Guidelines for quality provision in cross-border higher education, based on United Nations and UNESCO principles and instruments, are an educational response to the growing commercialization of higher education. The objectives of the Guidelines are to propose tools and a synthesis of best practices that can assist Member States in assessing the quality and relevance of higher education provided across borders and to protect students and other higher education stakeholders from low-quality higher education provision.

Conclusion

In line with the objectives of providing policy support for its Member States in this dynamic field, this volume which presents case studies in two very different national contexts, aims to provide innovative examples of the utilization of ICTs in higher education for other countries facing similar challenges. The ultimate purpose is to help promote South-South cooperation in policy development in this area. Aimed at planners, policy-makers and other higher education stakeholders, it is intended to be a practical guide for capacity-building and decision-making.

Chapter 1

New Technologies in Higher Education: The Chilean Experience

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Chapter summary

In order to sustain economic growth, maintain a competitive position at a global level and improve the quality of life of their citizens simultaneously, developing countries need to improve the skills and knowledge-base of their population.

Higher education worldwide has experienced increasing massification, characterized by new students demanding extended access and flexible learning opportunities.

The use of new technologies appears to be an effective alternative for achieving widespread quality education for a large number of people.

This chapter analyses the potential of using new technologies in the field of education in Chile. A case study shows best practices at the Universidad de las Artes Ciencias y Comunicación (UNIACC), illustrating how the Chilean system of higher education has utilized these new technologies to improve access to, and quality of, education.

In the current context of globalization, Chile's approach to the application of new technologies for education can be used to try to answer questions related to the challenges facing many other countries. In this way, other higher education stakeholders confronted with similar situations can be helped to establish pertinent policy considerations.

I. Challenges to higher education

Information and communication technologies (ICTs) have had an impact on higher education worldwide. A resulting phenomenon is the emergence of globalization and the ensuing development of a knowledge society.

As a developing country, Chile needs to upgrade the skills and knowledge of its workforce in order to sustain national economic growth, as well as maintain a competitive position internationally.

In micro terms, this means producing more qualified people, who in turn access better jobs, earn higher salaries and improve their quality of life.

In this context, higher education institutions have to re-conceptualize the notion of learning as a means of building up knowledge in a participatory and collaborative way. Instead of a hierarchical process of learning from teacher to student, the teacher serves more as a facilitator, where every student plays a central role. Learning now spans different generations and is not concentrated just in one period – youth. Education programmes constantly need to be updated and teachers trained in both formal and non-formal environments, not exclusively in the classroom. In view of this, new methodologies for teaching will be required.

Higher education needs to be balanced between student expectations and market requirements. In this context, e-learning is a particularly appropriate means of working. Firstly, it should be recognized that the 'net generation', made up of 'digital natives', born into the digital world, is characterized by being connected (via the Internet), immediately and efficiently. Secondly, the target public are adult learners, who have limited time and space to study, but the market requires that they advance and improve their knowledge-base. Thus, according to the advanced technology used and the interactive flexible methods of teaching, e-learning responds to these demands by providing a flexible framework for studying.

Education should be a right of all citizens, which by definition means that it must be accessible to all. The introduction of ICTs in education, through means such as e-learning, has allowed those who live in isolated places, single mothers, the disabled and other often excluded groups, to benefit from educational opportunities.

The massification of higher education has resulted in institutions extending their access to meet the varied needs of students. ICTs have supported the growth and diversification of academic quality and supply while reducing social differences.

The number of students registered in the Chilean national higher education system has been increasing progressively. According to statistics of the Ministry of Education of Chile (see Table 1), in 1990 there were 249,482 students in the whole higher education system.¹ By 2005 the number of students had risen to 663,679.² These figures represent a growth of 266 per cent of the enrolment in higher education over a period of fifteen years.

Table 1: Total undergraduate and graduate enrolment, 1990 - 2005

Type of Institution/Enrolment	1990	1995	2000	2005
Universities	131 702	231 227	319 089	486 570
Universities of the Council of Chancellors of Chilean Universities	112 193	161 850	215 284	271 598
Private universities	19 509	69 377	103 805	131 702
Professional Institutes	40 006	40 980	79 904	114 680
With direct fiscal contribution	6 472	-	-	-
Private	33 534	40 980	79 904	114 680
Centres of technical training	77 774	72 735	53 184	62 429
Total	249 482	344 942	452 177	663 679

Source: Ministry of Education of Chile. Details at:
http://compendio.educador.cl/docMatricula2006/2.1.1_d.xls

¹ These were broken down into: 112,193 students in universities of the Council of Chancellors of Chilean Universities; 19,509 students in private universities 40,006 students in professional learning institutes; and 77,774 students in centres of technical training.

² These were broken down into: 271,598 students in universities of the Council of Chilean Universities; 214,972 students in private universities; 114,680 students in professional learning institutes; and 62,429 students in centres of technical training.

In the same year, 2005, there were 25 universities of the Council of Chancellors of Chilean Universities, 38 private universities, 47 professional institutes and 111 centres of technical training, according to the Ministry of Education of Chile (see Table 2).

Table 2. Higher education institutions in Chile, April 2005

Type of institution	Number of institutions
Universities of the Council of Chancellors of Chilean Universities	25
Accredited	0
In examination	0
Supervised	0
Autonomous	25
Private universities	38
Accredited	6
In examination	1
Supervised	0
Autonomous	31
Professional institutes	47
Accredited	4
In examination	19
Supervised	0
Autonomous	24
Centres of technical training	111
Accredited	57
In examination	0
Supervised	41
Autonomous	13

Source: Ministry of Education of Chile. Details at http://compendio.educador.cl/docEstadistica/I_E.xls

The growth in the number of institutions as illustrated in Table 2 highlights the fact that the national authorities are assuming greater responsibility for increasing access, with a view to achieving *education for all* while at the same time providing high standards of duly accredited³ quality education.

Accreditation is a very important issue, not just for certifying the quality of the education provided but also in terms of determining the proportion of students admitted into institutions of higher education. In order to obtain a scholarship from the state, students must be enrolled in a recognized higher educational institution. To increase access for the most disadvantaged students and incorporate them into higher levels of study, it would be advisable if other private universities, professional institutes and centres of technical training also followed the same process of accreditation.

Structure of the quality assurance bodies in the Ministry of Education

In the Ministry of Education (MOE) a special unit, División de Educación Superior (DIVISUP)⁴ is responsible for implementing the norms and standards that regulate higher education in Chile.

Furthermore, the MOE also has a Programa de Mejoramiento de la Calidad y la Equidad de la Educación Superior (MECESUP)⁵, which includes the Comisión Nacional de Acreditación de Pregrado (CNAP)⁶, constituted in 1999. CNAP is responsible for designing and proposing a national system for assuring quality higher education and conducting the processes leading to the accreditation of the major and autonomous institutions, so as to

³ Accredited institutions are those which have undergone a review of their quality assurance measures by an external body (e.g. through a peer review, or by the Ministry of Education). This review exercise leads to a certification as an 'accredited institution' or 'recognized as a national higher education institution'.

⁴ The Higher Education Division.

⁵ Programme for the Quality and Equity Assurance in Higher Education.

⁶ The National Commission of Accreditation of Undergraduate Studies.

provide these institutions with nationally recognized qualifications (for periods of 2 to 7 years). In addition, the Comisión Nacional de Evaluación de la Calidad de Programas de Postgrado (CONAP)⁷ is part of the Comisión Nacional de Investigación Científica y Tecnológica (CONICYT).⁸

Another related institution is the Consejo Superior de Educación (CSE),⁹ which is in charge of establishing and administrating the accreditation system of new universities and professional institutes, and evaluating the level of institutional development during the process of accreditation. Its tasks are to assure the quality of services that these institutions offer, give complete, appropriate and reliable information concerning the operations of these institutions, create conditions for them to progress and innovate, and provide them with autonomous titles.

When an institution obtains autonomy, it operates as an independent entity in academic, economic and administrative terms, and the accreditation of the institution is optional. E-learning can fit into the general evaluation process for certifying quality, but these kinds of institutions are not always recognized by any official Chilean law.

The potential for using ICTs in education and the way in which higher education institutions in Chile have applied ICTs in their educational provision, in particular at the Universidad de las Artes Ciencias y Comunicación (UNIACC), will be reviewed in this chapter. The chapter will conclude with policy considerations, developed from experiences and efforts made in response to the huge challenges imposed by current globalization.

⁷ The National Commission of Quality Evaluation of Postgraduate Programmes.

⁸ The National Commission of Scientific and Technological Investigation.

⁹ The Higher Education Council created in 1990 by Law No. 18.962.

II. Potential for using technologies in higher education

Distance education is an excellent means of using new technologies in higher education. Distance education is effectively a formal teaching/learning process, produced when the time and/or physical location of the teacher is different from that of the student.

Distance education is achieved using e-learning, where tools such as web browsers, the public Internet, private Intranet or the extranet on the wide area network (LAN/WAN), as well as audio and videotapes, satellite broadcasting, interactive TV and CD-ROMs, are used. It can also incorporate links to other learning resources such as references, e-mail, discussion groups and a facilitator who can provide course guidelines to the students (Kaplan-Leiserson, n.d.).

These tools can be used for exclusively on-line courses, but also by a mixed-mode methodology that involves e-learning in some instances and the physical presence of an educator in others.

E-learning provides a learning methodology distinct from the majority of Chilean higher educational institutions. Naturally, there are many other variations where, for example, e-learning is only used for technological activities taking place in the classroom and not for distance education programmes. In some cases even, distance education courses are carried out without the use of e-learning, as is the case in many correspondence courses where information is sent back and forth using the traditional postal system.

The potential for using new technologies in higher education includes innovative ideas such as:

- working with the Internet, allowing content of courses to be updated, saved, retrieved, distributed and shared, immediately and regularly (Rosenberg 2001);

- a flexible and mobile system that can be adapted to the needs and potential of students, using various formats for various target users;
- access to knowledge and information with control in terms of the time, i.e. you can access information when you want and wherever you are;
- an interactive educational process where the participatory model of e-learning can generate a collaborative dynamic in which the student occupies a central role.

Students are not just the audience but protagonists with opportunities, for example, for being involved in online forums, chats and debates, providing:

- a learning experience, developed by each individual student, as well as by all students together, as a collaborative and sharing forum;
- closer teacher-student and student-student relationships, required in the e-learning process;
- access to a great quantity of information, allowing students to re-orientate and upgrade the information they receive, enriching, building and modifying their learning modes, while not only accumulating but also constructing their own path to knowledge;
- extended access to abundant information which was previously only available physically (i.e. books in a library). This leads to the regular redesigning of teaching programmes, with a tendency to reduce course length and to encourage the students' capacity to provide for themselves the necessary information for course development;
- different tools to acquire new information and generate new skills and capabilities;
- learning stimulated by means of user-friendly designs, the latest communication techniques and a variety of interactive technological resources that will provide a better overall understanding;
- maintained interest and motivation using diverse means to encourage greater concentration;
- innovative teaching in order to produce more creative learners;

- a learning environment of technological innovation that encourages students to be more open to change;
- 'learning by doing', achieved by permanent student/student and student/teacher interaction while carrying out a series of practical activities;
- students with a sense of the purpose and relevance of what they are learning, in both the theoretical concepts and practical applications;
- real cases to be studied using role play, and games with the use of audiovisual technologies;
- the incorporation of a conceptual structure, interactive games and simulations to make learning more appealing.

The effectiveness of e-learning is uncertain and has been discussed by many different specialists. Many empirical studies have demonstrated that no real distinctions can be seen between on-campus and e-learning courses in terms of the knowledge and understanding acquired. Among them 'The No Significant Difference Phenomenon', by Russell (2001) can be noted. Looking at 78 cases where the success of traditional education versus distance education programmes was compared, Russell showed that 27 per cent of the studies favoured the e-learning methodology and only 5 per cent the traditional on-campus modality, but the majority (68 per cent) found no significant difference between them, with both methods achieving their academic objectives.

Accelerated changes in technology can generate different effects: on the one hand, they stimulate a permanent renewal of knowledge and updating of teaching methods; on the other hand, this can challenge established and proved academic strategies, revealing weaknesses not only of the teachers, but also of other stakeholders from the educational field, who may find this development unfamiliar, unpredictable or even risky.

To integrate these advances into daily activities, Berge's research, and more specifically the article written together with Soomyung Kim Cho (2002), shows the main ways in which to overcome barriers facing distance education. They are as follows:

- **Technical expertise, support and infrastructure**
E-learning needs to have adequate infrastructure, updated technology and systems, and available technical support, in an appropriate environment with qualified people.
- **Administrative structure**
A modern administrative structure is needed for implementing an e-learning programme in an effective and efficient way.
- **Assessment/effectiveness**
Evaluating the process is vital for optimizing it, in terms of academic content, formats, pedagogic models and teaching methods, with special emphasis on student opinions.
- **Corporate change**
Leadership is a central tool for taking care of organizational changes. Compromise, tenacity and a process of advocacy and enquiry are needed for incorporating the necessary adjustments.
- **Educational interactions**
Interaction of students (among themselves and with the teachers) is very important for evaluating their progress in the courses and constructing the knowledge-base together. The tools and the skills for using them must be managed optimally in order to have a high-quality experience that is more effective in terms of learning as well as being appealing for the students.

- **Student support services**
To have an expeditious way of resolving problems that will allow mistakes to be corrected, the system to be improved and students' satisfaction maintained while maximizing their academic performance is important.
- **Ensuring that teachers are comfortable with technology**
Teachers should be trained and qualified to use technology to its maximum potential in the pedagogical field, reducing fear of the unknown and the sense that technology will take them over.
- **Access**
Having technical availability in terms of infrastructure, devices and support, as well as a friendly platform, can facilitate access and make distance education more effective.
- **Incentives for teachers**
Teachers should be involved in the whole process, from generating the appropriate curriculum, with an online format, until its implementation.

III. The Chilean reality

Chile is a country that in the past fifteen years has been distinguished for its sustained economic growth derived from a group of public policies that facilitate private management for the generation of wealth. The nation has also been striving to increase the process of regionalization and decentralization so as to reach a more harmonious development that generates a greater social and territorial integration, thereby attaining a more equitable distribution of the benefits of this development (Gaete, 1997).

In view of the above, one can assert that, in order to achieve sustained economic growth of a country with a knowledge-based society and advanced human capital, it is necessary to have a range of competencies including the integration of ICTs. To achieve this goal, higher education is essential and any improvements that can be made in this area are central to progress. In view of this, the MOE (2005) confirms that: 'in order to advance to a knowledge-based economy Chile needs to have advanced human capital in sufficient quantity and it must have people capable of carrying out competitive research and innovation on a world scale' (p. 7).

The review of universities belonging to the Council of Chancellors of Chilean Universities which receive direct funds from the state shows that many of them implement online programmes for several different degree levels (see Table 3). In this review of 25 universities, 48 per cent of them have an e-learning programme.

Table 3 illustrates that higher education has developed a range of programmes that use e-learning technology to benefit undergraduate, postgraduate and continuing learning programmes, using either a mixed-mode (face-to-face and distance learning together) or exclusively distance education. These programmes contribute to national development by enhancing a sound knowledge-base, human capital and equal access to a large variety of study opportunities, regardless of the student's geographical location or schedule. This approach opens up a wide range of opportunities to the people of Chile.

Many universities in Chile have a totally web-based e-learning system, with interactive environments, that create virtual classrooms where teachers and students meet to generate a shared teaching/learning process.

While 100 per cent online programmes of continuing education and postgraduate studies have been developed for some time, UNIACC is the

Table 3. Universities belonging to the Council of Chancellors of Chilean Universities with distance education programmes

University (region of the country where the university is located)	With distance education programmes
Universidad de Chile (R.M.)	•
Pontificia Universidad Católica de Chile (IX, R.M)	•
Universidad de Concepción (VIII)	•
Pontificia Universidad Católica de Valparaíso (V)	•
Universidad Técnica Federico Santa María (V, VIII, R.M.)	
Universidad de Santiago de Chile (R.M.)	
Universidad Austral de Chile (X)	•
Universidad Católica del Norte (II, IV)	•
Universidad de Valparaíso (V)	•
Universidad de Antofagasta (II)	•
Universidad de La Serena (IV)	
Universidad del Bío-Bío (VIII)	
Universidad de La Frontera (IX)	•
Universidad de Magallanes (XII)	
Universidad de Talca (VII)	
Universidad de Atacama (III)	
Universidad de Tarapacá (I)	
Universidad Arturo Prat (I, IX)	•
Universidad Metropolitana de Cs. De la Ed. (R.M.)	
Universidad de Playa Ancha de Cs. De la Ed.(V)	•
Universidad Tecnológica Metropolitana (R.M.)	•
Universidad de Los Lagos (X)	
Universidad Católica del Maule (VII)	
Universidad Católica de la Santísima Concepción (VIII)	
Universidad Católica de Temuco (IX)	

Source: Elaborated from information gathered from all the university web sites.

first and only university in the country to provide an online qualification that is comparable with a professional degree.

In view of the increased numbers of students going to universities, another issue related to e-learning and higher education is the centres that prepare these students for the Prueba de Selección Universitaria (PSU).¹⁰ At present in Chile there are specialized organizations that use online resources to train students to take this exam. This has made it possible for other educational institutions, among them UNIACC, to access the necessary teachers, materials, classes and examinations, as well as timely and appropriate answers to questions. All this information is available 24 hours a day, at any time, in any place, even in other parts of the world, just by accessing a computer connected to the Internet. Everything is available online, including registration.

Another way of advancing human capital is through training plans, supported by the state or through private initiatives, that are available in e-learning format. As the Servicio Nacional de Capacitación y Empleo (SENCE)¹¹ shows, this mode of education has been increasing over the past few years. In 2002 there were 14 organizations participating in online training programmes, with approximately 1,209 people accessing their programmes; in 2006, there were 70 participating organizations, training 37,812 employees. These figures show that the number of beneficiaries increased by 500 per cent between 2002 and 2006. The number of people trained during this period via e-learning programmes has increased by over 3 per cent, a high figure when one considers that one is combining technologies with education and professional training.

Training in Chile is tax deductible. Companies are allowed to invest up to 1 per cent of the total salaries paid in different courses or programmes for development of capacity and skills and the acquisition of new knowledge by

¹⁰ University selection test.

¹¹ The National Service of Training and Employment.

their workers. There is special treatment for small companies, which can benefit from this opportunity to promote training and thus improve staff productivity. It certainly gives small companies better conditions and contributes to being able to compete in the wider market.

Training can be done using the traditional face-to-face approach, or modern distance learning methods. It is important to note that companies and workers have increasingly been choosing the e-learning method of training. The Chilean state accords the tax deductible training option for both face-to-face and distance learning. Data and experience clearly show that the rapid growth of e-learning is due primarily to its effectiveness and efficiency.

Training is good business for workers, companies and certainly for the country as a whole. Better salaries, competitiveness, new markets and even the quality of life could be improved by giving new tools and instruments to companies and new skills and knowledge to workers. In view of this, the Chilean state has wisely chosen to offer more, and in many cases, better choices, to make this vision come true.

The MOE (2005) concludes that: 'the Chilean Government has made a commitment to reform higher education so as to allow the country to have at hand the advanced human capital needed to advance towards a knowledge-based economy and take advantage to the fullest of the opportunities offered by globalisation. This is viewed as fundamental to achieve economic and social development' (p. 13).

The training market has clearly shown that there is a strong and interesting process in place that has produced impressive results. The resources invested, the workers who have been trained, the companies that have chosen distance training instead of the traditional face-to-face method, are all different factors that have jointly achieved online legitimacy. This impressive result has taken place over many years, in both public and

private sectors. An important and remarkable result has been the bringing down of frontiers and barriers that constitutes obstacles for e-learning and distance education. Cultural, historical and traditional prejudices have been erased from Chilean society by learning and training online.

A big market has emerged, and many companies and educational initiatives have been instigated and consolidated with the objective of providing modern distance education and training. An increasing number of companies and new workers have taken advantage of the opportunity to learn in the online environment. As a result, ever greater resources have been invested in this type of learning. This process has achieved many different goals, but mainly it has been instrumental in giving the required legitimacy, reliability and consistency that modern tools and instruments used in the distance learning environment needed.

IV. A case study: UNIACC

UNIACC is a private and autonomous higher education institution. It aims to promote and develop the arts, culture, technology and communication, using a framework of comprehensive education, while preparing students in both human and professional terms to succeed in the integration of new social and working environments.

In order to achieve its goals, UNIACC supports innovative methods of teaching and the intensive use of multimedia technologies with progressive educational initiatives.

Key factors that make up the main ideas and values of the university's project are:

- People, capable of reflection, imagination and action;
- Communication, that unites the society;

- Creativity, a force of invention and change;
- Education, as a means to achieve personal and social growth and progress; and
- Technology, to facilitate development.

In view of the above, for the past 15 years academic excellence, creativity, innovation and a significant use of ICTs have been combined, as well as the systematic incorporation of e-learning tools, to accomplish the institutional objectives.

The idea of 'learning by doing' constitutes a core element of the training that UNIACC provides. An effective mix of theory and practice enriches the academic experience by giving practical tools to develop the necessary skills and professional abilities that students will need. With this in mind, UNIACC is aware of the importance of having a well-equipped environment where the students can experiment with constantly improving multimedia facilities, technological devices and computational programs. The facilities include a television channel, television and video media studios, editing and post-production rooms, studios for sound technology, professional television mobile units, digital animation labs, an experimental radio station, a press room, artistic and technological platforms, facilities for digital transfer, and music recording and audio workshops.

In this way, UNIACC is one of the most developed universities of its kind in Latin America, as compared with other institutions that have also invested time, work and resources in the field of advanced technologies.

Technology serves education in a multi-dimensional sense and, more specifically, applied technology has made UNIACC distinctive in the field of distance education.

UNIACC's use of ICTs in education started with the complementary use of technology for on-campus courses, with a view to developing courses to their full potential. UNIACC engages its academics in the application of teaching materials for their on-campus courses, so students can access complementary and supporting material for any course via the Internet in what is called an 'e-campus', a distance education platform that supports on-campus traditional academic programmes. The second step of online certificates was taken in order to incorporate a new approach to the teaching/learning process. Now undergraduate degrees that are 100 per cent online are available, with other courses, including master's degrees, offered through a mixed mode methodology with both face-to-face and online teaching/learning. UNIACC started with basic resources that allowed students access to some of the course content. Now there is scope for balanced online classes in a system made up entirely of e-learning.

Consequently, UNIACC has adopted an educational model that is centred round the diverse backgrounds and expectations of students. The best way of teaching and the provision of knowledge to achieve high academic results are constantly reviewed. Two target groups of students have been identified: those in on-campus undergraduate courses and those in e-learning courses.

Students taking traditional courses can now access course content through the e-campus and a part of their study plans is pursued in a mixed mode of face-to-face and through the e-campus. This methodology has led to the redesign of the whole curriculum and of each course within it.

An important element needs to be considered in this process: adaptation by teachers who need to adjust the content of the courses they teach. They need to redesign the curriculum so that what they teach is compatible with the use of ICTs. Thus the roles of both teachers and students are modified. Experience shows that the teacher is perceived more as a tutor or learning

guide for the students and the student as an active participant in the acquisition and construction of his/her own knowledge. The role of the teacher is to motivate, orientate and make the student's learning dynamic. The teacher's experience in the traditional on-campus classroom has great potential to be combined with the online modality. The following characteristics should be considered in this process:

- Content of courses should be specifically elaborated for e-learning not just a replica of the previous courses provided in the face-to-face class, but with the incorporation of multimedia elements that can attract and stimulate the students.
- Debate through discussion forums: systematic participation is a requirement of this pedagogical model, where the student is not a spectator but a constructor of his/her own academic experience.
- Scheduled activities sent by e-mail: organized assignments that can be done at home, and that encourage research and finding of information.
- Time-programmed evaluations: to have assessments to establish progress made by each student.
- Access to a digital library: to broaden the means and the amount of material that student can access.
- Access to a Learning Management System (LMS).

The UNIACC environment promotes creativity and innovation as central values. It has been a great motivator for getting better qualified teachers, especially with respect to new technologies. They have been constantly stimulated in the teaching and learning process, particularly with regard to the introduction of ICTs in teaching and learning through means such as e-learning, as well as audiovisual materials and equipment.

Academic programmes have been developed to satisfy the demands of new categories of students who require a new way of learning. In view of this, UNIACC has courses oriented not only towards students who have just concluded their secondary studies but also to adult learners.

The educational model for this second group of students is 100 per cent online courses for adults with previous professional working experience, who are studying in a lifelong learning framework. Adult learners who previously had not completed their higher level studies voluntarily undertake higher education in order to advance their professional careers or to complement and specialize their knowledge and skills for the labour market.

The teaching format of distance education requires a programme design where content is aligned to activities scheduled at the beginning of every course, with a view to promoting student-student and student-teacher collaboration, and to encourage the sharing of information.

In 1996, the e-learning programme began as a distance education system via the Internet. UNIACC Virtual University integrated human and material resources from the different parts of the institution, making up a team that was responsible for the programme. Close collaboration with the rest of the university was required, particularly with the schools and departments of continuing education.

While web technology was supporting the teaching/learning process of undergraduate studies, in 2001 the first exclusively distance education programme was put into operation and is an example of pedagogical innovation. In 2002 the university started its first 100 per cent online programme that prepared students for the university admission examination.

By 2003 the university implemented a unique curriculum, the Programa Especial de Titulación (PET)¹² which teaches in both online and face-to-face modes (in the evenings), to meet the needs of students enrolled in this programme, 95 per cent of whom were also working.

The first e-learning professional degree that was completely taught online was the business administration programme, I-COL. Later came the online psychology programme supported by traditional teaching at UNIACC, and other courses such as social communication and engineering, and a bachelor's degree programme in general studies. There are also two master's degree programmes, one in educative technologies and the other an International Master of Communication and Marketing.

There has been a significant increase in online courses offered between 2000 and 2006. In the year 2000 just 36 online courses were offered; by 2006 this figure had reached 1,709 courses, taking into account regular undergraduate programmes and PETs (see Table 4).

Table 4. Online courses offered between 2000 and 2006

Year	2000	2001	2002	2003	2004	2005	2006
No. of courses	36	128	341	546	711	1 245	1 709

Source: UNIACC data base.

As Andrés Lastra (2004), Academic Vice-Chancellor of UNIACC states: 'the present needs of continuous education in the different professional programmes; the transcendental character of transfer; a permanent upgrading; the constant technological change, and the different ways of learning, have led our university to a reorientation of its teaching model towards a model that integrates e-learning as a synergic part in its educational system.'

¹² Special Degree Programmes.

UNIACC utilizes the Modular Object-Oriented Dynamic Learning Environment (Moodle platform) which offers online courses with supporting face-to-face classes. It is geared towards providing collaborative, reflective and essential courses, using a friendly and accessible pedagogical format for both students and teachers. By means of this powerful technological tool, it is possible to teach programmes to any person, in any place and at any time.

To be able to provide the most comprehensive education possible, UNIACC has a digital virtual library, with a collection of documents, video cassettes, CDs, DVDs and other technological resources, available both on-campus or online, following the example of the most modern and advanced universities around the world. This digital material facilitates not only the access that students have to a wide range of information but also supports and encourages professors, researchers and faculties of the university to explore an extensive range of topics and provides access to the most recent discussions emerging round the world on a variety of topics. This access to information and technological tools demonstrates the potential of the distance teaching/learning system.

Different teaching materials such as complementary notes available on the Internet and virtual lectures have also been developed in the process of incorporating e-learning to the university. The dynamics of e-learning have provided a new type of relationship between professors and students, where diverse information, opinions and questions can be shared in a more fluid way. The assimilation of new technologies has enriched the student-teacher association as well as the means by which they communicate with each other, an illustration of another positive outcome resulting from using ICTs.

According to experiences gathered at UNIACC, three indispensable dimensions should be considered (Lastra, 2004): the academic platform, the

design of course content and the contribution of the learning guide. These three elements should be combined in a synergic way by establishing a multidisciplinary group made up of informatics and multimedia experts, methodology and pedagogical designers, and teachers, so as to provide both theoretical and practical knowledge from different viewpoints.

In order to produce positive academic results, facilities have been adjusted to meet these new requirements, as technology and the implicit infrastructure and technical support are necessary for allowing efficient and effective access to the system.

The technological equipment platform as well as electronic resources have been spread to other areas of UNIACC, affecting administrative procedures and resulting in improvements in different areas of the university. Technological orientation and innovations are seen in everyday activities as well as in the general institutional environment.

Teachers have also been influenced and have developed proactive innovations for institutional management, building a digital registration form that permits the system to have a record of the activities in their courses via a digital system. Attendance, content, assessment, timetables and events are all examples of activities that are controlled by a computer system.

UNIACC has been receptive to the challenges of the changing working environment, and has responded creatively. UNIACC, in its institutional profile, defines itself as oriented towards the arts and the field of communications. Today, the field of communications is strongly influenced by technology. In order to offer students high quality education, it should integrate this indispensable tool, technology, as a vital component of its academic activities. This conviction has been demonstrated in a variety of ways, but in general terms it can be shown by providing a well-equipped university with highly qualified staff and very motivated students who exploit the benefits of the ICTs provided.

All this reveals a transformation in the higher education model where technology is not only used in an efficient and friendly manner, but is also incorporated into the teaching/learning process.

Established models should be updated to meet the new demands of globalization. For a developing country such as Chile, one can consider globalization as a catalyst for improving professional skills so as to generate, manage and extend knowledge. For UNIACC to be pioneer in this line of action has meant experimenting in an unknown field. Due to its autonomy as an institution certified by the MOE, it will be able to advance with its innovative potential and offer, in a flexible way, a wider range of academic programmes that meet the social demands of high quality education.

One can therefore move forward towards a new concept of education that is compatible with globalization, where the teaching/learning process is complemented by a combination of technological systems, multimedia tools and a progressive incorporation of game models. In addition, a positive use of ICTs for interaction will make students protagonists of the educational process; their participation, collaboration and continuous communication will redefine a new manner of understanding so as to develop effective learning. In a world of widespread and fluent information networks, students will be the essential actors in a generation that retains, deepens and successfully achieves a sound knowledge-base that is related to their working lives.

V. Conclusion

Extended access and flexible learning opportunities are demands that have been made on higher education. New technologies have opened up a great opportunity for achieving quality education for an extensive number of people.

In this context assets acquired through e-learning implementation have been extensive in terms of inclusiveness, where good practice supports the development of knowledge and the upgrading of skills through an interactive system based on ICTs.

The teaching/learning process has to be coherent with this type of distance education and a redefinition of both teacher and student roles must be incorporated. While teachers need to learn about the technological means available and how to use them in a creative way for achieving effective academic results, students must integrate this process as active participants in this joint venture of knowledge construction.

Many initiatives have been made in the field of education. UNIACC's experience can be taken as an example of how advantageous the use of new technologies can be. There is scope for including people who probably otherwise would be excluded because they live in isolated places or they cannot fit in with the class schedule. In addition, students are helped to meet the challenges of the twenty-first century, with its language, codes, means of communication and interrelations.

E-learning has many barriers to overcome but eventually it will allow more harmonious development with the potential for greater social integration.

VI. Policy considerations

- Connectivity

Connectivity must be extended to ensure access to the Internet to those who do not have it. Connectivity should be improved in every location so that every citizen can be connected to the Internet, especially those who live in isolated places where going to a higher education institution is not an option.

A huge investment is required in order to be able to achieve this objective, thereby allowing schools, higher education institutions, cities and other places to be connected and to be able to communicate.

To widen access to the World Wide Web requires having a telecommunications system capable of allowing a proper connection. Infrastructure, computers and technological development are also crucial to support e-learning growth and quality.

- Training teaching personnel

Technology has been a great and significant factor in the development of education. An indispensable action is to provide those who are in charge of the teaching and learning process, the teachers, with the required training and qualifications. New skills, abilities and knowledge regarding e-learning, with particular emphasis on how to design curricula, evaluate achievements and teach online, are necessary.

It would be beneficial to establish a special foundation in order to specifically train teachers and professors in the differences between the on-campus and the online mode. Training would include understanding what participative and collaborative learning is, how to elaborate the content of courses and how they will be distributed, and, finally, how to measure the level of understanding from a distance.

- Sharing information

Considering that at present there are no specific regulations that establish what good practices are the desired outcomes of e-learning, it is necessary to learn from the example of others with experience in this field. Without many parameters, the best way to construct a good e-learning system is by sharing both successful and not so successful experiences of practical implementation and the particular challenges confronted. According to the findings, best practices can be determined and followed.

Being informed about what results can be achieved with e-learning is very important in order to eliminate scepticism and successfully apply the necessary changes in higher education, adjusting not just the infrastructure, facilities and equipment, but also the general opinion and understanding of the potential uses and outcomes of e-learning.

- Public-private alliance

There are strong and interesting players in the Chilean higher education system. Both private and public institutions have a significant role to play. Stakeholders are expected to invest in the system, particularly with improvement of the online environment. Expectations are focused on provision of new tools and improved elements that would add quality, interactivity and other attributes to the current academic distance programmes, while also subscribing to the concept of 'learning by doing'.

VII. Relevant internet sites

Educarchile

<http://www.educarchile.cl>

This web site offers information, resources, services and educational experiences for the needs and interest of academics, students, families and specialists. It also creates a space for communication and collaboration between different actors in the education community.

Educause

<http://www.educause.edu/>

This web site is oriented towards the advancement of higher education by promoting the intelligent use of information technology. Its resources include: professional development activities, applied research, strategic policy advocacy, teaching and learning initiatives, electronic publications and special interest collaborative communities.

José Joaquín Brunner

<http://www.brunner.cl>

José Joaquín Brunner is a recognized social scientist with a vast experience in the field of education. On his web site, he and other researchers inform, analyse and discuss education and educational policies in Chile and the world.

Red Enlaces

<http://www.enlaces.cl>

This web site is a part of the national policy for the introduction of communication and information technologies in Chile.

Revista de Educación a Distancia, RED

<http://www.um.es/ead/red/>

This is an online Spanish magazine that discusses distance education.

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Chapter 2

New Technologies in Higher Education: The Chinese Experience

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Chapter summary

Over the past decade, with China's economic and social development, the popularization of the use of information and communication technologies (ICTs) as well as the increased interest in lifelong learning opportunities, the number of people with access to higher education has increased greatly. Nonetheless, complex challenges remain to be overcome in order to increase participation in higher education to meet the challenges of globalization.

Distance higher education, through the increased use of ICTs, has become widespread to meet the growing demands of higher education.

This chapter outlines the important initiatives of the Ministry of Higher Education (MOE) in supporting the development of e-learning in the Chinese context. In addition, a case study of the China Radio and TV Universities (CRTVUs) system is presented, outlining the different aspects of this complex network of universities which currently serves 2.6 million students.

I. The Chinese higher education system

Introduction

Higher education is related directly to the social and economic development of a nation. The objective of higher education is to cultivate specialized skilled professionals of high quality and character, so as to meet the demands of social and economic development. With a view to keeping abreast with international educational transformation and deepening domestic reform in higher education, China has taken effective steps to launch innovative projects in the field of higher education. Thanks to efforts for joint facility building, cooperation, readjustments and collaboration in the reform of the structure of higher education institutions, China's higher education system has entered into a period of extensive improvement and development. Within the framework of this holistic reform approach to education, higher education will inevitably facilitate national economic development.

As a key component of the national education system in each country, higher education is important not only for transmitting knowledge but also for cultivating new ways of thinking and improving the skills of individuals. It promotes economic development as well as social, technical and cultural expansion in different regions or countries.

The Chinese government has always invested in the development of higher education. The rapid development of science and technology, and the emergence of a knowledge-based economy have brought about profound changes for China's higher education. Recently, the Chinese government adopted a series of policies and measures to speed up and intensify the reform of higher education and to encourage universities to collaborate closely together to support national economic and social development.

Higher education in China has played an important role in economic and social development by producing many talented professionals with

diversified skills. China has developed an established system of higher education. In 2006, there were a total of 2,311 higher education institutions (HEIs), among which there were 1,867 regular HEIs (RHEIs) and 444 adult higher education institutions (AHEIs) (see Table 1). The number of new enrolments and total enrolment have increased steadily. In 2006, the total number of new enrolments admitted by RHEIs was 5,460,500 students and the total enrolment was 17,388,400 students. The total number of new enrolments admitted by the AHEIs was 1,844,400 students while the total enrolment in these AHEIs was 5,248,800 students. The total number of graduates from RHEIs and AHEIs was 3,774,700 students and 815,200 students respectively (see Table 2).

Table 1: Higher education institutions in 2006

Category	RHEI		AHEI	PGU	
Number of universities	1 867		444	767	
	BDEI	HVEI		HEI	SRI
		1 147		450	317

Source: Bulletin issued by the Ministry of Education in 2006.

RHEIs = regular higher educational institutions

AHEIs = adult higher educational institutions

PGUs = postgraduate universities

BDEIs = bachelor degree education institutions

HVEIs = higher vocational education institutions

HEIs = higher educational institutions

SRI = scientific research institutes

Table 2: New enrolments, enrolments and graduates between 2004 and 2006

	Entrants		Enrolments		Graduates	
	RHEIs	AHEIs	RHEIs	AHEIs	RHEIs	AHEIs
2004	4 473 400	2 211 600	13 335 000	4 198 000	2 391 200	1 896 200
2005	5 044 600	1 930 300	15 617 800	4 360 700	3 068 000	1 667 900
2006	5 460 000	1 844 400	17 388 400	5 248 800	3 774 700	815 200

Over the past 10 years, China's higher education system has taken effective measures to adapt to social and economic requirements. As a result of structural reform, efficiency within the system has improved. Institutions have now been endowed with more autonomy in managing and running schools. According to the Ministry of Education (MOE), the reform of higher education involves five components: educational provision; management; investment; recruitment and job-placement; and intra-institutional management.

The overall objectives of higher education reform are to establish collaborative links between government, society and HEIs, establishing and perfecting a new system in which the state is responsible for the overall planning and macro-management, and HEIs, while following established rules, enjoy the autonomy to provide education projects based on the needs of society. Resulting from efforts to ensure joint facility building, increased cooperation between institutions, and certain readjustments and mergers, the structure and distribution of higher education has changed. Through the reform of the education system, a new system has emerged in which the government is primarily responsible for macro-control. Universities have improved their management techniques and now offer more flexible choices for students. A mechanism of joint investment in higher education has been established between government, society and the individuals involved. HEIs have modified their curricula and now try to

design their courses so as to ensure that they are work-related. As a result, tremendous achievements in the field of higher education have been made.

In general, the increase in enrolment rates has offered more opportunities, resulting in innovations that have made Chinese higher education institutions more competitive and stronger overall.

However, in order to be able to reach the goal of providing lifelong learning opportunities, multiple channels and strategies need to be developed to meet increasing social demands. To ensure the successful further development of quality higher education in China, according to Vice-Premier Chen Zhili,¹ 'the universities of the future will put in a more flexible and lively learning system to comply with the growing trend of lifelong education'.

II. Information and communication technologies and e-learning in the Chinese context

Advances in the development of technology, the key symbol of the twenty-first century, have gone hand-in-hand with an overall increase in productivity. Information and communication technologies (ICTs) and resources are becoming essential elements for production, intellectual property and social wealth. Meanwhile overall national strength and competitiveness rely more and more on the development of education and the accompanying increase in the level of scientific technology. A large number of high quality creative personnel are urgently needed to meet the demands of national development. The rapid growth of this information society stimulates a huge demand for various forms of education, especially higher education. Popularization of higher education and lifelong learning has become an inevitable trend for social development. However, owing to restrictions of the current economic climate and available educational resources, the number and scale of conventional universities cannot be expanded indefinitely.

¹ Chen, Zhili. 2002. *Proceedings of the Chinese-Foreign University Presidents Forum*, Beijing Higher Education Press.

The advent of a knowledge-based economy, and the advancement and application of ICTs have greatly influenced daily lives in China. According to the China Internet Network Information Centre (CNNIC), at the beginning of 2007 there were more than 139 million people in China using the Internet for at least one hour per week. With a view to facilitating economic development and social harmony, the Chinese government attaches great importance to improving education via new technologies.

The emergence of a third generation of distance education, entitled 'modern distance education' (MDE), which is based on ICTs, provides a solution to some of the obstacles facing social development. MDE includes the integration of satellite TV broadcasting systems and Internet, across time and space, allowing students to study any course, in any form regardless of restrictions of time and place. In 1998, the State Council approved the MOE's *Education Rejuvenation Action Plan towards the Twenty-first Century*.² This Action Plan clearly indicates that MDE has to be implemented in order to form an open education network and to establish a lifelong learning mechanism. In 1999, four conventional universities were initially approved by the MOE to establish e-colleges. Later, another fifteen conventional universities including Renmin University and Beijing Foreign Studies University were approved for involvement in MDE. To date, in this framework, sixty-seven e-colleges together with the China Central TV and Radio University (CCRTVU) offer different educational opportunities, including degree and non-degree education, to an increasing number of people in China.

Infrastructure development

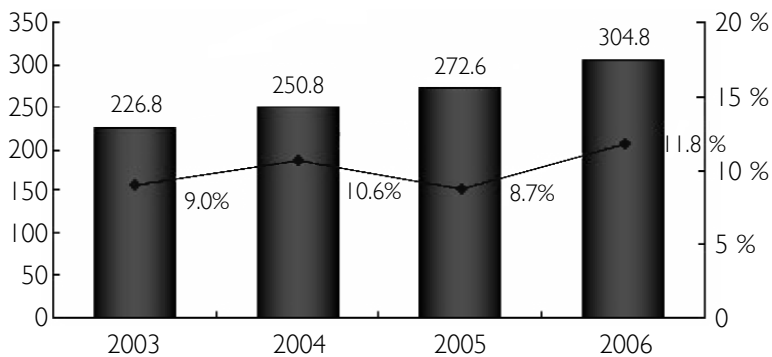
Further to recommendations of the *Education Rejuvenation Action Plan towards the Twenty-first Century*, the delivery of MDE has been based on the China Education and Research Network (CERNet) and the Satellite TV video delivery system (CEBSat). In 2004, the MOE issued the *2003-2007*

² <http://www.moe.edu.cn/edoas/website18/info3337.htm> (In Chinese only).

Education Rejuvenation Action Plan,³ which further emphasized the need to: implement infrastructure development for e-learning; accelerate the upgrading and expansion of CERNet's capacity and the educational satellite TV broadband delivery network; actively participate in the Internet and grid construction; strengthen the integration of resources to establish a public educational information service mechanism; and establish an Internet education public service platform for software and hardware sharing.

According to statistics, there has been consecutive growth of national investment in information infrastructure, which has accelerated the ICT infrastructure for MDE (See Figure 1.).⁴

Figure 1: National investment for informatization infrastructure construction from 2003 to 2006



³ <http://www.moe.edu.cn/edoas/website18/info3338.htm> (In Chinese only).

⁴ 2003-2006 Situation about Informatization Investment: <http://article.pchome.net/192413.html>

The *China Informatics Development Report* of 2005 indicates that CERNet and CEBSat have been connected nationally at a speed of 100 megabytes/second. Satellite TV, Internet and human resources for MDE networks have been combined. CERNet's main cable is 30 thousand kilometres long and the overall capacity of the main network reaches 40 gigabytes per second (Gb/s) covering more than 200 cities in 31 provinces (regions and municipalities). It has a nationwide network centre, 10 regional Internet centres, 38 host nodes, 28 international and regional channels, the international outlet band-width is over 3Gb/s, and national connection with the domestic Internet exceeds 10 Gb/s.⁵ In 2007, the China Grid project was successfully completed, connecting computers, storage and software resources from 20 universities. The CEBSat broadband multimedia delivery platform is a nationwide network, which can offer eight sets of digital TV programmes and eight vertical blanking intervals (VBI) digital broadcasting programmes. More than 2 million students can watch programmes showing education-related information on subjects such as poverty reduction, and CCRTVU's distance education programmes. They can also participate in fundamental education synchronized classrooms, satellite TV English classrooms, rural broadcasting programmes and distance education courses for the military.

The platform combining satellite TV, Internet and human resources is convenient for information delivery, sharing and management of distance higher education. The wide use of new technology in distance higher education such as the Internet and distributed computation, the application of multimedia and peer-to-peer video on demand, video conferencing systems and wireless communication accelerates the speed of delivering and sharing resources.

Furthermore, some 70 per cent of universities have established their own Intranet networks. In the western part of China, there are more than 150

⁵ <http://www.moe.gov.cn/edoas/website18/info25213.htm> (In Chinese only).

universities connected to CERNet. The China Academic Digital Library Information System (CADLIS) has also been constructed and represents a link between the China Academic Library and Information System (CALIS) and the China-America Digital Academic Library (CADAL). In 1999, the project Online Courses Construction Engineering in the New Century was launched. Now more than 300 higher education online courses and various kinds of resource banks have been developed and 1,139 national courses of high quality have been completed. In addition, 19 university digital museums have been established. At the same time, the Higher Education Instrument Facilities and Quality Resources Sharing System has passed the acceptance test. These projects all demonstrate the increased use of ICTs in the field of higher education.

MOE-initiated projects

Course content development - The Project of Online Courses Construction Engineering in the New Century

Within the framework of MDE, the Internet infrastructure can be seen as the foundation, the development of resources as the core and educational application as the objective. For quite some time, e-colleges in conventional universities have been working independently and have designed Internet courses separately. Online education has increased, but the lack of collaboration between e-colleges has resulted in an inefficient use of educational resources. The Project of Online Courses Construction Engineering in the New Century launched by the MOE, has facilitated and supported the construction and application of online courses in e-colleges in some of the conventional universities with a view to sharing resources. In response to survey results on the demand of e-college resources, the most needed teaching resources were identified through this project. The completed online courses are used in e-colleges on a pilot basis and also for courses providing credit towards a degree. Colleges in developed and

developing regions have also strongly supported each other. Students in different parts of China can share the advanced teaching methodology and rich educational resources, resulting in an overall improvement in the quality of educational provision. This initiative has had a great impact on higher education in China.⁶

Course content development - The National MDE Resources Database Construction Project

In October 2003, the MOE authorized the CRTVUs system to launch the National Modern Distance Education Resources Database Construction Project. The project aims to integrate and develop teaching resources of good quality and improve the utilization of resources by establishing a national distance education resource database. This tool is a distributed resources database system of great capacity, covering distance education resources in China and abroad, including a central resource database and distributed node resource databases in different areas. By the end of December 2006, the central resources database in the National Modern Distance Education Resources Database Construction Project had already integrated 100,000 items (e.g. teaching materials and distance education resources) of over 5,000 gigabytes capacity from 5 different sources including the CRTVUs system, e-colleges in conventional universities, vocational education programmes, conventional universities abroad and public teaching materials.

By the end of 2006, this database included videotapes for 20,000 teaching hours, more than 3,000 sets of final examination papers from previous years from CCRTVU, 1,000 hours of audio and visual resources from Tsinghua University, over 500 open courses from the Massachusetts Institute of Technology (MIT) and more than 5,000 academic papers about distance education.⁷

⁶ <http://www.mder.com.cn/WebCenter/> (In Chinese only).

⁷ New Century web-based courses,
<http://www.mder.com.cn/WebCenter/item/part/xsj/index.htm>

The construction of a digital resource database provides, to some extent, a solution to the shortage of resources available for distance education development and the imbalance of resource allocation. Concentrating on the development of good quality resources and improving the efficient use of these resources through an effective resource-sharing plan will definitely improve the overall quality of distance higher education and lower the cost of running schools.

The CRTVU Public Service System

One of the characteristics of distance education is the separation between teaching venues and learning sites, in both time and place. As a result, learning support and teaching resources have become the two pillars of quality assurance for distance education. In recent years, many problems and contradictions have emerged that affect the quality of online learning in the development of grass-roots teaching sites, learning support services and educational management. Further to the approval of the Higher Education Department of the MOE for the establishment of a Public Service System by CCRTVU, in March 2005, CCRTVU, together with CRTVU-Online, established the Open Distance Education Centre (OPEN). OPEN provides off-campus learning support for MDE in higher education institutions via an online public services platform. At the same time, it also offers a special MDE learning support service for educational administrative departments and academic institutions. OPEN offers a 'One-Stop' online learning service for students by connecting them with academic management platforms in collaborative universities. It delivers multimedia materials to students such as student registers, course selection tools, applications for examinations and the payment of tuition fees, online assignments and examination assessment. These materials are delivered via the Internet, free phone calls and mobile learning, thus satisfying individual demands of students for teaching and services.⁸

⁸ Distance and Continuing Division, Higher Education Dept, MOE. General Introduction about the Web-Based Courses Construction Engineering in the New Century Project, [], 2003 (9).

The implementation of a public service system shows that repeated waste of resources can be reduced using the online public service platform and study centres located all over China, targeting education institutions using e-learning for educational delivery. Through such a system, organizations can focus on building up teaching resources and reforming online teaching and management methods. At the same time, a well-managed specialist team providing an efficient service can be formed to further strengthen learning support services and ensure quality distance higher education.

Digital Harbour for Educational Reform Project

ICTs and e-learning strongly support the development of MDE as well as creating a huge market for digital learning support services. In the context of establishing a lifelong learning society, the MOE launched the Digital Harbour for Educational Reform Project in June 2006. The purpose of this Project was to make full use of ICTs, establish a digital learning support service system for the development of lifelong, online and open continuing education. This Project integrates ICTs, and organizes resource providers and service operators in a marketing mechanism. The Digital Harbour creates an e-learning environment with the integration of web sites and platforms, and offer web-based service and management. It also provides students with e-learning resources, a learning support service and support for educational management. Researchers describe the Digital Harbour as an e-learning supermarket, located in different geographical areas. It aims to create a standardized learning environment and offer friendly, personalized service at low cost, to meet the demand of various groups of students for access to good learning resources and services.⁹

Digital Harbours differ from a public service system which exclusively serves school-run institutions. While a public service system is an important component of the Digital Harbours, the latter project is mainly established for local communities and businesses.

⁹ Luo Gang. Establishing Modern Distance Education Resource Database, Service and Knowledge Based Society [J], *Modern Education Technology*, 2007(4).

III. A case study: The China Radio and TV Universities System

Introduction

The China Radio and TV Universities (CRTVUs) system constitutes a nationwide education system, dedicated to distance education. Since its establishment, 29 years ago, this system has made great commitments and contributions to training large numbers of students to adapt to local requirements, producing more than 6.32 million tertiary-level graduates. The total number of active students in the system is now 2.6 million. Among the 44 local provincial radio and television universities (PRTVUs), three exceeded a 100,000 enrolments in 2006.¹⁰ The CRTVUs system, as the mainstay of distance education in China, is making continuous efforts to take further steps through innovative educational reforms via the application of modern technology.

The structure of the CRTVUs system

The CRTVUs system was approved by the Senior Leader Deng Xiaoping in 1978. It was an astute idea to establish an open university in China at the time with its comparatively difficult economic situation and relatively limited educational infrastructure. Deng Xiaoping took an open-minded forward-thinking view when he stressed the need to formulate measures to speed up the development of modern educational tools such as broadcasting and TV, important means to develop and improve educational activities efficiently and economically.

Since the establishment of the CRTVUs system, through joint efforts from both central and local governments, a nationwide distance education system has been formed that includes: CCRTVU, 44 PRTVUs, 945 branch

¹⁰ These universities are: Guangdong Radio and TV University, Jiangsu Radio and TV University and Zhejiang Radio and TV University.

schools at prefecture and city-levels, 1,842 work-stations at county-level and 46,724 teaching classes. The establishment of the CRTVUs system has changed the imbalanced distribution of educational delivery and provided more opportunities for those who have aspirations to go on to higher education or those who wish to find a convenient way of training in order to obtain a certificate. The CRTVUs system is now regarded as the largest distance education system in the world and is also looked upon as the mainstay for development of distance education in China. According to yearly statistics (March 2007), the CRTVUs system generated more than 730,000 tertiary-level graduates in 2006, which indicates an increase of 20.7 per cent compared with the number produced in 2005. The total number of new enrolments reached more than 760,000 students, which indicates an increase of 3.97 per cent as compared with the preceding year. In comparison with AHEIs and RHEIs, the enrolment of the CRTVUs system reflects 34.7 per cent of the total number of China's AHEIs and 10.06 per cent of China's RHEIs. The number of new enrolments in the CRTVUs system amounts to 28.46 per cent of China's student population in AHEIs and 9.63 per cent of those in RHEIs. The number of graduates of the CRTVUs system is 27.8 per cent and 11.54 per cent of China's AHEIs and RHEIs students respectively.

Open education pilot project

The open education pilot project, approved by the MOE and recognized as an important component of MDE, aims to support the development of relevant teaching methods, academic management structures, and the systematic mechanisms necessary for the development of high-level applied professional skills to meet the needs of society. Aside from the important issue of ensuring the development of effective MDE delivery systems through the use of ICTs, a further important focus is the development of an open education concept and system. In this regard, in this project,

research and practice focus on 7 topics: i) the target students, teaching objectives and specifications, ii) the structure of students' knowledge, capability and quality, course system and teaching content, iii) practical teaching procedures, iv) ICTs and the application of educational technology, v) teaching and learning methods, vi) academic management methods and learning support system and vii) the learning evaluation and quality assurance system.

Under the supervision and support of the MOE and local governments, the project officially started in June 1999. It was organized by CCRTVU with the participation of nationwide RTVUs and involvement of collaborative conventional universities and other organizations. By the end of 2006, more than 1.7 million graduates had been produced and there had been more than 2.17 million active students.

Programme to improve professional skills and competencies

The Improvement of Skills and Competencies programme is a work-place based training method aiming to improve professional skills and competencies. This programme aims to support highly skilled practising professionals who can apply what they have learned to their practical experiences and make contributions to local economic development. This programme aims to meet the demands of existing economic and social development. Specializations and courses are adapted to the learning demands of employees by: integrating and optimizing learning resources, taking into account the learning environment of the three combined networks (TV-based, web-based and human-based), promoting autonomous learning for students as the principal approach and guaranteeing a strict but flexible management approach.

Teaching methodology

Meeting the specific requirements of adult distance education delivery is quite different from traditional pedagogic methods in regular higher education institutions. In view of this, a 'guided learning methodology' has been identified by the CRTVUs system. This methodology stresses that students can make use of many media resources to achieve autonomous learning and collaborative learning. Based on teaching design, teachers may encourage and give guidance to students in a variety of ways, and institutions may offer learning support throughout the whole learning process. This method of teaching has changed the traditional mode of one-way transmission by TV and broadcasting and the closed methods of face-to-face education. It addresses the students' particular needs and conducts education according to their personal capacities and context. This methodology focuses on assisting students to solve difficulties and to encourage interaction throughout the learning process. In addition, each local RTVU formulates its own teaching methodology in a particular subject or course, according to local characteristics.

Management

When the CRTVUs system started to run schools at different levels in a more systematic and coordinated way, it had to stipulate a series of management standards and implementation regulations. By focusing on people-oriented management, the CRTVUs system has reinforced management of the whole learning process, enhanced assessment, improved standards, and increased management capacity through application of ICTs. Within this framework, each RTVU has also been able to develop and enrich its systematic operations in accordance with local circumstances.

Operational mechanisms

By working together with conventional universities and relevant ministries and organizations, the CRTVUs system has created an integrated operational mechanism that is demand-driven and encourages project cooperation. Activities are based on contractual agreements and modifications and adjustments instituted through established feedback loops. This integrated operational mechanism reflects the idea that promotion of MDE should be undertaken in various ways. Without this basic approach of integrated design and implementation, transparency and constructive competition will be jeopardized. The very nature of open education is compatible with innovative ideas, learning resources, learning environments and learning approaches, but is dependent on a high degree of collaboration and integration.

Infrastructure

The combined network of satellite TV and Internet, and an effective academic management network constitute the main components of the CRTVUs system. The three-level teaching and learning platform developed by CRTVU-Online comprises of a digital interactive learning environment that includes the CRTVUs, PRTVUs and the branch school's learning platforms. This is achieved via an education satellite broadband transmission platform and the Internet delivering learning resources and interactive teaching and learning activities.

The fixed assets of the CRTVUs system are worth 238 million Renminbi (RMB) Yuan. This includes teaching equipment valued at 57.9 million RMB Yuan. There are more than 32 million computers available for online education. The main network in the PRTVUs has reached 1 gigabyte and the band-width of this outlet is 100 megabytes. Students in different parts of China may receive education programmes in different ways. As the

satellite TV delivery channel runs at a high transmission speed, it is suitable for delivering multimedia messages like video streaming and animation, etc. (Muzhen, 2007). Meanwhile, as e-learning is so popular, it is easy to browse learning resources and have interactions with instructors and other students.

In the CRTVUs system, a three-level interactive platform has been developed to connect the central and local RTVUs so that documents and information can be transferred when necessary. A learning management platform allows students to acquire necessary learning materials and explore references, download tutorial timetables or submit their assignments. Apart from this, full use has been made of telephones, video conferencing systems, e-mail and a Microsoft Messenger (MSN) to enable interaction to take place at any time so that obstacles faced by students can be overcome and more students will complete their studies. Interaction is increasing within the system thanks to supporting regulations and the efforts and awareness of CRTVUs system instructors.

Course development

The CRTVUs system has taken many effective measures to ensure quality open distance learning (ODL). One critical measure is to select and design the content of the system with relevant courses and materials, which means offering courses different from those offered by campus-based traditional face-to-face education. The course structure is based on three main principles with emphasis on: teaching objectives, students' subject specialization and the potential for applying what students have learnt.

As a knowledge-based economy calls for more competence and practical skills, the current CRTVUs system curriculum has been reformed and adjusted to adapt to new requirements. Since 1999, the CRTVUs system

has developed 60 pilot specialties including 18 specialties for bachelor's degrees and 42 specializations for diplomas. The considerable range of courses on offer has increased flexibility and appeal. A reform on the modular construction for courses such as mathematics and English has been carried out and focus lies on practical experiments for some engineering and accounting courses. A simulated court for law courses has been set up, and theoretical and practical teaching is combined for management courses. It is considered important that courses on offer be compatible with social and market demands so that students can be fully prepared for their present and future needs. It is true that the CRTVUs of all levels have long been focusing their orientation on cultivating applied professional skills so that students can link their study with their current work and future career. Innovation and reform of the curriculum will be continued by adjusting, supplementing and creating new courses and subjects. The fields of study now offered include law, literature, accounting and finance, science and engineering, agriculture, medicine, education and languages, etc. According to the outcome of some surveys carried out recently, it is likely that the scale of provision for subjects such as accounting, computer application, law and business management will be increased.

Links to the workplace

CCRTVU works with both relevant ministries and commissions as well as with trades and industry. A finance course, for example, is offered together with the Chinese People's Bank (the Central Bank of China), civil engineering with the Ministry of Construction, digital control with the Mechanical Education Development Centre, hydropower and water conservancy with the Ministry of Water Resources, etc. There has also been collaboration with conventional universities to offer subjects leading to bachelor's and master's degrees in subjects such as computer applications and educational technology. To date, contracts have been signed with 20

conventional universities and 14 ministries to offer degree courses, non-degree courses or research projects.

Student support

Student support is looked upon as the base to quality assurance of ODL. In the CRTVUs system, regulations and rules have been set up to control every procedure from the delivery of course materials to the deadline for replies to the students' enquiries. Not only have infrastructure and facilities been provided to serve students, but full use has also been made of staff available in call centres, enquiry offices and libraries to encourage them to help students achieve their learning objectives. The philosophy of 'student-focus' is adhered to and every attempt is made to provide effective face-to-face tutorials, laying emphasis on participatory involvement on the part of the students. The aim is to enable every student to be independent and successful, not only in the present but also in the future. One of the research findings indicates that the overall rate of satisfaction of students towards the CRTVUs system has reached 84.5 per cent, which shows that the CRTVUs system provides an efficient support service to their target students. Access is open to new students as soon as they are registered. Independent and collaborative learning is encouraged and efforts are made to meet the demands of the majority of learning groups.

Quality assurance

Quality assurance is of major concern in large institutions such as the CRTVUs system. With a view to encouraging change, focus has not only been directed towards increasing scale but also towards enhancing the quality of the educational provision. The CRTVUs system treasures quality in distance higher education and considers quality assurance as a critical component to its success. For the past 29 years, the system has made rules

and regulations and set criteria and standards to assure quality. Five main principles serve as guidelines for academic management. These five principles are unified teaching plans, curricula, teaching materials, examinations and marking standards.

A further five factors are also important elements and symbols for MDE: development of teaching and learning resources, control of teaching and learning processes, provision of learning support, management of academic delivery and the overall operation of the CRTVUs system.

To offer quality education not only do unified standards have to be established, but also a friendly environment should be created. It is also important to ensure the development of qualified staff and ample resources. Meanwhile, helpful support and a flexible but strict management structure needs to be in place. In order to keep informed of the progress and outcomes of target students and to enable students to know what they have achieved, formative and review assessments are also offered. Formative assessment is an important means to enhance guidance and management throughout the learning process. By making systematic assessments of learning achievements and providing necessary feedback of learning information, the independent learning capacity of students can be identified and their understanding of the subject matter enhanced. Meanwhile, formative and review assessments are also an effective way to examine course content and teaching results so that further reform of the teaching and course structure can be conducted in the future.

Both internal and external assessments are carried out regularly so as to enable reflection on past experiences. Though it is not easy to control overall quality within a system as large as that of the CRTVUs system, endeavours are being made to maintain its sustainable development.

Staff development

Both academic staff and administrators in the CRTVUs system play important roles in supporting the students and they, to some extent, affect the overall quality assurance of the system. For this reason, the recruitment of competent staff members is paramount. It is believed that professionals working for ODL should not only be experts in their subject areas, but also familiar with the learning environment and methodologies used in ODL. The range of responsibilities of different teachers is restricted to: identifying their respective working objectives, providing regular workshops and seminars as well as regularly reviewing their performance and achievements.

In this way, academic staff can be fully aware of their duties, exert their initiatives and contribute proactively to facilitating and guiding their students. According to yearly statistical data, there are now more than 40,000 full-time and more than 30,000 part-time teachers working for the CRTVUs system. It can be said that they serve as a link in achieving the learning process of ODL. They are now even striving for better performance through enthusiastic encouragement and effective management.

Educational interactions

In the context of MDE, interaction between students and teachers or between students themselves is of vital importance in the learning process. Many experts have pointed out that without interaction, the students will never feel they are getting in touch with the institutions. The separation between students and teachers in physical distance must be bridged by interactions so that students may obtain sustainable assistance. The process of interaction is vital and attempts need to be made to enable its effective implementation.

The value of the CRTVUs system

The CRTVUs system is continually progressing and is at the forefront of open universities worldwide. The CRTVUs system will meet the new challenges with courage, intelligence and a positive attitude in order to achieve valuable knowledge dissemination and delivery. The CRTVUs system will serve as a stepping stone for people to make progress, a means to demonstrate educational equity and a vehicle for students to gain self enrichment and motivation.

Experiences indicate that the objectives of open education must be clarified to meet social needs. Furthermore, learning resources must be sufficient to allow students to have a range of choices. In addition, learning support must be efficient, based on a student-centred philosophy. In this context, technology must be user-friendly to guarantee interaction when needed, while staff should be qualified to provide pedagogic guidance and facilitate interactive activities. Finally, management must be effective to offer standard criteria and assessment.

Achievements of the CRTVUs system can be seen by observing their infrastructure, their increased comprehensive capacity in running schools, and their real value as truly innovative universities.

IV. Conclusion

Massification of higher education is relevant to every country, including China. The Chinese government has attached great importance to bringing education to the forefront. Since 1986, a series of educational laws have been promulgated and many effective measures have been taken, that have enabled the education system to be improved and educational continuity to be more coherent. While accelerating the implementation of continuing education and lifelong learning, the CRTVUs system has shown

a very positive attitude by raising awareness and developing peoples' knowledge and skills. Many new projects have been formulated and efforts have been made to address the needs of everybody, particularly those of minority groups. The CRTVUs system has not only offered opportunities and services for disadvantaged people and those in less developed areas, but has also assisted students to be useful and valuable in the social development and construction of China. The CRTVUs system practises the concept of open education and education for all.

According to Martin Trow (1974) in the context of industrialized or developing economies, the evolution of higher education passes from the elite to the masses and then to systems at a global level. For the past few years China has entered into the phase of mass education. The remarkable record of a gross higher education entrance rate of 22 per cent in 2006 symbolized significant progress (see Table 3). However, in view of the remaining percentage of young people who do not attend higher education, there is a long way to go in catching up with enrolment rates found in many developed countries. Looking at the dramatic increase in demand for higher education, but the limited financial input in education delivery from national gross domestic product (GDP) (see Table 4), it can be predicated that there is still great potential to develop distance and online learning programmes in the coming years in order to meet demand.

Table 3: Gross new enrolment rate for HEIs between 1998 and 2006

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006
Percentage %	9.8	10.5	12.5	13.3	15.0	17.0	19.0	21.0	22.0

Source: Ministry of Education.

Table 4: China's educational expenditure as a percentage of GDP between 1993 and 2006

Year	1993	1994	1995	1996	1997	1998	1999
Percentage %	2.51	2.51	2.41	2.44	2.49	2.55	2.79
Year	2000	2001	2002	2003	2004	2005	2006
Percentage %	2.87	3.19	3.32	3.28	2.79	2.86	-

Source: Ministry of Education.

If China expects to catch up with the developed world soon, it must develop multiple education channels and allow more people to benefit from higher distance education provision. The CRTVUs system has taken on the great mission of offering more and varied opportunities for further education to the general public through MDE provisions. The open learning concept that the CRTVUs system has valued for so long lies in the openness in which schools are run, addressing a wide range of needs of society. The open learning concept reflects flexibility, affordability, availability and social value. It implies educational democracy and social fairness in programmes delivered and services offered to the general public. Orientation towards grass-roots units, rural and remote regions, and ethnic minority groups has ensured that the CRTVUs system has gained social recognition and reputation. Surveys conducted recently found more than 80 per cent of graduates satisfied with the system and more than 83 per cent of employers satisfied with graduates from the system. By studying projects carried out over the past years, a very positive social impact can be seen. Projects initiated by the CRTVUs system have offered more opportunities for less developed areas and less advantaged people, which has resulted in greater educational equity and social fairness, and created a learning environment in a more harmonious society.

China is a large country with a large population and diversified characteristics in different regions. There are extreme differences in economic prosperity and educational resources and delivery. The southern, eastern and coastal areas seem more advanced compared with western and central areas. To even out the balance for development in different regions, the government has adopted many proactive strategies in western areas, which have reduced this gap in equity. However, if one intends to achieve a real sense of equality in the expansion of higher education, one should depend not only on the government but also on inputs from society and higher education institutions. Efforts made by the CRTVUs system in the past few years have demonstrated this approach.

V. Policy considerations

Though distance education and e-learning have made large strides in the context of China, there are many more challenges to be faced. Further exploration and research is required on current topical issues and stronger support in policy and strategy development is needed.

- The need to develop education at multiple levels, in multiple dimensions

Demands for lifelong learning will become more diversified so it is essential to develop education at multiple levels, in multiple dimensions and varieties. It is useful when government establishes laws and regulations to allow each category of education to develop its own characteristics and trademarks, within pre-defined parameters.

- The need to develop national criteria for quality assurance of distance education and e-learning

With the objective of improving skills, distance learners should be able to become more practically oriented professionals. Pre-learning assessment, experience evaluation and credit transfer should also be

achieved so that more adult working students can benefit from diversified learning channels.

- **The need to put regional divergence in place**
Regional divergence needs to be put in place by decision-makers, and relevant strategies and guidance should be provided to reduce the imbalance of development. Partial support for infrastructure and training programmes should be provided, particularly to less developed areas. Of all the solutions, those that might stimulate enthusiasm and participation on the part of the local authorities should be encouraged.
- **The need to control and manage open education resources**
Effectiveness of open learning resources depends on effective management and adaptable operating mechanisms. Thus, it is beneficial if government entrusts educational institutions with responsibility for decisions so that sustainable development for distance education and e-learning can be maintained.
- **The need to encourage international exchange between institutions in different regions**
Good practices should be circulated and shared among institutions so that distance education and e-learning practice can be guided in the right direction and developed harmoniously around the world. It is sincerely hoped that UNESCO will work to generate links and bridges between countries for promoting and enhancing the exchange of activities and information.

We are aware that the government has placed great hope on undertaking of open learning and MDE. Sustainable development for developing institutional suggestions needs to be maintained to meet social demand. This is not only a starting point of the CRTVUs system, but also a long-term objective. The CRTVUs system needs to increase

its openness, maintain a high quality of educational provision, enrich its main characteristics and establish itself as a brand name. The vision from the current president, Prof. Ge Daokai, encourages the input of sustainable commitments to the further development of the CRTVUs system through the following efforts: assembling quality learning resources, providing considerate learning support, conducting lively scientific research and constructing a lifelong learning platform for the general public in order to serve professional education, to establish a harmonious society and create a satisfactory distance and open learning environment.

VI. Relevant web links

Agriculture: <http://www.sannong.com.cn>

College for Disabled People: <http://www.sunnylearn.cn>

General information on the CRTVUs system: <http://www.crtvu.edu.cn>

Ministry of Education of the People's Republic of China:

<http://www.moe.edu.cn>

National Modern Distance Educational Resources:

<http://www.mder.com.cn>

Open Education Project: <http://www.l.open.edu.cn>

'One Student in One Village' Scheme: <http://ycy.open.edu.cn>

Public Learning Support: <http://www.openonline.com.cn>

Regular Higher Education, China Education and Research network:

Teaching Chinese as a Foreign Language: <http://www.mychinese.org>

<http://www.cernet.edu.cn>

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www.aaou.or.kr

Conclusion

The experiences of China and Chile presented in this volume illustrate how information and communication technologies (ICTs) have been used to address increasing higher education enrolments in two very different contexts. The two cases studied show consensus on a number of key issues as well as diversity in approaches and innovations.

Both studies highlight the recognition of the important role of higher education as a means of promoting national social and economic growth. The value of ICTs for providing the kinds of learning required in the global knowledge economy - lifelong frameworks and programmes that are responsive to national capacity building requirements as well as to individual student needs - is stressed in both studies. Furthermore, both analyses recognize the importance of ensuring that the teaching and learning processes are duly receptive to the specificities of ICT-enhanced learning, whether in terms of course development, student/student and student/teacher interactions, and/or quality assurance mechanisms.

The Chilean experience attests to the value of distance education, and specifically e-learning by illustrating the widespread national use of this mode of instruction. The case study of the Universidad de las Artes Ciencias y Comunicación (UNIACC) provides rich examples of the incorporation of ICTs at university-level into both distance and face-to-face courses. The importance of the changing roles of students and teachers in ICT-enhanced education is stressed in this study. It underlines the methodologies that have been chosen to meet the needs of traditional students entering higher education directly from secondary school, as well as those of adult learners who are returning to upgrade their professional skills.

The Chinese experience illustrates how China's national higher education system has taken effective measures to adapt to very rapid social and economic development. This chapter outlines the innovative projects initiated by the Ministry of Education to harness the potential of ICTs for educational provision which is responsive to national capacity-building needs. The case study of the China Radio and TV Universities (CRTVUs) system illustrates a novel structure that has provided educational delivery in geographically diverse regions in the country for over 6 million students during its 29-year history. This case study provides in-depth details on the innovations occurring in the different components of this system.

The policy considerations provided at the end of each chapter outline the key points that have proven to be effective for decision-makers in making informed policy choices in each of the national contexts discussed. In the framework of South-South cooperation, the lessons learnt from the varied experiences in Chile and China provide illustrations of valuable best practices in the use of ICTs for higher education for other countries facing similar challenges.