A New Approach to Assessing End-User Computing

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Abstract

The Department of Computer Science and Information Systems at UNISA has adopted a new method of assessing students who has registered for End-User Computing (EUC). UNISA is a distance-education university offering tuition to students world-wide. A student who now registers for EUC with UNISA, in effect registers for the International Computer Driving Licence (ICDL). This requires the student to do 7 tests on computer throughout the course of the year, instead of writing a written exam at the end of the year. In this paper the reasons why the ICDL approach was adopted, the way it is implemented at UNISA, the advantages offered by the approach and the results obtained to date, are discussed.

Introduction

The Department of Computer Science and Information Systems at UNISA has implemented a new method of assessing the End-User Computing module (CEM101-A) this year. A student who registers for CEM101-A, in effect registers for the International Computer Driving Licence (ICDL). The ICDL requires the student to do 7 tests on computer during the course of the year, instead of a written exam at the end of the year as was previously the case.

CEM101-A replaces the previous End-User Computing module, INF103-6. INF103-6 runs for the last time this year, and is available only to students who repeat this module and students who cannot access an ICDL Test Centre. Students registered for INF103-6 will still submit 4 assignments (2 multiple-choice and 2 practical) in order to obtain the necessary credits for exam entrance. They will also have to complete a written exam at the end of the year, as previously.

This paper explains the ICDL concept, indicates the reasons why UNISA adopted this approach, and discusses the current implementation thereof and the results obtained to date.

The International Computer Driving Licence (ICDL)

The ICDL certifies that the holder has knowledge of the basic concepts of Information Technology and is familiar with the operation of a personal computer and basic software applications, up to an internationally accepted standard. Apart from the first module (which consists of a written test of basic IT knowledge), all the modules test practical skills rather than theory.

The ICDL was originally developed in Europe by CEPIS (Council of European Professional Informatics Societies) where it is known as the European Computer Driving Licence (ECDL), and is owned by the European Computer Driving Licence Foundation (ECDL-F),

with its headquarters in Dublin. The ECDL is offered and accepted in many countries in Europe, and the ICDL is being offered and accepted in many countries around the world (for example, it is already available in South Africa, Australia, Canada, and is in the process of being announced in the USA by the ACM). An ECDL/ICDL issued in one country is also valid in another.

In South-Africa the Computer Society of South-Africa (CSSA) is the sole licensee for the ICDL, and has established the International Computer Driving Licence Foundation of South-Africa (ICDL-F) as a section 21 not-for-profit company to manage and administer the ICDL both locally and in various nearby countries including Mauritius, Namibia, Zimbabwe, Botswana, Lesotho, Swaziland and Kenya. The ICDL-F does not offer training facilities or courseware, but accredit training institutions and test centres. Accreditation of training centres is not mandatory, but accreditation of test centres is, and the ICDL-F ensures that certain minimum standards are maintained. Test Centres have to send the results of tests taken to the ICDL-F on a regular basis. The ICDL-F also maintains a database of all students to whom a Log Book was issued, as well as details of where and when each module was passed, and when the particular Driving Licence was issued.

The ICDL is based on a specific syllabus and a Skills Card or Log Book. The syllabus is independent of platform, operating system, software packages and language. It consists of 7 modules, namely:

- Module 1: Basic Concepts of Information Technology (IT)
- Module 2: Using the Computer and Managing Files
- Module 3: Word Processing
- Module 4: Spreadsheets
- Module 5: Databases/Filing Systems
- Module 6: Presentations
- Module 7: Information and Communication

Basic Concepts of Information Technology (IT) requires the student to be familiar with the basic physical composition of a PC and to understand some basic IT concepts such as data storage and memory, the background for computer-based software applications in society, and how information networks are used in computing. The student must also be aware of how IT systems are used in daily life, how PC's can affect health, and of some of the security and legal issues associated with computers.

Using the Computer and Managing Files requires the student to demonstrate knowledge and competence in using the basic functions of a PC and its operating system. Students should be able to use the desktop environment effectively for managing and organising files and directories/folders (i.e. be able to copy, move and delete files and directories/folders). The student must be able to work with desktop icons, manipulate windows and use search features, as well as simple editing tools and print management facilities.

Word Processing requires the student to demonstrate his ability to use a word processing application on a PC. He must be able to understand and perform the basic operations to create, format and finish a word processing document ready for distribution. He must also be competent in using some of the more advanced features in word processing such as creating tables, using clip art, importing objects and using mail merge.

Spreadsheets requires the student to understand the basic concepts of spreadsheets and to demonstrate his ability to use a spreadsheet application on a PC by using the basic operations to create, format and use a spreadsheet. The student must be able to use basic formulas and functions to perform standard mathematical and logical operations. He must also display his ability to use some of the more specialised features such as importing objects and creating charts and graphs.

Databases/Filing Systems requires the student to understand the basic concepts of databases and to display his ability to use a database on a PC. The module is divided into two parts - the first part entails that the student design and create a simple database using a standard database package; and the second part requires the student to retrieve information from an existing database by using the query, select and sort tools in the database. The student must also be able to create and modify reports.

Presentations requires the student to demonstrate his competence in using presentation tools on a PC by creating, formatting and preparing presentations for distribution and display. He must be able to create an assortment of presentations for various target audiences and situations. The student must be able to perform basic operations with charts and graphics, and to use different slide show effects.

Information and Communication is divided into two parts. The first part, *Information*, requires the student to perform basic Web searches using a Web browser and available search engines, to bookmark search results, print Web pages and search reports. The second part, *Communication*, requires the student to use electronic mail software to send and receive messages, to attach documents or files to a message and to organise and manage message folders/directories within the electronic mail software.

The *Log Book* is used to record successful completion of the 7 modules, each of which demonstrates the student's competence in a specific area. Each Log Book has a unique number and provides space for the student's particulars (including his ID number), as well as a space for each test, where an ICDL accredited test centre can stamp and sign the Log Book to indicate that a student has passed the test. The student must present both his Log Book and a valid ID (matching the ID in the Log Book), on turning up to write a test. Once all 7 tests have been passed, the Log Book is returned to the ICDL-F who then issues the Driving Licence. After any four modules have been passed, a student may apply for an ICDL Start certificate, which can be updated to a Driving Licence once all seven modules have been passed.

Internationally, to obtain an ICDL, a student buys a Skills Card or Log Book from an ICDL training centre and then writes the tests for each of the seven units at any ICDL authorised testing centre anywhere in the world. The seven ICDL tests may be written in any order, and a student may rewrite a test as many times as is necessary, to pass it. A test has a time limit of 45 minutes. The pass mark for all the tests is 80%, except the test for Module 1, which has a pass mark of 60%. The Log Book is valid for three years since the date on which the first test is written.

Testing can be done manually or automatically. Manual testing simply means that the tests are marked by hand - the student will always conduct at least six of the seven modules on computer. In manual testing, between 12 and 20 different tests for each module is provided by the ECDL-F. The tests are localized for each country, while using the same syllabus and

so certifying the same level of knowledge and competence in computing. Automatic testing is preferred, however, since scoring is quicker and it also provides facilities for record-keeping and easy auditing.

In SA a Log Book can be bought for R250, which includes registration and the issue of the actual Driving Licence once all seven tests have been passed. The recommended price for a manual test is R60, while Test Centres using automated testing software usually charge at least R80 per test. All in all, it would cost at least R670 (doing manual tests) or R810 (using automated testing software), to obtain an ICDL on your own. It is recommended, however, that a student enrols with an accredited training institution as this allows the student to prepare for the tests with a clear understanding of the syllabus, since, though passing the tests is not difficult, it is also not trivial. In a commercial setting the expected cost to obtain an ICDL can be in the region of R2500 to R3000, but there can also be substantial variation in these figures. At UNISA the tuition fee of R810 includes the cost of the Log Book and 7 tests, as well as the study material.

According to the ICDL-F, local experience has shown that a student with very little technological background, needs up to 120 hours of "lecturer to student face-time"[2] to obtain his ICDL. Students with some basic knowledge of technology, requires 70 to 80 hours. Apparently these figures correspond to experience in other countries such as the UK.

The ICDL-F has submitted a number of Unit Standards that map to the ICDL modules, to the South-African Qualifications Authority (SAQA). Once approved, this will put the syllabus in the public domain, but the term "International Computer Driving Licence" and the acronym "ICDL" will remain the property of the ICDL-F.

Reasons for Adopting the ICDL

Various factors contributed to UNISA adopting the ICDL. Among others, the number of students registering for EUC played an important role. In 2000 we had 4000 students registered for EUC, and the trend during the previous years indicated a 10% growth in the number of students per year. Like most of the Computer Science and Information Systems Departments at tertiary institutions in SA, we have a personnel shortage, and 4000 students who hand in two practical assignments to be marked by hand, as well as a written exam at the end of the year, started posing a very real problem in terms of workload.

The fact that EUC is included in all the new degrees UNISA registered with SAQA in 2000, even though for most of them it is not a core or a foundational module, also pointed to the necessity for a new method of handling this module.

Further more, EUC is a very practically oriented subject, and there is general consensus in the Department of Computer Science and Information Systems at UNISA that ideally it should be tested practically and not by means of a written exam. UNISA, however, is one of the largest distance-education universities in the world, with students from Australia to Iceland, which complicates matters. If we set a practical exam, all the exam centres in SA and the rest of the world should be provided with the necessary hardware and software to allow the students to do the practical exam. Taking into account that in SA these examination centres are often simply a church hall, or overseas, a conference room at an embassy, it certainly does not offer a practical proposition.

Nowadays there is little doubt that an EUC module should include some training on how to use the Internet. To accommodate that, all the students registered for EUC, should have access to the Internet, even if it is only via an Internet café. This raises the possibility of using the Internet to assess students. A few problems arise: once again, students may claim that hardware and software should be provided at all exam venues for students who do not possess their own; if all the students do not do the practical exam at the same time, a number of exams have to be set for the same subject, adding to the workload; and also - how can it be proved that the person who does the test, is the student he/she claims to be if there is no invigilator to confirm it? The integrity of its degrees is crucial to UNISA as a distance-education institution.

The ICDL offers a near-ideal solution to UNISA:

• The practical modules are tested practically.
• The high pass mark contributes to the integrity of the qualification by ensuring that the student who has obtained an ICDL is really able to the use the software.
• A large number of countries already have accredited ICDL/ECDL Test Centres.
• There are several ICDL Test Centres distributed across SA, offering testing facilities to those students who cannot reach UNISA's ICDL Test Centres.
• The Test Centres are audited on a regular basis that guarantees the integrity of the qualification and maintains the standard.
• The student has to prove his identity when turning up for a test.
• The ICDL-F verifies the test results when the Log Book is handed in to obtain the actual Driving Licence - the stamp used by the Test Centre and the signature of the examiner is checked as well as the results that have been sent in by the Test Centre for this particular student.
• Automated testing software is available, which simplifies the testing of a large number of students enormously.
• Unit standards for the ICDL modules have already been submitted to SAQA.
• Students obtain an internationally accepted qualification.

Based on the above, as well as a study made by the Bureau for Management Information at UNISA, it was decided to implement the ICDL as a method of assessing students registered for EUC with UNISA.

Current Implementation

End-User Computing is offered as two different modules in 2001, INF103-6 and CEM101-A, both of them year modules. Students who register for the first time for EUC had to register for CEM101-A, unless they reside in a country where there are no ICDL Test Centres, in which case they would register for INF103-6. Students repeating EUC, could register for either INF103-6 or CEM101-A.

INF103-6 runs for the last time in 2001, and is offered in the same format as previous years, i.e. students have to submit 4 assignments at fixed dates during the course of the year, in order to attain the necessary credits for exam entrance to the written exam at the end of the year. Two of these assignments are multiple-choice, marked by computer, and the other two are practical assignments, on spreadsheets and databases respectively. The two practical assignments are marked by hand.

INF103-6 and CEM101-A use exactly the same study material, 7 study guides, one for each of the ICDL modules, printed at UNISA Press under licence from Masterskill, a Johannesburg-based company. The prescribed software is Windows 98 and Microsoft Office 2000.

The tuition fee for CEM101-A is R250 more than the fee for INF103-6 (the cost of a Log Book), and includes the study material, a Log Book and the opportunity to write 7 ICDL tests free at a UNISA ICDL Test Centre. The INF103-6 assignments are also supplied to the CEM101-A students, with the difference that the CEM101-A students do not submit the assignments, but use it for self-evaluation, as the solutions to the assignments are sent to both the INF103-6 and the CEM101-A students.

UNISA buy the Log Books in bulk from the ICDL-F and issue them with a label containing the student's name, ID and student number pasted into the back of the Log Book. The unique Log Book number is linked to the student to whom the Log Book was issued and recorded in UNISA's student database. The Log Books are despatched to the students via registered insured mail.

UNISA runs three ICDL Test Centres at the main campus in Pretoria and the Regional Offices in Cape Town and Durban. 82% of the students registered for CEM101-A in 2001 reside within 200 km from these Test Centres, and should therefore be able to conduct their 7 tests for free. 54% of the total number of students registered for CEM101-A, 2028 students, live within 200 km from Pretoria and are expected to conduct their tests at the UNISA ICDL Test Centre in Pretoria. 413 students live within 200 km of Cape Town and 626 within 200 km of Durban. Students who cannot, or do not wish to, access a UNISA ICDL Test Centre, may conduct the ICDL tests at any ICDL accredited Test Centre anywhere in the world, but have to pay for the tests themselves. A list of public ICDL Test Centres in SA are also sent to the students.

Though UNISA originally planned to use automated testing software, the testing software for Office 2000 was not yet available at the beginning of the year and therefore we signed a contract with Masterskill to do the testing manually. Masterskill supplies three roving examiners, one for each of the three Test Centres, while UNISA handles the bookings for tests and makes the test results available to the students. The testing arrangements was organised in close collaboration with the ICDL-F.

There are no set dates for tests. Students work at their own pace and book when they are ready to do a test. There are between 12 and 20 different tests available for each of the 7 modules, and tests are allocated at random by the booking program when a student books. If a student has to repeat a test, the booking program ensures that he will not conduct a test he has taken previously. The booking program also keeps track of the number of tests a student has done. As mentioned already, the first seven tests are free and thereafter a student has to pay R80 for each additional test.

In order to assist the students in their studies for the ICDL, UNISA offers the following:

- Microcomputer laboratories in Pretoria, Johannesburg, Pietersburg, Cape Town and Durban are open for students who do not have their own computers.
- Tutors for CEM101-A are provided at the UNISA Learning Centres in Thutong (Sunnyside, Pretoria), Johannesburg, Pietersburg, Western Cape (Cape Town) and

Durban.
- Limited access to the Internet (necessary for module 7) is available at the microcomputer laboratories. A list of Internet cafés in SA was also sent to the students.
- A list of FAQ was distributed to the students.
- Additional exercises for each of the 7 modules are sent to the students.
- Discussion classes for CEM101-A (and INF103-6) are held in Pretoria, Durban and Cape Town during March and June.
- A complete breakdown of the ICDL syllabus is supplied to the students.
- A web site where sample tests for the ICDL modules can be downloaded, is also given to the students.
- An Internet-based discussion forum for CEM101-A/INF103-6 is maintained.

The system offers a number of significant advantages to students, mainly because of the flexibility it offers:

- Students work at their own pace. Therefore it is possible to plan their tests so as to complete all the ICDL tests before the final year-end exam and also to avoid tests during mid-year exams.
- More than one test may be written on the same date.
- A student may repeat a test as many times as necessary to pass it, bearing in mind that only the first 7 tests are free.
- Since the Log Book is valid for three years from the date on which the first test is written, even if a student do not pass all 7 ICDL tests during the year of registration, he may continue doing the tests without having to register again for CEM101-A. Once he has obtained his Driving Licence, he would then have to apply for credit with exemption for CEM101-A at UNISA, in order to let it count towards his degree.
- It is generally agreed that writing a practical test on computer, offers a better way to demonstrate a student's ability to use the software, than a written exam.
- Students gain an internationally accepted qualification as well as credit for CEM101-A.

Results to date

On 2 March 2001 there were 3760 students registered for CEM101-A and 237 for INF103-6, giving a total of 3997 students registered for EUC, compared with 3892 students registered for EUC (INF103-6) in 2000 on the same date. Of these, 317 students are from outside SA. There have been a substantial number of late registrations for CEM101-A and currently the number of students registered for CEM101-A is 4038. The combined number of students for CEM101-A and INF103-6 indicates a 7% increase on last year.

In general we are satisfied with the implementation. Initially we experienced many enquiries about exactly how the ICDL testing would work, and the Test Centres opened later than planned, due to renovations. The most persistent problem we experience, however, is one unique to distance-education institutions - the after-effects of the postal strike during February/early March. Due to the strike, the notification slips informing students that their Log Books (sent via insured registered mail) have arrived, were either not delivered, or delivered too late. If a Log Book has not been collected within 30 days of arrival, the Post Office returns it to UNISA, where the address have to be confirmed and the Log Book despatched again. This is causing a delay in writing the tests for many students.

The (temporary?) closing down of the ICDL Test Centre in Mauritius, run by a semi-state organisation, due to re-organisation, has compelled us to give the opportunity to the 152 students in Mauritius to change their registration for CEM101-A to INF103-6, if they so prefer. The ICDL-F are negotiating with the said organisation, as well as another institution, to open another Test Centre in Mauritius, but no date has yet been confirmed, and UNISA cannot leave students in the lurch.

To date (1 May 2001), 495 test were done by 291 students. 242 tests, 65% of those written, were passed. No student has as yet written all 7 tests. The results for the individual modules are as follows:

Module	Number of tests written	Number of tests passed	% Passed
1 - Basic Concepts of IT	291	186	64%
2 - Using the Computer and Managing Files	116	68	59%
3 - Word Processing	47	36	76%
4 - Spreadsheets	21	17	71%
5 - Databases/ Filing Systems	6	3	50%
6 - Presentations	6	5	83%
7 - Information and Communication	8	8	100%

Test results at this stage show an increase in pass rate for the higher modules in general, with the exception of Module 5, Databases/Filing Systems. This is to be expected, as the students who attempt these modules, are probably more proficient and already well-versed in the software. Also, fewer students have attempted these tests.

The test results for Module 5 are interesting. From my own experience, it seems as if EUC students find databases difficult to understand and use. Last year we offered discussion classes (in Pretoria) and video conferences (to the Learning Centres in Pietersburg, Cape Town and Durban) on databases, in June, in addition to the previously held once-a-year discussion classes in March, during which databases was not covered. It is my personal opinion that this contributed directly to the 3% increase in pass rate for INF103-6 in 2000.

Conclusion

Since only a small portion of the students have been tested, it is not possible as yet to use the current pass rate of 65% compared to the pass rate of 41% (of students registered) for INF103-6 last year, as confirmation that students will be more successful with this method of assessing EUC students. The early results, however, seems to be positive.

References:

[1] 2001 UNISA Calendar
[2] Guy, C.P. May 2000, The International Computer Driving Licence (ICDL), *Interface 2000*

Websites:

ECDL: http://www.ecdl.com
ICDL: http://icdl.org.za
ICDL Sample Tests: http://www.ecdl.com/download/sampletest.html