

Egypt

Introduction

The Egyptian government identified information and communication technology (ICT) as a national development priority in 1999, and the country aspires to become a regional and international ICT provider competing with India and Ireland (Hassanin, 2003). In October 1999, a new Egyptian Ministry of Communications and Information Technology (MCIT) was established as the first step towards executing the national project for a technological renaissance to achieve the 'Egyptian Information Society' (Darwish, 2003), which aims to offer individuals, businesses and communities the opportunity to harness the benefits of ICT within the boundaries of national priorities and issues (ESCWA, n.d.). MCIT was entrusted with developing and improving the telecommunication infrastructure, creating an Egyptian Information Society and preparing the National Communications and Information Technology Plan (NCITP). MCIT's strategy concentrates on building partnerships with the private sector via working groups to produce new initiatives and projects for the ICT market (Ismail & El Nawawy, n.d.).

It is within this movement that current trends in ICT in higher education are located. This chapter provides a review of literature on the status of higher education and ICT in Egypt. The broader context of prioritising ICT on a national level is considered, before looking specifically at higher education challenges and e-learning initiatives centred in higher education. Internet-based searching, the resource

centre of the South African Institute of Distance Education (SAIDE) and an Egyptian educational technology expert provided the input for this review. While every attempt was made to gather up-to-date information, there was a general paucity of research on the use of e-learning at higher education institutions, as well as on challenges facing higher education in Egypt. Nevertheless, most recent reports are represented, and attempts were made to extricate information from various other reports. Several university web sites were reviewed in order to ascertain whether they had ICT and e-learning policies or whether they offered an e-learning component. The research revealed large disparities between institutions regarding ICT resources and use of e-learning, with some universities having established e-learning centres, while others did not provide any e-learning facility. In addition, reports on challenges facing the higher education sector point to the need to focus on e-learning as an area of priority.

National infrastructure

It is estimated that 98 per cent of the Egyptian population have access to mains electricity supply (CIA, 2006). Egypt has a modern, 90 per cent digital, telephone network, due to an extensive improvement of its infrastructure throughout the 1990s. Internet and mobile telephone services are available in most of Egypt. Demand for telecommunications services of all kinds (from fixed and mobile telephony to data communications and Internet usage) is growing faster than the capacity to meet it, and Telecom Egypt continues to invest in new infrastructure (Mohammed Shakeel, 2006).

Table 1.1: Telecommunications infrastructure indicators, August 2005

Detail	Indicator	Extent
Fixed services	Exchange capacity	12.5 million
	Fixed telephone line subscribers	10.2 million
	Waiting list for fixed telephone lines	65 928
	Exchanges in rural areas	1 119
	Public phone cabinets	55 352
Mobile lines	Mobile phone subscribers	11.224 million
	Mobile phones per 100 people	15.8
	Mobile service companies	2
Internet penetration	Internet capacity	3 345 Mbps
	Internet users	5 million
	Monthly internet subscription	Cost of local call
PC penetration	PCs	2.54 million
	PCs per 100 people	3.58

Source: MCIT (2005)

Domestic communications are based on a coaxial cable and a microwave radio relay that has key hubs in the capital, Cairo, and major provincial cities (Alexandria, Tanta, Mansura, Suez and Ismailia). The country has an X.25 network, Egypt Net, with a capacity of 3 500 ports and access rates up to 256 Kbps. Both frame relay services and digital leased lines offer access rates up to 2 Mbps. For regional communications, Egypt, Syria and Lebanon laid a fibre-optic cable called ALETAR-BRYTAR in 1997, and a regional microwave system links Egypt to Libya and Jordan. Egypt is a member of the Arab Satellite Communications Organisation (ARABSAT), which provides regional telecommunications services for the Middle East region. International communications are conducted through satellite earth stations, five submarine fibre-optic links and a microwave radio relay. Egypt is connected to the SEA-ME-WE3 submarine fibre-optic system and is a member of INTELSAT (Atlantic Ocean and Indian Ocean), INMARSAT and the Fibre Optic Link Around the Globe (FLAG) project (Hassanin, 2003).

In 2003, there were nine licenced telecommunications service providers in Egypt: Telecom Egypt, a government entity that operates the traditional fixed landline network (it is the largest telecommunications operator in the Arab region and maintains a monopoly over all fixed and international telephony) (UNECA, n.d.a); two GSM (mobile telephone) companies (MobiNil and Vodafone Egypt); two providers of payphone services; and four low-earth orbital systems operators (VSAT Service, Anmar-Sat, Al-Soraya and Global-Sat). Egyptian fixed-line telecommunications services are among the fastest growing in the Middle East and North Africa (Hassanin, 2003).

National ICT policies

Shortly after its establishment, MCIT announced the NCITP (or National Plan) in December 1999. The NCITP's main objectives are to:

- create a strong, exportable IT industry in Egypt;
- support the development of a state-of-the-art national telecommunications network that provides an enabling environment for business and electronically links Egypt with the rest of the world;
- increase employment opportunities in the communications and information technology sectors;
- build an information society capable of absorbing and benefiting from expanding sources of information; and
- develop and upgrade ICT systems to improve standards of living and to support competitiveness in the international ICT market (ESCWA, n.d.).

By 2005, the National Plan was being revised through the Egyptian Information Society Initiative (EISI) to establish the foundation of the Egyptian Information Society until 2010. The focus here includes:

- digitisation of telecommunication networks for fixed and mobile telephony;
- e-government services to citizens and investors in their locations through the Internet;
- e-business services to transform the Egyptian community into an information society in line with international developments;

- e-learning applications aimed at spreading knowledge and information using electronic means through the Internet;
- e-health services using IT to raise the efficiency of services and telemedicine, especially in remote areas;
- e-documentation of civilisation and nature through building integrated information systems to make local and international presentations of Egyptian civilisation; and
- developing technology-related industries through raising the quality level of Egyptian companies and enhancing their international competitiveness (ESCWA, n.d.).

The framework is designed to exploit new ICT opportunities through Egyptian models and interactive relationships between citizens, businesses and the government. EISI aims to establish a 'citizen-driven info-centric structure', designing a variety of corresponding e-services that are geared in their objectives and policies to develop nationally relevant hardware and software (ESCWA, n.d.). With regard to promoting universal access to ICT, the NCITP aims to establish 50 Technology Access Centres annually that will provide communication and information services, directly benefiting all citizens of Egypt (Hassanin, 2003). Egypt has also started to build the first of a series of IT business parks, or 'smart villages', aimed at IT firms to create an 'Egyptian Silicon Valley' on the outskirts of Cairo (ITU, n.d.).

With regard to e-learning, the framework includes the development of policies to ensure that ICTs are integrated into education and training at all levels, including teacher development, curriculum development, institutional administration and management, and in support of lifelong learning. It involves collaboration between private sector education service providers, network operators, data centres, content providers, NGOs and local and international companies and educational institutes. To remove language barriers, content providers are being encouraged to supply Arabic educational content through e-libraries nationally and regionally. Schools are positioned as a focal point for communities' access by offering programmes including after-school use of computer labs. The framework acknowledges that its success will depend on acceptance by students, teachers, administrators and the community, the value of the diploma or certificate, a sufficient number of instructors, good monitoring and evaluation systems, the design of good course content and effective delivery methods, as well as infrastructure development (MCIT, 2005).

Progress towards realising the EISI vision included the approval of the establishment of the Information Technology Industry Development Authority (ITIDA) in 2005. ITIDA is an

autonomous body entrusted with the mission of developing the IT sector and enabling IT industries to boost exports (ESCWA, n.d.). Furthermore, the Egyptian government has made large strides in the past decade towards establishing the country as a potential ICT hub in the region. Major infrastructure developments have updated ICT capacities in Egypt (Hassanin, 2003). Progress includes increased provision of communication services in Egypt, including telephone and mobile services, Internet and personal computers at reasonable prices (UNECA, n.d.b). Beckstrom et al. (n.d.) mention that at an Arab League meeting of the ministers of telecommunications and information technology, Egypt was selected to become the hub of e-learning in the Arab region. This is not elaborated on, however, and it is unclear what it entails.

The new Communications Law of 2003 aimed to liberalise the communications sector in Egypt. It included establishing a national authority to manage the communications utility. The regulatory framework for telecommunications established the Telecommunications Regulatory Authority (TRA) and corporatised Telecom Egypt. The TRA, falling under the Minister of Communications and Information Technology, is responsible for licensing telecom operators and implementing government telecommunication policies (UNECA, n.d.b). The TRA's main responsibilities are to:

- increase private investment in the sector;
- oversee various technical aspects of the telecommunications market, such as monitoring frequencies and their spectrums; and
- issue service licences and approve all sector-related tariffs. (Hassanin, 2003)

The Egyptian government is actively promoting the spread of the Internet. Internet services were first introduced in Egypt in October 1993 through a gateway established by the Egyptian Universities Network (EUN) of the Supreme Council of Universities (SCU). Egypt pioneered the Free Internet Model, launching the Free Internet Initiative in Cairo in January 2002. The Free Internet Model is a public-private partnership (PPP), a joint effort between MCIT and Telecom Egypt, in co-operation with the majority of Egypt's private Internet service providers (ISPs). The initiative offers subscription-free Internet services to Internet users via dial-up to special-prefix numbers. In September 2002, free Internet services were available nationwide. Internet users across Egypt are charged only for the price of local phone calls (approximately US\$0.15 per hour) associated with connecting to the network. The revenues from the free Internet calls are shared between Telecom Egypt and the

service providers. The Free Internet Model was a major step in increasing the number of Internet users in Egypt. After introducing the Free Internet Model, the number of Internet users increased to more than 5.2 million, through more than 1.7 million connected households. The total international capacity increased to 5.51 gigabit/sec in June 2006 (ITU, n.d.).

Other government initiatives to increase access to ICT include the 'PC for Every Home Initiative' and the establishment of IT Clubs nationwide. Approximately 73 750 PCs were sold through the 'PC for Every Home Initiative' (Hashem, n.d.). Less privileged members of society and those in rural areas lacking ICT infrastructure can gain access to computers and the Internet through the Mobile Internet Unit project. The launch of the Broadband Initiative in May 2004 also helped expand access to the Internet through the adoption of Asymmetric Digital Subscriber Line (ADSL) technology and the establishment of WiMax hotspots (MCIT, n.d.a).

In addition, the e-Government Scheme aims to modernise the way citizens interact with the government by introducing ICT to the internal operations of government departments and their interface with the public. The e-Health Scheme facilitates the integration of ICT into health services, such as in the areas of health administration and clinical consultation, and is working to improve medical education in remote and underserved areas of Egypt. The Community Development Portal initiative is assisting and empowering developing rural communities through the provision of knowledge and information. This scheme will link the network of IT Clubs through an Internet portal that functions as a common entry point to information of potential interest to users. MCIT has also implemented a number of development-based initiatives in the cultural field. These include an ambitious plan to document Egypt's cultural heritage and efforts to expand the production of Arabic e-content. Another cultural development scheme is the Community Knowledge Generation e-Library Initiative, whose objective is to provide 'Information for All' by creating electronic libraries and establishing a mechanism for information gathering, validation and maintenance that is relevant to local communities and which can be provided in digital format. In order to maximise its impact, this initiative will be linked to the Smart Schools and IT Club Franchise programmes (see below for an explanation of these programmes) (MCIT, n.d.a).

The establishment and growth of Egypt's ICT sector is largely the result of the work of MCIT, which has led Egypt into the digital age. During the last three to four years, MCIT

has changed its vision from the production of ICTs to their use for cultural and socio-economic development. Thus, the majority of MCIT's initiatives target the development of Egyptian society in addition to the expansion of the local ICT sector (MCIT, n.d.a).

The movement toward creating an Egyptian Information Society includes a focus on formal education. Using ICT in education is particularly challenging for Egypt, given the region's comparatively low literacy rates. The adult literacy rate in Egypt in 2003 was approximately 57.9 per cent (ESCWA, n.d.). With the belief that investment in education is the solution for most obstacles to national development, MCIT has been working closely with the Ministry of Education (MOE) and the Ministry of Higher Education (MOHE) on a number of projects aimed at empowering students with IT skills, thus preparing them for the demands of the modern workplace. A search for national higher education policies was done in order to ascertain whether ICT or e-learning is mentioned in higher education policies. However, no such policies were located in the search.

ICT initiatives in education

There are several ICT programmes that are running in education, a few examples of which are presented below. There are also programmes operating at the higher education level; these are discussed separately.

The Egypt Education Initiative

The objective of the Egypt Education Initiative (EEI), which was launched in May 2006, is to improve education in Egypt through effective use of ICT. The EEI focuses on four tracks: pre-university education; higher education; lifelong learning; and e-learning industry development. The first phase of the EEI aims to benefit 820 000 students in 2 000 schools and over 300 colleges through provision of technological infrastructure and high-speed Internet access (MCIT, n.d.b). The initiative supports Egypt's overall education reform efforts and maximises the potential for collaborative PPPs to achieve their goals (ELCC, 2006). The initiative is a partnership between not only the local public and private sectors but also multinational IT companies, donors and the World Economic Forum (MCIT, n.d.a).

The Smart Schools Network

The Smart Schools Network initiative was launched in 2003, and aims to ensure that all Egyptian students are

'computer literate' before completing preparatory school, by introducing basic computer literacy classes (for levels 7–9). The project is running in 7 500 preparatory schools across Egypt over five years (MCIT, n.d.a). The project is also working at establishing infrastructures in schools that will bring the ratio of users (students or teachers) to computers to 1:10, and introducing software applications that assist in school management. The project has also focused on building the capacity of schoolteachers and administrators to use ICT tools effectively (MCIT, 2005).

The iEARN project

The International Education and Resource Network (iEARN) is a non-profit project with over 15 000 member schools in over 100 countries. Children and young adults are collaborating on school assignments using the Internet and other communication technologies (MCIT, n.d.c). Since 1999, iEARN Egypt, the MOE, the Regional English Language Program Office (RELO) at the Embassy of the United States of America in Cairo and the Regional Information Technology and Engineering Centre (RITSEC) have been working collaboratively on developing the iEARN operation in Egypt. Participating schools (which numbered 35 in the 2002/03 academic year) were involved in a variety of iEARN projects on the environment, civic education, global issues and human rights. The emphasis is on upgrading student computer/Internet skills, English language ability and exposure to real-life, authentic texts and themes. Projects are focused on learner-centred teaching, co-operative and interactive learning and development of life skills – critical thinking, problem solving, conflict resolution and teambuilding (iEARN, n.d.).

Think.com

Think.com is an online-managed service provided free to schools, which allows learners to create, communicate and collaborate online and learn key life skills for the knowledge economy. The ability to link school to school across local or international borders provides the opportunity to integrate technology in a meaningful way into curricular work (iEARN, n.d.).

IT Clubs

In order to bridge the PC and Internet penetration gap in Egypt, MCIT, in collaboration with NGOs and youth centres, provides 15–25 PCs, software, training and Internet connectivity to clubs, mostly in villages and densely populated urban areas. The aim is to use the IT Clubs for

training, Internet connectivity and other community services. The plan is to have at least 1 000 IT Clubs, about 600 of which are already operational (Beckstrom, et al. n.d.).

E-Learning Competence Centres

The ELCC initiative between MCIT and Cisco was set up to create a national e-learning programme and establish an organisation to lead and co-ordinate all e-learning projects in Egypt. The initiative focuses primarily on upgrading the local corporate culture and supporting the private sector economy, with the width of delivery of e-learning projects being expanded to all sectors. The first implementation phase includes the establishment of ten competence centres to disseminate the programme. The first two centres (qualified in 2005), aside from the main ELCC centre in the Smart Village, were the Ministry of Internal Trade's Trade Information Centre and Cairo University's Scientific Computation Centre. An agreement has been reached with the MOHE, MCIT, Cisco and Middlesex University in England to use and adapt the latter's general curriculum for e-learning. MCIT has worked in collaboration with MCIT Jordan in sharing teaching methods and material. Special projects that have been implemented include women's empowerment, ICT online training, and lifelong learning (MCIT, 2005). The ELCC's main focus for 2005/06 was to deliver a set of programmes to serve specific sectors of the community, and included the Small and Medium-Size Enterprise Development Programme, the Cisco Regional Sponsored Curriculum Networking Academy Programme, the MOHE E-Learning Centres Programme and the IT Clubs Programme. Other ELCC activities include a project to convert a part of the MOHE's curriculum to an e-learning format (MCIT, n.d.d). In addressing the issue of illiteracy, MCIT has begun an initiative to produce a CD-ROM tutorial for basic literacy (MCIT, n.d.a).

Other initiatives

The MOE has installed 27 technology development centres, approximately one for each education directorate. Each centre contains an advanced science laboratory and a multimedia laboratory. IT training is offered to the public through each centre's videoconferencing network. The MOE is also in the process of providing Internet access to every school in Egypt at the primary and secondary levels (Hassanin, 2003). In order to meet the growing demands for ICT professionals in Egypt, other initiatives, like the development of the Nile Technology University, focus on developing ICT expertise and improving the quality of application of ICT in the education system (Hashem, n.d.).

Overview of the Egyptian higher education system

Egypt operates two parallel education systems: the secular system and the religious, or Al-Azhar, system.

The secular system is organised as follows:

- the first level, known as basic education, covers the first eight years of schooling;
- the second level divides students between three-year general academic secondary schools and three- or five-year vocational schools; and
- the third level is comprised of universities, which include teacher training colleges.

The Al-Azhar system, which focuses on Islamic learning, enrolls 4 per cent of the country's total number of students. In this system, primary school covers the first six years, and preparatory school the next three years. Students who then successfully complete four years of secondary school can enrol at Al-Azhar University (Egypt, n.d.a).

Higher education in Egypt is provided by universities and higher institutes of technical and professional training, both public and private. The MOHE is responsible for higher education, and state universities are under the authority of the SCU (Egypt, n.d.b). Major universities include Cairo University, Alexandria University and the 1 000-year-old Al-Azhar University, one of the world's major centres of Islamic learning (Wikipedia, n.d.a).

Non-university level post-secondary education is offered by industrial, commercial and technical institutes that provide two-year courses leading to diplomas in accountancy, secretarial work, insurance, computer or health sciences and electronics (Egypt, n.d.b). Technical education schools provide five-year courses leading to advanced technical education diplomas in commercial, industrial and agricultural fields (Egypt, n.d.a).

There are different entry requirements into higher education. To enter non-university higher education studies (technical institutes), a Technical Education School Certificate with a minimum score of 70 per cent is required. For admission to university-level studies, *Thanaweya Am'ma* (a General Secondary Education School Certificate) with a score of 70 per cent or above is required. Alternately, holders of an Advanced Technical Education Certificate may enter university-level institutes in their speciality if they have

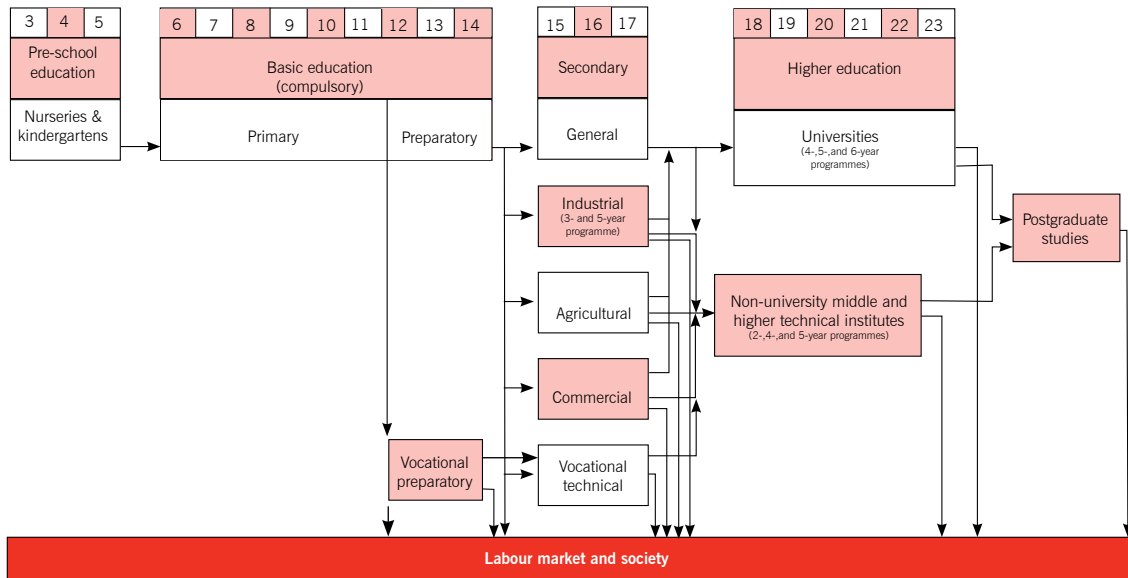
obtained scores of at least 75 per cent. Entry into the secular system is highly competitive, and the SCU determines the number of students to be admitted by the faculties of each university. Arabic is the language of instruction at most universities, but English and French are used at some foreign universities and in selected faculties; for example, Helwan University and the Faculty of Agriculture of the University of Alexandria use English as the language of instruction (Egypt, n.d.b).

Public higher education is free in Egypt, and Egyptian students pay only a token registration fee. Students also pay for their books, transportation and residence fees. The government has a loan scheme for needy students. Amounting to 1 000 Egyptian pounds a year, the loans are interest free and can be paid over a period of 40 years after graduation (ICHEFAP, n.d.). Private education is much more expensive (Wikipedia, n.d.a).

Governance and control of higher education is the responsibility of three organs: the MOHE, the SCU and the Central Administration of Al-Azhar Institutes (PES, n.d.). The SCU is the university sector governance advisory body and, although chaired by the Minister of Higher Education, is theoretically independent of the ministry. A similar, less autonomous body exists for the higher technical institutes (HTIs) in the non-university sector (NUS), with the same chairmanship. Intermediate NUS institutions, such as middle technical institutes (MTIs), have no such body and are governed directly by the MOHE. All major decisions concerning policies, admission levels, definition of programmes and curricula, creation of new academic positions for the recruitment and appointment of faculty, allocation of resources, establishment of academic standards and the assessment of those standards are made by the MOHE and through the SCU (Said, 2001). The Central Administration of Al-Azhar Institutes supervises and is responsible for Al-Azhar higher education, as well as the primary, preparatory and secondary levels (PES, n.d.). The SCU indirectly supervises private universities and is responsible for monitoring standards to ensure that graduation certificates from state and private universities represent an equal education level. A 2002 presidential decree saw the establishment of the Private Universities Council, which has the same powers as the SCU (Egypt, n.d.a).

Statistics indicate that there were 12 public universities and five private universities in 2000/01 (Said, 2001). Statistics for 2006 reveal 17 public universities and 20 private universities (Wikipedia, n.d.b), indicating a dramatic growth in the higher education sphere, particularly in the number of

Figure 1.1: Overall education structure in Egypt by level and age



Source: Said (2001)

private higher education providers. Egypt also has 51 public non-university institutions, of which 47 are 2-year MTIs and four are 4–5-year HTIs (Said, n.d.).

According to UNESCO's 2006 *Global education digest*, the total enrolment in Egyptian higher education in 2004 was 2 153 865. Of these, 18 per cent were enrolled in private institutions. There were 72 592 teaching staff in 2004 (UNESCO, 2006). Egypt has one of the largest higher education systems in the developing world (1.67 million students in 1999/2000) (Egypt, n.d.a). Approximately 22 per cent of the 18–22 age group are enrolled in higher education (Said, 2001). The non-university stream of education absorbs a significant portion of the student population enrolled in tertiary education (Said, n.d.). Technical institutes enrol 40 per cent of all secondary school graduates (Egypt, n.d.a). As the literacy rate among females is increasing (on average from about 30 per cent to 40 per cent over the last 20 years), the female enrolment at universities has also been increasing. The ratio of newly admitted male students to female students is approximately 2:1, and approximately 1:1 for enrolled and graduate students (Said, n.d.).

General higher education challenges

The higher education challenges presented here are based largely on Dr Mohsen Elmahdy Said's work. At the time of

writing *Higher education in Egypt* (Said, 2001), he was the Director of the Projects Implementation Unit at the MOHE in Egypt.

High student numbers

One of the 'strategic and prime mandates' of the Egyptian government is to admit all students coming out of secondary education into tertiary education. Approximately a third of these students enter general secondary schools, the traditional route to universities. Almost 70 per cent of students are channelled into technical secondary education, but fewer than 20 per cent gain employment when they leave (Said, 2001). Secondary education reforms aim at channelling approximately half of the students admitted to secondary education into general secondary schools. However, since 2004/05, due to a change in policy, instead of directing 70 per cent of preparatory school graduates to technical/vocational schools and 30 per cent to tertiary education, the mix has been reversed. This means that the number of students entering university will be doubled in coming years. It is feared that this will cause further overcrowding, and will burden the higher education system. Thus, many are looking towards e-learning as a solution (Beckstrom et al. n.d.).

Overcrowding of students has occurred for many years, as failing students, together with the newly admitted students, contribute to the high student numbers. The high failure rate suggests that the existing student selection criteria or

the processes of allocating students to programmes are not robust. Another contributing factor may be the absence of a credit system, and the fact that failure in some courses may require repeating them over a full year, and, in some faculties, repeating all the courses. Inadequate expansion, poor and limited facilities and infrastructure, together with overcrowding, have led to the deterioration of the average quality of the graduate (Said, 2001). However, Said (2001) notes that 'above average' students graduating from the system perform well according to international standards, as many students are accepted and admitted yearly to top-ranking universities in the United States and Europe and other reputable universities worldwide.

Staffing

The main consideration in hiring academic staff into permanent positions is the merit of their undergraduate academic results, without considering actual competency or potential ability in teaching or conducting research. These undergraduate teachers often lack the experience and expertise to teach, thus impacting on the quality of teaching. Other challenges faced are that the salaries of academic staff are very low, and their workload allocation leaves little time to prepare for teaching (Said, n.d.). The very high loading of staff has a direct impact on the average quality of graduates. There are only two formal promotion exercises carried out during the entire career of an academic, and there are no mechanisms to measure quality of teaching or accountability, such as annual reporting by staff on the work they have done (Said, 2001). The working environment in most faculties does not appear to be conducive either to innovative teaching or to carrying out research. Office spaces are not sufficient or adequately used, and, as a rule, universities do not provide academic staff with computers (Said, 2001).

Egypt's administrative-to-teaching staff ratio of 4:3 is high by international standards, and university officials cannot readily remedy this because personnel management is constrained by regulations that make termination difficult (Said, n.d.). Therefore, the share of public spending devoted to actual teaching is low. In addition, there is no mandatory retirement age, resulting in more senior faculty members and fewer junior teaching staff to meet the teaching needs of students. Nearly all full-time faculty members are permanently appointed from the outset (Said, 2001).

Research and publishing

According to Said (n.d.), the environment at most universities does not foster research productivity or innovation by staff members. The main incentive to initiate

and publish research is to fulfil promotion requirements rather than to produce quality and innovative research. In addition, the quality and quantity of research is affected by limited funds, lack of remuneration and poor relationships between industrial enterprises and universities. Internationally cited research work emanating from Egyptian universities is relatively sparse and disproportionately low considering the number of faculty members working in Egyptian universities.

Financing of higher education

Officially, the state is responsible for financing higher education in Egypt. However, the state's funding of universities was reduced to 85 per cent in 1994/95, leaving the universities to generate the remaining 15 per cent through various revenue diversification strategies. This has resulted in universities adopting a number of approaches, like charging nominal tuition fees for alternative academic programmes that are perceived to be of high quality, and introducing foreign language programmes for which they charge tuition fees, or charging for degrees where English is the medium of instruction. The number of applicants in some degree programmes in public universities exceeds available spaces, providing the opportunity for universities to charge for tuition (usually about 33 per cent of the actual cost of the programme). Recently, a new system of admission to the faculties of law, commerce and arts has allowed less qualified students to obtain places after paying an admission fee. However, the impact of this has been a high number of repeating students (Egypt, n.d.a).

The high enrolment rates coupled with decreased public expenditure pose challenges, as the enrolments are not financially sustainable. In addition to compressing resources, the size of the Egyptian higher education system poses special challenges to the provision of quality education.

Governance and management of the higher education system

The governance and management system faces complex and outdated legislation and institutional organisation, inefficient resource allocation mechanisms and funding patterns, absence of quality assurance mechanisms and inadequate strategic planning and management, at both the system-wide and the institutional level (Said, 2001).

Education programmes are determined by the SCU, recurrent financial resources by the Ministry of Finance (MOF), and investment resources by the Ministry of Planning (MOP). The available information highlights that all need a stronger

planning and co-ordinating link. In the absence of a funding formula, university budgets are determined by the MOP and MOF, and are based on individual discussions and needs assessments of each university. The MOHE has a minor role in this budgeting process. Furthermore, there are no effective policy-making advisory bodies to inform the government on resource allocation, or to co-ordinate with institutions to assist the decision-makers in planning system development. The SCU and the MOHE have no technical secretariat to carry out policy analysis or advisory functions, to guide system development, or to periodically monitor programme quality and performance of graduates (Said, 2001).

At the institutional level, financial resources are limited primarily to government funds, student enrolment fees, funds from centres of excellence that offer community services, research or consultation work, and funds from joint research activities. Institutions have limited authority over internal reallocation of resources, student intake, faculty hiring or firing, or academic offerings. Inadequate budgeting practices provide few incentives for efficiency or quality improvements, and the governance structures do not motivate senior managers to make the best use of resources (Said, 2001).

Said (2001) points out that despite several attempts by institutions to develop strategic plans, none has been implemented effectively due to limited funding, management culture and strategic planning. In addition, neither the universities nor higher education governing bodies like the MOHE and SCU have developed a modern management information system (MIS) to assist with strategic planning and resource allocation. Although they gather many statistics, they make little use of them. It was reported that most statistics are collected and transformed manually, with the exception of limited individual initiatives to computerise and automate the process.

Quality assurance

Said (2001) highlights that there are no quality assurance mechanisms in place to evaluate teaching (formative or summative). There are insufficient criteria for assessing performance, particularly teaching. Chairs and deans are not empowered to take any meaningful action following on evidence of poor performance by their staff. Except for some individual and isolated initiatives, there is also limited expertise for developing strong standards for performance, and no generally available data that could readily be used as indicators of educational quality. Most academic departments exhibit a lack of focus on evaluation of student problems or their reactions to the learning experience (Said, 2001).

Challenges faced by middle technical institutes

MTIs face the challenge of matching training with labour market needs. Enrolment levels are low, given the skills needs of the economy. More than 60 per cent of MTI graduates remain unemployed for at least two years due to the poor quality of education. This has been attributed to:

- lack of relevant mission, poor and outdated infrastructure, equipment and materials, lack of teacher development and poor image of MTIs in the community;
- the MOHE having total control over the management of MTIs, thus allowing MTIs little autonomy over their mission or teaching;
- lack of economically relevant academic programmes;
- poorly trained teaching staff working under difficult conditions; and
- no clear articulation policies for student transfer or progression to universities. (Said, 2001)

Teaching and learning challenges

Use of ICT in higher education

Said (2001) argues that the lack of an overall technology plan, coupled with the short-term funding model and the absence of a clear acquisition and replacement plan, has led to 'an inconsistent and unproductive approach to IT implementation'. Within individual universities, there is a shortage of up-to-date ICT for teaching, libraries and research. The EUN connects 17 universities, with the SCU acting as a focal point for the network and as the ISP for universities (see below). Despite this network, there is no content (for example, research material, library catalogue or learning media) available through the EUN. Libraries have poorly maintained buildings and equipment, and face low rates of stock replacement and a high proportion of outdated content (Said, 2001). Beckstrom et al. (n.d.) note the presence of satellite, videoconferencing and virtual classrooms (although the technologies are not widely used beyond selected centres). El-Shenawi (2005) observes that, in spite of the efforts of the MOHE to integrate technology into the education system, results are far behind what was intended. This has been attributed to lack of co-ordination between universities and between different departments within each university. The efforts of instructors and university students are independent and

not sufficiently organised to make a noticeable difference (El-Shenawi, 2005).

Teaching methods

Said (2001) argues that it is difficult to use innovative teaching strategies, as opposed to the well-established traditional lecturing style, because of:

- the large number of students that a lecturer has to deal with;
- the limited acquaintance of many top-level administrators with the new teaching technologies, and their reluctance to accept these strategies as more appropriate for learning;
- the limited financial resources available to acquire these new teaching aids;
- the limited space and facilities available to accomplish the intended changes; and
- staff facing high workloads with limited time for teaching.

El-Shenawi (2005) outlines some of the challenges facing the adoption of e-learning, including:

- developing an e-learning strategy for organising the educational process, including defining objectives, components and mechanisms for implementation;
- empowering students at all educational levels through an active educative system, where students can choose the courses they would like to study;
- designing educational courses and subjects, and defining personnel responsible for maintenance and improvement of the programmes; and
- developing accreditation and evaluation criteria to ensure the success of programmes.

ICT and higher education

Institutional higher education ICT infrastructure

No direct information was found on institutional higher education ICT infrastructure in Egypt. However, in an assessment of e-learning readiness in Egypt, Beckstrom et al. (n.d.) note that the existing telecommunications infrastructure, in terms of primary access lines, data circuit availability, ISPs and satellite communication

capabilities, is adequate to support the distance and distributed learning initiatives that are being developed by the Egyptian government. In addition, they note that the general availability of very low-cost access to the Internet and the 'PC in Every Home' project (which allows end-users to purchase personal computers on a monthly instalment plan) assist in the deployment of hardware platforms and affordable access.

Recent initiatives to improve ICT infrastructure in higher education (currently one of six projects dealing with improving higher education in Egypt) include the upgrade operations, inaugurated in January 2007, of the unified high-speed information network linking Egyptian universities, research centres and the Bibliotheca Alexandria. The upgrade operations encompassed updating the technological environment of 17 Egyptian universities by establishing 315 IT clubs inside the different colleges. Internal networks as well as the infrastructure of the main centre of the EUN were upgraded, including videoconferencing and streaming facilities (MCIT, n.d.e). The main network at each university will be connected with the nearest centre by fibre-optic cables with a speed of 34 Mbps (EUN, n.d.a).

The EEI higher education track focuses on supporting the ICT infrastructure for academic and research institutions and will assist in the introduction of e-learning in Egyptian universities. It will also support management-information and decision-support systems, the establishment of quality assurance and accreditation systems, and the expansion of digital libraries (MCIT, 2006a). An August 2006 progress report makes mention of 500 people being trained in Microsoft's digital literacy training programme, a Microsoft and IBM content-development training programme, which targets over 3 000 university professors and university e-learning centres, and the summer training in Oracle development tools of students at engineering and computer sciences faculties in collaboration with Oracle International (MCIT, 2006b).

As indicated above, the desktop research did not reveal much information regarding institutional higher education ICT infrastructure. However, the 2004 African Tertiary Institution Survey, which surveyed Internet connectivity across 40 countries and 83 tertiary institutions in Africa included two Egyptian universities (Cairo University and Assiut University). The survey revealed that of the institutions in Africa with highest bandwidth capacity, the two Egyptian universities were in the top ten, Cairo University at number one and Assiut University at number four, the former having a capacity of 14 000 Kbps and the latter a capacity of 8 000 Kbps. In addition, of the top ten

institutions with the cheapest bandwidth, Assiut University and Cairo University, both with \$0.17/Kbps/month, were ranked third and fourth, respectively (Steiner et al. 2004).

Assiut University's web site indicated that the university is enhancing its ICT infrastructure through the Assiut University Infrastructure Enhancement Project (AISEP). The objectives of the project are to:

- upgrade the university's infrastructure;
- improve network services (mail, web);
- improve network reliability; and
- enhance network security.

The intended outcomes are:

- faster connection rates throughout the university network;
- improved mail and web service to all university network users;
- continuous operation of network services;
- enhanced security and protection against viruses and hackers; and
- an increase in the number of outlets. (Assiut University, n.d.a)

Thus, it appears that attention is being given to improving ICT infrastructure at higher education institutions in Egypt through the MOHE and MCIT. However, reports on the actual infrastructure of higher education institutions were not found.

Institutional ICT and e-learning policies

No information was found on any institutional ICT and e-learning policies. Also, as noted above, no national education policies addressing ICT and e-learning were found. However, a paper by El-Shenawi (2005) provides some suggestions for e-learning policies that would help to develop the education sector and the country economically. These include:

- capacity-building of high-level management in e-learning platforms;
- introducing an MIS into educational departments as part of transformation towards e-governance;
- joining schools and universities into an integrated e-learning framework;
- locating financial resources to effect e-learning;
- establishing evaluation systems to measure e-learning efficiency and ensure quality;
- developing the legal platform required to apply e-learning;
- distributing equipment and technical support among the 26 governorates' universities and schools on an equal basis;
- capacity building of educators in how to teach using IT;
- designing and building e-learning curricula and content, and learning from best practices in e-learning;
- empowering students at all educational levels to subscribe to e-learning programmes; and
- developing evaluation systems to measure effectiveness and quality.

Institutional higher education e-learning initiatives

On a national level, there are several programmes operating to address the issue of e-learning centres at the higher education level. The SCU has signed a number of agreements with international higher education institutions to exchange knowledge and experience in educational methodologies and the use of advanced technologies including e-learning (SCU, 2006). A review of web sites of universities in Egypt revealed that there are different e-learning initiatives. (Note that the researcher was unable to access some university sites, as they were not in English; in cases, parts of sites had an English version, while others were translated using a web-based translation tool.)

Egyptian University Network

The EUN was established in 1987 by the SCU, with the major objective of linking Egyptian universities to the Internet as part of an effort to facilitate communication and the exchange of information amongst the universities. Egypt introduced its first Internet use in 1993 through a link between the EUN and France. The EUN services 20 universities in addition to various other government and research institutes. The EUN's mission includes:

- having the leading portal of information locally, nationally and internationally;
- implementing an e-library that electronically provides researchers and the decision-making community with quality information;
- fostering integration, co-ordination and linkage between the Egyptian universities to maximise the utilisation of

the available information and informatics resources;
and

- developing an e-learning centre to enhance the higher education system. (EUN, n.d.b)

National E-Learning Centre

The National E-Learning Centre (NELC) forms part of the SCU. Its primary objective is to 'promote and support the development of e-learning in Egypt by improving the development of the learning content to the highest maturity level, to achieve strong presence both locally and regionally' (NELC, n.d.).

The further objectives of the NELC are to:

- provide an e-learning infrastructure to defined, high-quality specifications;
- provide a range of e-learning tools to defined, high-quality standards;
- provide information, training and support for staff and students in the use of e-learning tools and facilities, in collaboration with the universities;
- provide nationwide co-ordination for e-learning development, where the centre will integrate courses produced by other projects;
- focus on both asynchronous and synchronous learning;
- produce courses on a competitive basis;
- promote the use of appropriate standards and specifications in e-learning development, including conformity with accessibility guidelines and standards;
- provide support to universities in their evaluations of e-learning developments and, where appropriate, carry out such evaluations, especially at institutional level;
- adopt standards for courseware development in Egypt; and
- encourage courseware export and offshore development. (NELC, 2006a)

In order to meet these objectives, the NELC's revised strategic plan aims to develop a robust infrastructure at each of the universities, capable of facilitating an effective e-learning system. This will be achieved through the establishment of an e-learning centre at each of the 17 Egyptian universities. These centres will be able to develop pedagogically sound e-courses that fully utilise the potential of ICT in an interactive way. Each will be staffed by a centre director, instructional designer, e-content developers, graphics designers and subject-matter experts. The NELC will monitor the progress of the university centres and develop national standards.

One of the activities that the NELC is involved in is participation in the Massachusetts Institute of Technology (MIT) OpenCourseWare (OCW) in a Box Programme.

Through this programme, MIT OCW has received support to distribute MIT OCW in a Box packages free of charge to African institutions. Each package includes an external hard drive that contains a copy of the entire MIT OCW web site (including videos), software tools, user documentation and marketing material. This programme is open to educators and students at Egyptian universities, allowing access to free, searchable and open educational course materials (NELC, 2006b).

Arab Open University

A branch of the Arab Open University (AOU) that offers distance learning, including e-learning, opened in Cairo in February 2003 (Darwish, 2003). The Arab Campus E-Learning System (ACES) is a learning-management system that provides a virtual learning environment. It is built on a foundation of two key elements: computer technology and education. ACES tools fall within four broad categories: content-delivery tools, synchronous and asynchronous communication tools, assessment tools and course-management tools. It relies heavily on the tutoring process, which aims to promote a proactive environment of learning. Course lectures are laid out in a programmed and progressive mode via textbooks and supporting notes, and other supplementary forms of delivery media based on audio and video cassettes, CD-ROMs and online web sites. These various components work together to offer an environment of supported open learning (AOU, n.d.a). In co-ordination with UNESCO, the university is working on developing a telecommunications network linking all of its branches in the Arab countries. In addition to teleconferencing, this network will allow the AOU to transmit lectures delivered in any branch to all the other branches, where they can be shown concurrently or recorded for later viewing. Within this framework, the AOU also aims to set up a virtual library to allow students to access electronic sources located at a number of Internet sites, providing a nucleus for back-up sources of electronic learning (AOU, n.d.b).

Mediterranean Virtual University

The Mediterranean Virtual University (MVU) brings top universities in the Mediterranean region together with two European Union universities – the University of Strathclyde (Scotland) and the University of Aalborg (Denmark). The MVU will establish a network of universities that collaboratively will build online courses and deliver them to students across the region. Initially, the courses will be in IT-related areas, defined in partnership with industry

and relevant to its needs. They will be facilitated using live videoconferences with subject experts, streamed video lectures, online text-based discussions, online assessment, interactive courseware and simulations (FCIS, n.d.). The Faculty of Computer and Information Sciences at Ain Shams University in Egypt is one of the project partners.

Ain Shams University

On its web site, Ain Shams University's e-learning section includes links to:

- medical education online;
 - the MVU;
 - the NELC;
 - e-learning courses; and
 - e-books (including a brief description of the books).
- (Ain Shams University, 2006a)

The section on e-learning courses provides links to MIT, Varsity Notes (the world's largest directory of free lecture notes), e-books, a medical course (a global repository of lectures on public health and prevention, targeting educators across the world) and a number of e-courses offered at Ain Shams University. The e-courses are for undergraduates and graduates in several fields. They include courses from the applied sciences (computer science, engineering, medicine, natural science) and human sciences (psychology, athletics, media). Lecture notes, assignments, study materials and readings are provided in portable document format (PDF) (Ain Shams University, 2006b).

Al-Azhar University

The Al-Azhar Online Project involves preserving ancient and rare manuscripts and publications, putting the library's collection into electronic form, creating a portal (www.alazharonline.com) and establishing a network to connect Al-Azhar's various departments. The portal is due to go online in several languages, and will include extensive information on the history and institutions of Al-Azhar, as well as online fatwa, transcripts of sermons from the Grand Imam of Al-Azhar, a virtual tour and many more sections concerning Islamic jurisprudence, culture and history (AME Info, n.d.).

Assiut University

Assiut University's web site indicates that it offers a number of online courses and distance education programmes (Assiut University, n.d.b). The distance education programmes include offerings from the commerce, science, agriculture, pharmacy and medicine faculties (Assiut

University, n.d.c). Several online courses are offered by the computer and information, agriculture and science faculties (Assiut University, n.d.d).

El-Minia University

El-Minia University's web site indicates that it offers two e-learning courses: a Photoshop course and a Frontpage course (El-Minia University, n.d.).

Cairo University

Cairo University has a dedicated centre – the Cairo University E-Learning Centre (CUELC) – the main aim of which is to bridge the existing gap between the advanced, technology-enhanced teaching and learning methods of Europe and those employed in Egypt. It is envisaged that these advanced methods will enhance the skills of Cairo University teaching staff, provide better feedback on students' performance, allow web-based student-student and student-teacher interaction, and facilitate continuous monitoring. Other goals of the centre include offering learning on demand and lifelong learning possibilities, as well as using CUELC in conjunction with the e-learning centre at Aachen University of Technology to design an intercultural virtual campus, thus bringing together students from different cultures and giving them the opportunity to exchange their experiences in the area of technology-enhanced learning (Cairo University, n.d.a).

In 2006, the first e-course (Data Structures and Algorithms) was launched within the framework of CUELC at the Computer Engineering Department, Faculty of Engineering, Cairo University, and first-year computer engineering students were given access to the course (Cairo University, n.d.b). (Note that no records of an evaluation of this programme could be found during the literature review.)

The Faculty of Science at Cairo University also has an e-learning facility. It offers HTML-based distance learning courses. The courses are designed to allow learners to proceed at their own pace, offering pre assessments, post assessments, course glossaries, quick references, detail links, notes and tips (Cairo University, n.d.c).

Electronic Learning Egypt (ELEG) is a joint European-Egyptian project, based at Cairo University. It is currently helping the 'Regular Education System' at Cairo University's faculties to produce e-courses on the wiki platform. ELEG's mission is to 'allow Cairo University to become autonomous in producing web-based e-learning courses and to fully evolve into an international online university' (ELEG, n.d.). The approach is to build on existing assets (knowledge, equipment, courses), develop and/or create local

competencies and provide full Arabic production facilities. Course production focuses on training teachers (via hands-on experience) in the preparation of didactic course material (ELEG, n.d.).

Mansoura University

Through its powerful network infrastructure, Mansoura University is a leader amongst Egypt's universities in all aspects of ICT in education. The university infrastructure comprises an e-learning portal (<http://mansvu.mans.edu.eg/>), a health information system and a library management system, which is currently being installed in all the Egyptian universities. In addition, a grid computing facility for scientific research has been installed. The Mansoura University campus is provided with numerous hot spots for wireless network access. In 2006, the MCIT presented the university with the National E-Content Award. (The information in this section is drawn from Tolba, n.d.)

The E-Learning Centre at Mansoura University was established in 2005 to support the work of the faculties and students, using recent advances in ICTs. The primary purpose of the centre is to promote and encourage excellence in teaching and learning.

The goal of the centre is to remove barriers for those interested in using IT for their teaching, by providing them with the basic know-how to develop e-courses. The centre is a division of the University Development Centre (UDC), which supports e-learning activities at the university, including training, instructional development support, technical support and hosting of the university's web-based and web-enhanced courses. The UDC also seeks private resources and grant funds to stimulate the further development of e-learning at the university through sponsorship of activities directed at faculty, staff and students.

Mansoura University is taking a leading role in e-learning in Egypt, and seeks to raise awareness amongst the university community. Towards this goal, the university aims to employ the recent advances in IT in developing a software infrastructure to fulfil its strategic plan. The major software components developed by Mansoura University computer science graduates of the Faculty of Computer and Information Sciences during 2004–2006 include:

- a personalised learning and content management system;
- a videoconferencing system;
- a blog server;
- a chat server;

- Mansoura Wiki;
- Mansoura Digital TV;
- Mansoura Digital Radio;
- a curricular repository;
- a previous exams repository;
- a video-based remote oral exam system;
- a social tagging server;
- a CV builder;
- a portfolio server;
- a homepage generator;
- a distributed learning object repository;
- an e-management system;
- a personalised dictionary;
- a multilingual dictionary;
- a student assessment system;
- a teaching evaluation system;
- a whole-system report generator; and
- a virtual professor (under development).

In 2004, Mansoura University selected Moodle as a course-management system to help educators create effective online learning communities. By March 2007, the number of Moodle-based sites had grown to 21. These sites give an indication of the increasing awareness of the potential of e-learning in enhancing the educational system in Egypt, although its utilisation is at a nascent stage. Moodle hosts about 700 courses, the contents of which range from PowerPoint presentations to full e-courses. These courses are intended for blended learning.

The university anticipates transforming the majority of these courses into e-courses through funds allocated by the national E-Learning Centre to Mansoura University. This transformation is a challenge, as many faculty members are yet to be convinced of the need for this change in content development.

Other e-learning courses offered at Mansoura University are the Graduate Diploma in Special Pedagogy (in Arabic); Master's Programme in Environmental Management, Engineering and Technology; and Diploma in Special Education.

Helwan University

Helwan University offers a Professional Diploma in Educational Administration, which focuses on administration in educational institutions through all its stages – from kindergarten until higher education and university level –

with special emphasis on the challenges and needs within the Arab world. This professional diploma aims at increasing the efficiency of educational institutions, so as to achieve the highest educational and learning outcomes. It also expands the knowledge, skills, approaches and behaviours of individuals working in the education sector and prepares them for better leadership roles in their educational institutions (Helwan University, n.d.).

Medical Education Online

Medical Education Online is hosted on a dedicated server at the SCU in Egypt. This is a multidisciplinary medical education site intended to provide medical students and young doctors with clinically-oriented, up-to-date information in different branches of medicine (MEO, n.d.).

Regional Information Technology and Software Engineering Centre

The Regional Information Technology and Software Engineering Centre (RITSEC), hosted by the Egyptian Cabinet Information and Decision Support Centre, is a joint project of the United Nations Development Programme and the Arab Fund for Economic and Social Development. Its mission is to support the development of the IT and software industry in the Arab region and to serve as a catalyst for accelerating socio-economic development within the region. The project is involved in presenting programmes for e-learning leading to master's degrees, in co-operation with British and American universities (Darwish, 2003).

Research studies

Despite extensive research on the use of ICT in teaching and learning in Egypt, this survey did not reveal any relevant literature or information on the use or non-use of ICTs in teaching and learning, other than the challenges facing higher education, and specific barriers to accessing computer-based learning environments. However, regarding the latter, the government's drive for free Internet access and the 'PC in Every Home' project indicate that computers are relatively accessible at the broader societal level.

Tackling the challenges

Abdelraheem (2006) points out that e-learning faces increased challenges in almost all the universities of the Arab states. These challenges can be summarised as follows:

- *ICT infrastructure:* Generally, Arab countries score below world averages on all connectivity indicators.
 - *Culture, leadership and e-learning strategy:* There is a need for a culture that will embrace e-learning with strong leadership.
 - *Leadership support:* Efforts towards using technology for learning have not been sustainable because many leaders have underestimated the complexities of the interactions between e-learning and the working environment, and how difficult it is to change people's attitudes about what learning events are and what they can be.
 - *Local content:* There are few relevant applications for the general population. Few organisations use the Web to deliver significant quantities of information or to carry out transactions with their user base.
 - *Copyright issues:* There is a lack of awareness of copyright issues.
 - *Special skills:* There is a need for instructors who have the special skills and talents to deal with e-learning. (Abdelraheem, 2006)
- The World Bank is pushing for reform efforts in Egypt that are directed at improving the quality of higher education. The World Bank considers Egyptian higher education to be 'severely compromised' because of centralised governance and excessive state control, instead of expansion to meet rising enrolment demands. Egypt recently approved the establishment of private and foreign universities, and this may help in coping with the expansion in enrolment at higher education level (OBHE, 2005).
- A National Conference on Higher Education Enhancement was held in February 2000 to address the challenges faced by higher education in Egypt. The World Bank is supporting the Egyptian government in implementing its reform initiative through the Higher Education Enhancement Project (HEEP), which focuses on five broad areas of higher education and aims to:
- improve quality and efficiency (Higher Education Enhancement Project);
 - develop faculty and staff leadership (Faculty Leadership Development Project);
 - improve network infrastructure, computing and their applications (Information & Communication Technology Project);
 - improve quality and institute accreditation (Quality Assurance and Accreditation Project);
 - improve teacher education (Faculties of Education Enhancement Project); and
 - revamp the curriculum of the technical colleges, and partner with industry (Egyptian Technical Colleges Project) (Stovall, 2005).

The main areas of reform identified under the HEEP include:

- administrative restructuring and management development;
- use of information technology to establish an MIS and new teaching methodologies, as well as setting up a national multimedia centre;
- establishment of a comprehensive faculty development programme;
- development of faculties of education;
- development of higher and middle technical institutes;
- setting up library automation and centres of excellence;
- enhancement of graduate studies and research;
- establishment of quality assurance and accreditation mechanisms;
- establishment of a national qualifications framework; and
- encouragement of 'distant' and 'lifelong' learning.

The above-mentioned areas of reform were classified into 25 distinct projects, ready for implementation (Said, 2001).

Of direct relevance here is the focus of the Information & Communication Technology Project (ICTP). Much of the recent improvement in ICT infrastructure appears to fall under this project. In addition to improving the Internet infrastructure of the public university campuses, among the ICTP undertakings are initiatives to improve administrative and academic computing systems, to integrate technology into teaching and learning, to create digital libraries, to train faculty and staff in ICT-related functions and activities, and to establish centres of excellence for e-learning (ICTP, n.d.). E-learning centres funded under the HEEP are expected not only to generate products (fully developed courses), but also to establish procedures for creating and supporting courses, training and supporting faculty members, and assuring online course quality. According to Stovall (2005), one difficulty with meeting the goals of the e-learning ICTP activity will be to find faculty members and administrators

with enough online learning experience to lead the projects to successful completion.

Conclusion

Egypt has already started implementing major reform plans in the higher education sector through the HEEP. There is evidence of significant activity around ICT in higher education in Egypt. Recent initiatives have focused on upgrading the ICT infrastructure at public institutions. The various national programmes point to increasing accessibility to computers and the Internet. These initiatives are likely to have impacted on higher education. This is supported by the results of the African connectivity survey, which ranks two of Egypt's universities highly in terms of bandwidth and affordability. However, the actual impact of these initiatives in terms of infrastructure at the institutional level is unclear, given the lack of available research.

A review of the various university web sites, and current initiatives such as the NELC and the EEI point to increased attention to e-learning. Nevertheless, e-learning appears to be in the relatively early stages of development, and seems to focus more on web-based teaching material, primarily using English as the medium of instruction. There is some e-learning content available on university web sites, and evidence of collaboration between Egyptian and other higher education institutions (particularly in Europe). Furthermore, with the establishment of the AOU and the work of the MVU in Egypt, e-learning seems to be on the increase, addressing the issue of large student numbers in higher education institutions.

No evidence of national or institutional e-learning policies was found. The extent of open-source usage is difficult to assess, but it does appear that open education resources are available (as evidenced by access to MIT resources on the NELC and Ain Shams University web site). A general paucity of research on ICT and higher education was noted, particularly with regard to the use of ICTs and e-learning in higher education.

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