Integration of the two home-grown Learner Management Systems of "Old Unisa" and "Old TSA": The past, the merger and the future.

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Abstract

Both Technikon SA & Unisa (Africa's two largest distance education institutions) have had a long history of traditional, mainly paper based, correspondence education. With the recent advances in Information and Communication Technologies (ICT) in the educational sector both institutions allowed a few enthusiasts to explore the online environment for enhanced service rendering, academic support and augmentation of educational practices.

At both institutions the initiatives were initially driven by people with high levels of technical expertise. It was the passionate perseverance of these people and a small number of forward thinking academic staff who have driven the e- learning ideals within the organizations. Even though a great amount of resistance were encountered over the years (and still exists within the academic fraternity), approximately 20-30% of the students at both institutions were using the online facilities by the end of 2003. In January 2004 with the merger of Technikon SA, the University of South Africa and the incorporation of Vista University Distance Education Campus (Vudec) a new comprehensive institution dedicated to open distance learning was created. The merger of the institutions implied the merger of academic offerings, business processes and ICT systems, including the online systems.

The paper discusses the history of the two virtual campuses, reports on the current status of the merger of the two online systems into a single integrated system, and briefly explores future plans for the New Unisa's online environment.

Introduction

This paper will endeavour to reflect the virtual campus environments of both the former Technikon SA and the old Unisa, as accurately as possible. Both the authors are, however, from the former Technikon SA, and even though we have been working very closely with the old UNISA staff for the past two years, the discussions will tend to favour the former TSA as the environment is more familiar to us.

UNISA was the first tertiary institution in Africa to provide interactive online administrative services to students via SOL (Students OnLine) and TSA the first in Africa with a fully integrated, fully functional virtual campus system designed for African conditions (TSA Online).

The first version of “TSA Online” was deployed as early as 1996 and like UNISA’s SOL (Students OnLine) mainly focused on administrative functions.

In 1995 a unit was established within TSA’s Computer Services, focusing mainly on the online environment. In 1998 the Integrated Technology Centre (ITC) was established. The ITC was a business unit specialising in the development and deployment of a wide range of technology solutions for education (academic, learner support and administrative). In 2002 all information and communication technology (ICT) fragments throughout TSA were consolidated into a single Directorate: ICT in preparation for the Unisa, TSA, Vudec merger.

The current version (version 3) of TSA Online, renamed TSA COOL (TSA CoOperative Online Learning), has three similar interfaces; one for learners, one for academic staff and one for administrative staff. Each of the interfaces has two components. The first is an academic component, with sections for courseware, academic guidance, assignments, an interface into the library database, interactive discussion groups, etc. The second is an administrative component allowing staff and learners to access relevant information such as the status of assignments, exam dates and marks, financial records, a calendar, etc. in real time.

UNISA’s SOL (Students OnLine) went live slightly more than a year before TSA Online did. From 1998 to 2002 a Transitional University Web Team (TUWS) coordinated activities associated with SOL and lead to the “SOL Office” (to provide necessary support). In 2002 the Cluster for Online Learning Environments (COLE) was established within UNISA’s Buro for Learning Development (BLD). The unit has committed itself to advance academic support and ensures an enhanced learning experience for all learners using Internet communication technologies. All major online

development and technical support is done by an online unit within UNISA's Computer Services Department.

UNISA's Online system, like TSA COOL, is divided into three distinct subsystems - SOL (Students OnLine), LOL (Lecturers OnLine) and Staff Online (the latter has similar functionality as the Old TSA's Intranet). Although there are similarities between old UNISA's and TSA's virtual campus systems, each has unique features.

Over the past six months we have been investigating the merger of the two systems into a single combined system for the New UNISA. It is envisaged that a new system will be developed using the combined expertise from the previous TSA and UNISA. The new system will include all the functionality of its predecessors, as well as some enhancements.

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Discussion

International Trends

This section will attempt to highlight some prominent international trends in the development of TLT that will influence the way that technologies are deployed within the New Unisa.

The debate about whether or not one should make use of technology-enhanced learning and particularly e-learning is over and the debate has turned to best practices. It is, however, still a very immature environment and new practices are still evolving. The inherent resistance to new ways of teaching and learning and the vigorous attempts to point out weaknesses in these approaches and systems have in fact opened up a can of worms regarding education as a whole. Instead of inhibiting technology-enhanced teaching and learning, these attempts continuously point out potential weaknesses, which, owing to the nature of the environment, are rectified immediately. They have, however, also highlighted the poor and ineffective pedagogy of most current (non-technology) systems. The schooling systems worldwide have perpetuated mediocrity, and learning has been restricted by the limited vision of teachers. Learners need to be exposed to as many experiences as possible and must be given the opportunity to explore new horizons.

Most of the newly developed online systems place the learners and their needs at the centre (often to the discomfort to the unwilling academic). Systems cater for higher levels of flexibility, rich learning environments, different learning styles and the perception of “one-on-one” interaction with a good instructor. Learners must feel that the courseware and the learning experience was designed “just for them”.

There is a new focus on industry needs and TLT must solve business, needs and the content and interactivity must meet those needs. Industry is starting to realise that knowledge is the competitive weapon of the 21st century.

A few obvious trends are highlighted below:

Collaboration

Owing to the high cost of producing media-rich, highly interactive courseware, as well as the lack of specialist skills, a trend of collaborative alliances between universities, industry and technology providers is starting to emerge. These collaborations are often initiated with government funds and could take various forms. For example, in the USA high bandwidth educational networks such as Internet2 and the “University Light Rail” in California, were established several years ago. In some instances local governments assist colleges to establish these networks. New Jersey is the latest to follow the example of other states, such as Missouri, Michigan and California, that have set up their own high-speed networks dedicated to higher education. The project is intended to guarantee high-quality video and data transmission among member institutions (37 two- and four-year institutions) through a private network backbone. The backbone will obviously be connected to Internet2, which serves other parts of the country. In India the Indira Gandhi National Open University is planning to establish 40 FM radio stations and set up 2 000 television satellite downlinks to study centres throughout the country. The government will pay for the construction cost for each radio station, and most of the programmes will be produced at local level by regional universities, non-governmental organisations and community groups.

Other initiatives, such as the British Virtual University, the proposed Commonwealth Virtual University and Mbeki’s proposed Southern African Virtual University, will have to facilitate high levels of collaboration (not necessarily mergers) to be successful.

There are many more examples. The end result, however, is a new entity, “owned”, but not necessary governed, by all stakeholders.

ICT Trends

The specific technologies that will be used in future education are still uncertain. Interactive networked learning, probably via high bandwidth Internet, will, however, feature strongly, especially in developed countries. In developing countries such as India, radio and television seem to be promoted. Owing to its size, Africa will have to use an assortment of broadcasting technologies if education has to reach deep rural areas. In urban areas land-based technologies will probably still dominate for the next decade.

The former Minister of Communications, Jay Naidoo, had a vision of "wiring" Africa and drove from Libya to Cape Town to publicise how the Internet could jump-start Africa into the digital age. The current talk is of "unwiring" Africa, using wireless cell, radio and satellite technologies to provide access to the Internet. Sentec started rolling out its broadband wireless technology called MyWireless in the beginning of 2004, Telkom is soon to follow with a similar technology called T-Zone WiFi which will be installed at 100 sites at hotels and conference centres around the country.

Internet access is becoming less of a problem to learners. Approximately 80% of TSA's online learners, for instance, access the Internet from their workplace and 40% from home. ICT centres are being established all over the world. It is estimated that in South Africa alone, there are more than a 1000 such centres (government, NGO and private). These centres often take the form of a Multi Purpose Community Centre (MPCC) providing a diverse range of services, including access to various technologies and the Internet (not all). Unfortunately these centres are not widely advertised.

Large initiatives such as the SchoolNet and Gauteng Online projects focus on providing computer and Internet access to primary and secondary schools. These schools will not only provide ICT literate learners to the tertiary sector in the future, but will also present numerous opportunities for collaboration initiatives, especially with regard to providing access for our students and experiential learning opportunities for diploma students. Unisa in turn could provide development opportunities and technical support via the experiential learners. Other Internet access points could include cyber cafés, kiosks in

shopping centres, schools, tertiary education institutions, public libraries, private sector networks, government networks, etc. Institutions should be able to negotiate reasonable access frequencies and prices with many of the above.

The New Unisa is currently investigating the possibility of upgrading a significant number of resource centres at Regional Offices country wide to offer services such as study space and library facilities, end-user computing courses, Internet access, printing facilities, video conferencing and telematic satellite delivery to local learners. The facilities will be provided and maintained by Unisa. Internet enabled computers are also available at the libraries at both the Pretoria and Florida Campuses (the computers in the laboratory at the Pretoria Campus need to be upgraded).

At a Telecoms Africa conference held in Midrand in 2002, the International Telecommunications Union (ITU) and the United Nations telecommunications regulatory body, said that the number of African countries with more mobile than fixed telephone subscribers are growing. Cell phone users in Africa leapt to 30 million in 2002 from just 2 million in 1997 - a staggering growth by any standards. "It was estimated that by the end of 2001, there were more mobile than fixed subscribers on the whole African continent. Incredibly, one forecast estimates almost 100-million mobile users in Africa by 2005, or three times the number of fixed-line subscribers."

The latter, however, does not mean that the Internet will play a less important role in Africa. World Online has recently launched a mobile portal that brings services such WAP (wireless application protocol) access, web-based bulk SMS systems and a dial-in e-mail-to-voice to the mobile user. The super-fast next generation of cellular networks, known as 3G (third generation), will make it possible to get full Internet access via mobile devices such as Cell phones, PDAs and Notebook Computers. It is estimated that the total mobile market in Africa will grow to 200 million by 2010, a reasonable percentage of which will undoubtedly be 3G users.

The Internet has initiated many new phenomena worldwide. One of the most profound trends is that of the Open Source Software (OSS). Thousands of computer specialists worldwide spend countless hours developing free software programmes. In many cases large groups of programmers across the world work collaboratively to produce and enhance these software packages. Large IT companies, especially those developing and selling propriety software, are being forced to change their business models to accommodate this phenomenon. Free software is being developed for application in every field conceivable, including education.

Another result of the Internet is the concept of Network Computing. Due to the increasing pervasiveness of connectivity and continuously increasing bandwidth, the sharing of hardware resources, such as processing power and storage, is also becoming more common. In many educational institutions the power of network computing is utilised in research projects requiring a significant amount of computing power to do number crunching. Staff throughout the organisation avail servers, desktop computers and even mainframes after hours to “share the load” of computing.

From the above it should be clear that modern computing is increasingly relying on the interoperability and inter-connectivity of hardware and software infrastructures to facilitate the transfer of data. This is leading to the development of international computing protocols and standards (discussed in a bit more detail later). It is also leading to a progressive convergence of technologies. In the 1990’s most technologies used their own media and devices e.g. audio and video on cassettes using specialised cassette players and separate monitors in the case of video. Computing was done on desktop and laptop computers with data storage on floppy disks, CD ROMs, etc. Telephony was via cumbersome telephones and video conferencing using bulky cameras & monitors, etc. By 2010, most of the above functionality will have moved to the desktop and more mobile notebook computer, connecting to the Internet via broadband land based and wireless technologies. Small portable devices such as Cell phones and PDAs will have some of the functionality but will not be widely accessible. By 2020 all the above will be

available via highly portable devices such as cell phones. These devices could probably even be worn as accessories such as jewellery and watches.

For the next 10 years or so, however, DE educators worldwide (and especially in Africa) will be focusing on the exploration and optimisation of media rich interactive Internet based learning experiences on devices such as desktop computers, mobile notebook computers and “Television-like” home entertainment centres. This will be augmented with additional services provided on smaller mobile devices such as Cell phones and PDAs. In virtually all cases the information will be displayed to all stakeholders via a single interface – the Corporate Portal, which has the ability to provide secure, personalised and personally customisable information based on each individuals profile.

This section was not intended to discuss all possible technologies and the role they will play in shaping education in the future. The intention was rather to very briefly illustrate the potential of ITC and how it is taking a foothold in our everyday lives, even in Africa.

Learning objects

The concept of learning objects has become the main topic of discussion at many educational conferences, seminars and workshops over the past few years. These objects are also referred to in the literature as “instructional objects”, “educational objects”, “knowledge objects”, “intelligent objects” and “data objects”.

Learning objects are elements of a new type of computer-based instruction, grounded in the object-oriented paradigm of computer science. These objects can be re-used in various contexts owing to their adaptability and scalability.

To facilitate the widespread adoption of the learning objects approach, various standards for meta data, content packaging, digital repositories, learner information (profiles), questions and test interoperability, e-portfolios, competency definitions and learning design have been developed by various

organisations (IEEE (LTSC), IMS, ADL (SCORM), AICC and ARIADNE). These organisations ensure that universities, corporations and other organisations around the world will be able to ensure the interoperability of their instructional technologies, specifically their learning objects. It seems however, as if the SCORM implementation of the IEEE standards has become the most widely used international standard for e-learning. Many of the above local standard's efforts have representatives on the IEEE's Learning Technology Standards Committee group, which defines learning objects as follows:

> *"Learning Objects are defined here as any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning. Examples of technology-supported learning include computer-based training systems, interactive learning environments, intelligent computer-aided instruction systems, distance learning systems, and collaborative learning environments. Examples of Learning Objects include multimedia content, instructional content, learning objectives, instructional software and software tools, and persons, organisations, or events referenced during technology supported learning" (LOM, 2000).*

These learning objects can be accessed via a technology platform because of metadata (data about data) associated with each object. Ideally this should be done using an instructionally grounded approach to sequencing the objects. The end result could be automated, dynamically composed, personalised lessons, i.e. mass customised and personalised learning.

A system using learning objects will be flexible enough to support most, if not all, of the learning styles, modes, models (outcomes-based, resource-based, enquiry-based and constructivistic) and technologies described in the section above. It can furthermore seamlessly integrate information services rendered by libraries (such as e-books, references and content in full-text databases), into the courseware. Correct sequencing will cater for formal courses and programmes, such as diplomas and degrees, just as easily as for informal

short courses and in just-in-time learning. It will also provide the necessary flexibility to cater for a single institution to provide both traditional university-type education and co-operative Technikon-type education without compromising either. It will furthermore support the production of paper-based learning material.

See http://ltsc.ieee.org, http://www.imsglobal.org and http://www.adlnet.org for more information on standards.

Online teaching and learning technologies at TSA/UNISA (New UNISA)

The question is often asked; " Why build your own virtual campus system instead of buying one?". The answer is not simple, but there are a number of factors that contributed towards the decision.

The first versions of both systems (TSA and Unisa) were developed in the mid 90's when all commercial "Virtual campus" systems were in their infancy, many of them in pre- release phases and not suited for the rudimentary Internet infrastructure available in South Africa at the time.

All available "off the shelf" products were, however, investigated and evaluated before the decision was made to develop in-house.

In most cases costs were prohibitively high and technical expertise and support for third party products were virtually non-existent in South Africa. The systems were designed for first world environments and technical proficiency levels and therefore too complex for most academics. Academic staff also wanted a system that gave them academic freedom. Existing systems were too restrictive.

The development of a homegrown system in an emerging field of study had tremendous academic value. By simply purchasing a piece of software, the desired depth of knowledge could not be attained.

At TSA the "Virtual campus" system had to be an extension of existing systems, not an add- on. Continuous changes (often weekly) to the ITS

system required a high level of maintenance and made it virtually impossible to integrate third party software into TSA's legacy student administration system (ITS). In fact, the cost and effort to integrate the packages seamlessly into system (ITS) was comparable to development costs.

Due to the profile of TSA's learners (particularly ICT literacy and geographical distribution) the system had to be simple enough that no training needed to be provided.

Due to institutional disinterest, very little funding was available. As a result TSA Online was hosted on a desk top computer in a communal office for the first three years of its existence.

Many of the above factors also influenced the decision to continue with the development of subsequent versions of "TSA Online". This also holds true for the envisaged redevelopment of an online teaching and learning system for the New UNISA.

Being primary drivers in the deployment of teaching and learning technologies for more than a decade have taught us many valuable lessons. These include; patience, perseverance, and most importantly, passion. Without the latter, the first two can not be achieved.

A strategy of evolution (rather than revolution) was adopted in the deployment of the virtual campus. Institution wide acceptance of new technologies needs a "buy in" strategy. A "bully in" strategy causes severe resistance and often results in "passive sabotage", bad relations and unnecessary frustration. Either way, it takes time.

Other lessons learnt were:

- Be involved everywhere and actively promote the online environment among all staff members. Often results are achieved through unexpected channels.
- Work with the champions and celebrate their successes publicly (Internal publications, information seminars and achievement awards). Unfortunately less than 5% of academic staff fall within the "champions" category.
- Have a senior sponsor.

- Adopt a big picture approach - Ensure that the teaching and learning technology strategy supports the institution's strategy and that it is incorporated in the institutions overall technology strategy. The latter will assist in securing resources.
- Keep the interface simple and avoid unnecessary functionality that will not be used. Rather add additional functionality when there is a good "business case" for it. This will significantly reduce support and ensure high returns on investment (ROI). A simple interface does, however, not necessarily mean a "simple" system.
- Be prepared to provide/arrange one-on-one training of staff. Our experience was that training classes were badly attended. At TSA training was done by the ITC as well as the Academic Development Centre (ADC). The ITC did most of the one-on-one training and assisted the ADC to provide online training via TSA COOL using a course specially developed for this purpose. The Cluster for Online Learning Environments (COLE) at the old UNISA developed an online technical tutorial. Training strategies attempt to cater for three levels of training; basic technology literacy, LMS system training and using the technology as an academic practitioner. Both systems made use of online help facilities.
- Synchronous online technologies do not work in a distance education institution, especially in a developing country where access to Internet facilities is sporadic. The authors developed an asynchronous online facilitation methodology, called "FOCUS", to address this issue. Simple interactive discussion group technology is used (This software can be downloaded from various sites on the Internet, free of charge, and will run on most old and/or low end computers).
- In-house development has its risks. The biggest problem with in-house development (in resource restricted environments) is that only a few (often only one or two) developers are involved with the programming of the system. All knowledge pertaining to the system often resides within the heads of those few individuals. Programmers are notoriously bad at the documentation of systems. If the individuals leave the

organization, everything may have to be redeveloped from scratch. It is therefore imperative to make sure that proper documentation is kept during all stages of development. It is also important to agree upon programming standards before development commences. Provision must be made for staff attrition.

System Usage

There are currently approximately 526 active subjects and 3000 courseware related files loaded on TSA COOL (The latter two values are ballpark figures). All new courses developed for print, are also placed online in Acrobat portable document format (.pdf). Several fully interactive online courses have been developed and the academic results so far are extremely positive. Virtually all of TSA's academic staff members have subscribed to TSA COOL and are automatically linked to all their respective subjects when logging onto COOL.

In 2003 UNISA's Lecturers Online system had 2399 (currently 2793) courses linked to staff, 362 (currently 593) courses had active forums, 1280 (currently 1289) courses were open for e-mail and 307 (currently 221) courses had unique home pages (Currently 221 with unique and 140 with standard course pages). A total of 10 680 files with study material were loaded on the system in 2003 (currently there are 3 727 courses in use for formal programmes, 3 478 courses with registered printed study material and 2 670 courses with PDF courseware). 49 573 essay assignments and 33 663 multiple choice (M/C) assignments were submitted electronically during 2003. There are currently three fully online courses and one mixed mode course.

At the end of 2003, 21 629 learners were registered on TSA COOL, approximately a third of the 63 000 students enrolled at TSA in 2003. There are currently (end April) 16 450 learners registered. Figures 1-3 indicate the growth and increase of use of the system over the past 5+ years:

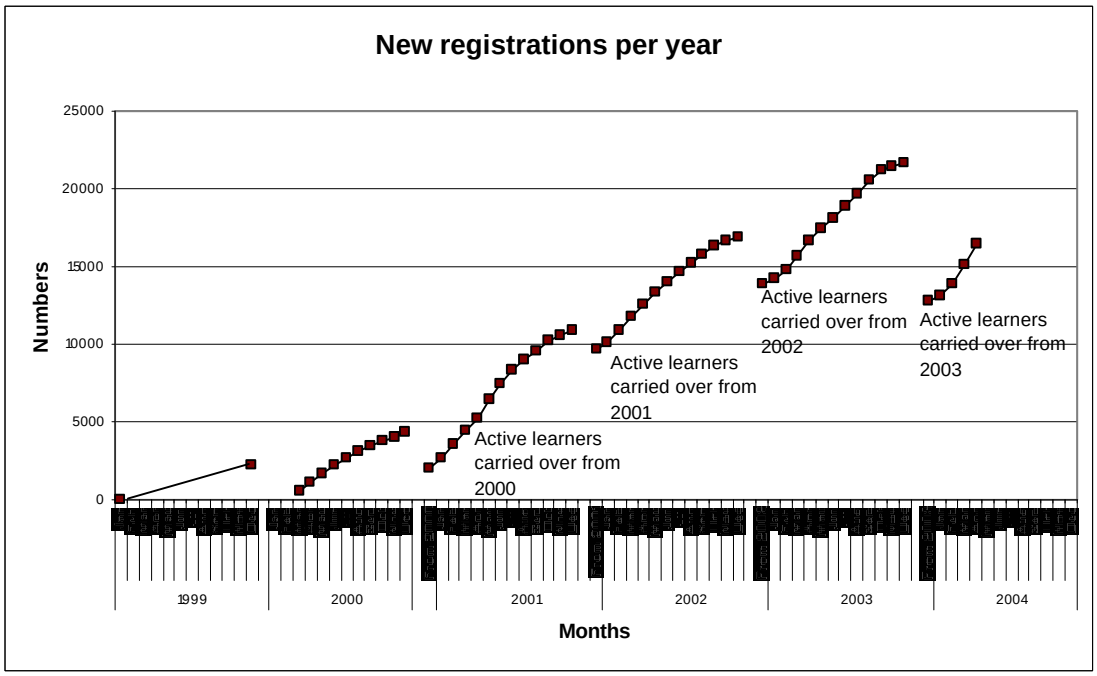

Figure 1: Growth in learner numbers using TSA COOL

The number of new students registering on TSA COOL increased at an exponential rate between 1999 and 2003. It is however expected that the numbers will eventually decrease due to factors such as lack of access to the Internet, unavailability of academic content and eventually total student numbers.

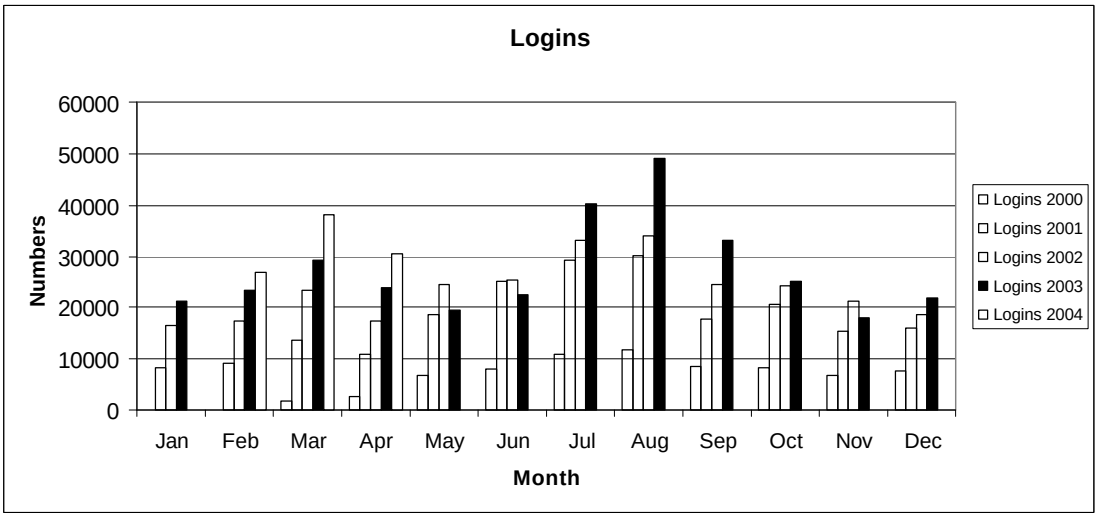

Figure 2: Usage of TSA COOL measured in terms of number of logins per month

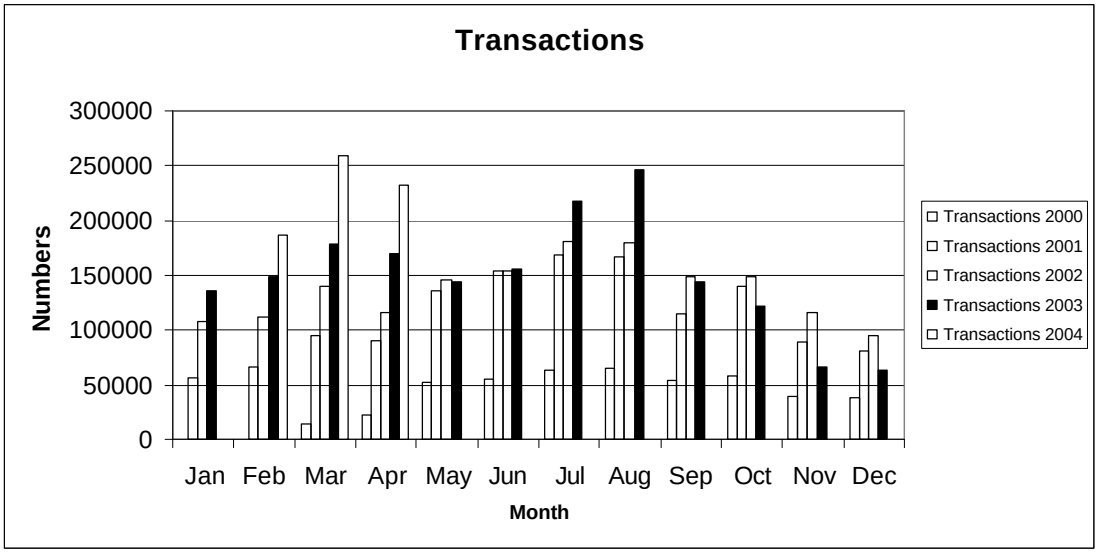

Figure 3: Usage of TSA COOL measured in number of transactions per month

A transaction can be roughly translated to the equivalent of a letter sent or telephone call answered in conventional correspondence terms i.e. TSA COOL provided a service to learners equivalent to nearly 1.79 million letters and telephone calls in 2003 and nearly 6 million over the past 4 years.

In April 2004 UNISA's Students Online (SOL) had approximately 72 000 users, about 50% of the registered students.

The usage of Students Online during 2003 is summarised below.

Total logins	1.11 million
Assignment results requests	1.10 million
Application for student numbers	14 834
Online registrations	27 528 (2003 academic year)
Online payment requests	41 402 (growing at 100% per year)
Address changes	16 842

In a survey done in 2002 among 942 learners using TSA COOL, the following information, among others, came to the fore:

Category	Parameter	Result
Field of study	Business, Commerce and Management Sciences	31%
	IT	36%
	Engineering	9%
	Marketing and Public Relations	6%
	Public Administration	4%
	Others	14%
Access to Internet	From work	78%
	From home	43%
	From Internet cafés	7%
	From other locations	9%
Frequency of use	Daily	24%
	Weekly	53%
	Monthly	17%
	Hardly ever	3%
	Unknown	3%
Conduct studies completely online	Yes	79%
	No	21%

The survey also highlighted some areas of concern with TSA as a whole, but apart from three exceptions, all the learners thought TSA COOL was “cool” and greatly enhanced their learning experience.

A demographic analysis of learners using COOL during the past four years shows the following (the percentages are based on actual figures, and are based on "new registrations" i.e. students joining COOL during the particular year):

	2000	2001	2002	2003
Gender:				
Female:	42.60	44.82	46.83	47.62
Male:	57.40	55.16	52.49	52.38
Unknown		0.01	0.68	

Ethnicity:				
Black	37.62	55.55	56.86	60.36
Coloured	7.94	6.35	7.46	7.59
Indian	6.84	5.78	5.54	4.88
White	47.39	30.25	28.96	26.36
Unknown	0.21	2.07	1.18	0.81
Age:				
< 20	0.07	1.34	3.50	2.71
20 - 24	15.81	26.96	25.88	25.54
25 - 30	29.43	29.16	28.26	26.83
31 - 35	27.38	20.79	20.54	20.36
35 - 40	14.51	11.62	11.60	11.85
40 +	12.78	10.11	10.23	12.69
Unknown	0.02	0.02	0.00	0.02

Two distinct trends are apparent in the data presented in the table above. The first is that the gender gap has virtually disappeared, and secondly, that the number of black students using the system has significantly increased. Due to the fact that Technikon type offerings focussed on employed learners, these trends reflect the change in our country's demographics where more and more females and black people are taken up into the workforce. The computer literacy level of school leavers have increased significantly over the past few years, resulting in quicker adoption of online learning initiatives.

The future

A detailed analysis of the e-learning systems at the Florida campus (TSA COOL) and Pretoria campus (SOL & LOL) have been completed. The two systems will be merged to bring the best of each system to our staff and students. A number of significant enhancements will furthermore be added. These will, among others, include:

- A portal based presentation layer, utilizing all the advantages a state of the art corporate portal can offer (profile based single sign on and content display, collation diverse resources into portlets, personalisation, etc.)
- Enhanced management information and student tracking using open metadata standards

- Close collaboration with all stakeholders (academic, non-academic and students) in the functional design of the system.
- Closer alignment and integration with institutional processes such as the courseware production process (paper based), workflow, administrative processes, etc.
- Rigorous version control
- Utilize mobile technologies where appropriate

Due to the factors mentioned earlier in this document as well as the experience gained over the past eight years with in-house developed systems, it has been decided to continue with in-house development. With the combined expertise gained by the merger, we believe that the new system to be developed will closely fit specific needs of the new Unisa and will be able to compete with any of the shelf products currently available.