

AUDITOR-GENERAL'S REPORT

PERFORMANCE AUDIT

Using Computers in Schools for Teaching and Learning
Department of Education and Training
Follow-up of 2000 Performance Audit



The Legislative Assembly
Parliament House
SYDNEY NSW 2000

The Legislative Council
Parliament House
SYDNEY NSW 2000

In accordance with section 38E of the *Public Finance and Audit Act 1983*, I present a report titled **Using Computers in Schools for Teaching and Learning, Department of Education and Training: Follow-up of 2000 Performance Audit**.

A handwritten signature in black ink that reads 'Peter Achterstraat'.

Peter Achterstraat
Auditor-General

Sydney
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Foreword

Our society is increasingly dependent on the use of computers and the internet.

It is difficult to know whether our children learn more about computers at home or at school. Nonetheless, we look to our schools to ensure they graduate with the skills and experience to competently use these resources in further study, work and in life generally.

Since we audited the use of computers in schools in 2000, there have been enormous advances in available information, and the speed with which we can retrieve it. We wanted to find out how well our schools have been keeping up.

Peter Achterstraat
Auditor-General

May 2007

Executive summary

The focus of our audit

The NSW Government introduced the Computers in Schools Program in 1995, allocating 70,000 computers to government schools. Our 2000 Performance Audit report 'Using computers in schools for teaching and learning' examined how well these computers were being integrated into teaching and learning.

Providing computers to our schools helps students get on the right side of the 'digital divide'. This separates people into the information rich and the information poor. Being on the right side of the divide is increasingly critical to personal, educational and economic success.

In this follow-up audit we wanted to find out whether:

- students and teachers have better access to computers than in 2000
- computer use has been integrated into teaching and learning.

Audit opinion

We consider that students and teachers have significantly better access to computers than was the case when we did our 2000 audit. Teachers and students are also increasingly using computers for teaching and learning.

The Department of Education and Training has been proactive in advancing Information Communication Technology (ICT) into schools. Since 2000, it has:

- provided high-speed internet connections to schools
- invested in training for teachers
- set up a support organisation for ICT teaching resources
- integrated ICT into the school curriculum
- developed ICT teaching standards.

However we found that teachers and students are less likely to use computers if there are problems with infrastructure or technical support.

Below we explain in brief the basis for this opinion. Our in-depth analysis is set out in the attached detailed report.

Key findings

Chapter 1: Do students and teachers have better access to computers?

Access to computers in our schools is significantly greater than in 2000. Schools have more computers and they work faster.

In 2004 the department introduced the \$544 million Technology for Learning Program, which included plans to maintain 100,000 computers in schools that are under warranty and less than four years old.

The department reports that the target for this program has been met, allowing a ratio of one computer for every eight enrolled students. Schools also use other funds to purchase additional computers that comply with the department's standards. The department estimates that the overall ratio is therefore one computer to every six students.

However there are still a few remaining problems like infrastructure and technical support holding some schools back. For example teachers are less likely to use computers where:

- high-speed cabling does not extend to all classrooms
- the school does not have enough rooms for computer labs
- there are not enough skilled personnel in schools to help out when problems occur.

**Chapter 2:
Has computer use
been integrated into
teaching and
learning?**

There have been great strides in the integration of computer use into teaching and learning since 2000. This is shown by:

- students achieving a high level of competence in computer use
- more and more teachers and students accessing ICT resources
- the many examples of integration we saw on our school visits.

In 2006 the NSW Board of Studies tested the computer skills of Year 10 high school students for the first time as part of the School Certificate. The results showed that they rated all students as competent or better.

In 2005 the department introduced the Teaching and Learning exchange (TaLe), an online teaching resource available to teachers and students. TaLe records show a dramatic increase in access. It grew from one million hits in the first seven months to a million hits per month by the start of 2007.

In our field research, we saw many examples of teachers and students using computers for learning. In many cases, a computer is now a standard tool. Teachers reported that many students are now submitting assignments in electronic format. Students use computers for a variety of tasks including word processing, presentations, modelling and design, and research.

It is encouraging to see teachers and students using computers for learning. However schools with infrastructure and technical support problems as discussed above are less likely to fully integrate computers into learning. The department needs better information on these issues so it can plan a targeted catch-up response.

Recommendation

We recommend that the Department of Education and Training identifies ICT needs in schools and develops strategies to systemically address the needs of any schools falling behind in the use of computers.

Response from the Department of Education and Training

I refer to your letter dated 4 April 2007, to the former Director-General regarding the Audit Office's draft final report - Progress in using computers in schools: 2000-2007. Thank you for the opportunity to provide a formal response.

The Department of Education and Training welcomes this report and appreciates the constructive approach the audit team has taken to this study. The report acknowledges the considerable progress that schools and the Department have made in providing access to computers and in integrating ICT into teaching and learning notably:

- *improvement in hardware acquisition, installation and support under the Technology for Learning program*
- *high-speed broadband connection to almost all NSW schools*
- *enough computers in schools to allow students to meet the requirements of the syllabus*
- *substantial technical support and local ICT support capacity development*
- *great strides in the integration of ICT into teaching and learning*
- *an extensive and growing range of quality support materials across all learning areas (particularly following the establishment of the Centre for Learning Innovation in 2004)*
- *a substantial investment in teacher ICT professional learning (nearly 2,500 teachers have been trained through the INTEL Teach Essentials program) and enhanced teacher ICT competence and confidence, which will be sustained through the Connected Learning Advisory Service*
- *increasing student familiarity with and competence in, using computers in learning (with special attention given to the needs of students with disabilities)*
- *the growth and success of the Teaching and Learning Exchange (TaLe), which now approaches 12 million hits and offers 48,000 links to 19,000 resources.*

However, I note that the report does recommend that the Department identify ICT needs in schools and develop strategies to systemically address the needs of any schools falling behind in the use of computers.

The Department encourages all schools to develop an implementation plan for ICT services.

The Department will provide standard templates to assist schools with ICT planning and identification of local ICT needs. The Department's Information Technology Directorate, in consultation with Regional ICT teams, will then identify any schools falling behind in the use of computers and support appropriate remedial actions.

(signed)

*Michael Coutts-Trotter
Director-General of Education and Training
Managing Director of TAFE NSW*

Dated: 30 April 2007

1 Access to computers in schools

At a glance

The key question we wanted to answer was:

Do students and teachers have better access to computers than in 2000?

Our assessment:

Access to computers in our schools is significantly greater compared with 2000. Schools have more computers; they work faster and give access to the vast resources of the internet much faster.

A target of one computer for every eight enrolled students has been set and met, although not all of these are available for student use. However, there are no minimum educational standards for how many students should share each computer.

Although access has improved there are a few problems like cabling, power supplies and technical support holding some schools back. The department needs better information on these issues so it can plan a targeted catch-up response. More technical support and training may be needed, or computers in some schools are less likely to be used to their full potential.

Despite these reservations, computers have become an established and indispensable tool in teaching and learning in a short time.

Our 2000 Performance Audit report 'Using computers in schools for teaching and learning' examined how well computers were being integrated into teaching and learning in NSW government schools.

In this follow-up audit, we assess whether students in schools across the state have improved access to computers since that time, and how well computer use has been integrated into teaching practice and student learning needs.

The NSW Government introduced the Computers in Schools Program in 1995, announcing plans to allocate 70,000 computers. In 2004, the \$544 million Technology for Learning Program (T4L) superseded this program. It included plans to maintain 100,000 computers in schools that are under warranty and less than four years old.

Providing computers and associated resources to our public schools is an important initiative to assist students to get on the right side of the 'digital divide'. This concept holds that access to information tools, such as the personal computer and the internet, are increasingly critical to educational and economic success and personal advancement. A 'digital divide' separates people into the 'information rich' and the 'information poor'.

1.1 Are standards for availability of computers to schools being met?

Our assessment

Through the Technology for Learning program, the Department of Education and Training (DET) has ensured that all schools have at least one computer for every eight enrolled students. This is not a standard of what is educationally desirable, but a calculation of an equitable distribution of available resources. Some of these computers are not available for students to use.

No standard, but a ratio has been established and met

After the government announced the Technology for Learning Program, DET determined an allocation guideline of one computer per 8.23 students. The aim is to keep 100,000 computers in schools under warranty, that is, less than four years old. It will replace computers older than four years with new ones. DET tells us that all schools have at least enough computers to maintain this ratio.

Schools also purchase additional computers using local funds, or grants from DET or the Commonwealth. DET estimates there are up to a further 35,000 computers in schools that comply with their standards. This means that the overall ratio is estimated to increase to one computer for every six students.

Technical advances make setting a standard complex

A single ratio of students to computers however may not suit all educational circumstances. There is no longer a simple answer to what counts as a computer. This is increasingly so as technology develops alternatives to the computer, such as interactive whiteboards and devices like personal digital assistants. Schools should be able to configure their resources to best suit their educational needs.

The variety in hardware options means that a ratio of computers to students can only be a guide to allocations, not a fixed standard. A school allocated one computer for every eight students may have an actual ratio worse than this, because:

- some of the computers are used in administration
- the school may allocate some computers directly to teachers
- some may not be effectively linked to the network due to cabling problems.

DET does not calculate the ratio of computers actually available to students.

There is more to making the computers work well than just the sheer numbers provided. DET has also made significant improvements in how they are made ready to work, and in the speed at which they work.

Installation support has improved access

Hardware acquisition, installation and support have improved under the 2004 Technology for Learning Program. Now a set-up team comes to the school with the new deliveries of computers for the year, and has them all connected and running before they leave. Schools told us that this is a vast improvement.

Faster connections has improved useability

DET has now provided high-speed broadband connections to schools, which has greatly improved the overall usability of the computers in schools. By the end of 2006, over 97 per cent of school networks had reached a benchmark of a bandwidth of at least two megabits per second. This is in stark contrast to the early days of 1996, when DET first connected all schools to the internet by a dialup phone line connected to a single computer.

This has upgraded access to the internet. It also allows a great variety of innovative solutions to educational needs, like that shown in Exhibit 1.

High-speed access allows 'virtual classes'

Exhibit 1: Connected classes through technology	
	<p>Seven high schools identified that they each had a small number of students wanting to study Year 11 Biology and other subjects. None had enough to form a class. However by using computers, interactive whiteboards and video conferencing in each school, hooked up over a DET network, they combined into a virtual class taught by one teacher based in one of the schools. They can participate in connected learning in real time despite numbers being too small to make a viable senior class in a single school.</p> <p>They see and interact with the same materials, allowing cross-school discussion and collaboration, focussed on active student participation. More subjects are being offered in this form in 2007.</p> <p>We consider that this technology has great potential. It could allow virtual field trips, guest speakers, and link student communities of interest across the state.</p>

Source: Audit Office observations from school visits and interviews with DET staff

The speed with which users in schools can access learning resources has been further improved by content prepositioning caches. These are servers that store materials so that users can access them on a local area network. This avoids potential delays from network traffic, and minimises the time it takes for teachers and students to download digital material such as multimedia learning resources.

1.2 Do students have enough access to computers to meet syllabus requirements?

Our assessment

Overall there are enough computers in schools to allow students to meet the requirements of the syllabus. However despite this investment, access may be affected in some schools by infrastructure problems, or gaps in technical support and staff expertise.

Schools say number of computers is adequate

Most schools reported having adequate computers to meet the syllabus requirements, if they were working properly and supported well.

Syllabus requirements can be met with a variety of configurations of computers. Many schools have computer laboratories where each student in a class has access to a computer for an entire lesson. They may also have smaller numbers of computers in other classrooms.

Some teachers told us that four or five computers to a classroom was an effective threshold for teaching purposes. Teachers can rotate all or most of the class through a shared computer in the course of a lesson. If there are only one or two computers, they may not be sufficient for that class to meet the syllabus requirements, unless it has reasonable access to another concentration of computers like a computer laboratory.

Other infrastructure is not fully provided for

Computers also need a number of other things before they can be fully used. These include:

- software
- user training
- a reliable power supply
- the cabling to connect to each other and externally
- technical support.

Teachers have generally been happy with the software provided. DET pre-installs a suite of licensed commercial software on the computers supplied. There have also been extensive efforts to train teachers in the use of computers for teaching. We will discuss this in the next chapter.

However we found a number of things lacking in some schools, particularly infrastructure and technical support. For example, some schools have old electricity systems, which may make the power supply unreliable. Other schools might not have enough rooms for dedicated computer labs or do not have rooms with appropriate security.

DET also supplies high-speed cabling up to the school. The school is responsible for extending the cabling throughout the school. If the school cannot find funds for the cost of cabling, it may be left with under-used computers. If downloading is unreasonably slow, students and teachers are likely to become frustrated and unwilling to use the computer.

Schools need to find ways to meet any gaps

The Computer in Schools and T4L programs providing computers to schools were not designed to provide fully for all of these needs. However DET provides about \$35 million a year to schools to support ICT services, including infrastructure, and integration of computers into teaching and learning. School principals have discretion over how they will use these funds to meet any gaps in related areas, such as infrastructure.

Schools may have a number of other sources of funds to address these infrastructure needs. These include parental fundraising, private donations or sponsorship, extra resources from DET for schools assessed as disadvantaged, and other general purpose funding enhancement programs. Schools that do not have access to these funds may struggle to fill gaps.

Technical support also improves computer useability. The Computers in Schools Program funded relief teachers to free up other school staff to become computer coordinators, and employed 40 technology advisers in district offices. This funding continues in parallel with the T4L program.

T4L has added 129 technical support staff, and developed remote management capacity. That is, support staff can manage problems from their own computer without coming to the school. DET designed the remote management system to free teachers up so they can use computers in teaching and learning.

Technical support is still concerning schools

Despite this, technical support has been a contentious issue for schools. Some teachers appointed as computer coordinators still have a full teaching load, even though there is some DET funding to avoid this. In many cases, they have had to build and administer relatively large computer networks, often with little formal training.

Exhibit 2: A view from the Secondary Principals

‘Whilst the volume of workstations in schools has increased there has been an inconsistent access by students to these workstations. This is a result of the lack of in-school technical support, the lack of in-school personnel with the skills and time allocation for staff and student training, and the lack of access to computers and IT training by staff.’

Source: Submission to the Audit Office from the NSW Secondary Principals’ Council.

Some schools report a need for on-site technical support, when remote and online support is not helping teachers to use computers to their full potential. Computers that are too old to be remotely managed will also need to be phased out more quickly.

We illustrate problems with infrastructure and support in the following case study.

A school not able to use all its computers effectively

Exhibit 3: A school in a dilemma

One school we visited has a ratio of about one computer for every six students. Most classrooms have two computers, and the computer laboratory is in the library. However teachers reported that they cannot use all the computers in teaching effectively, particularly for full-class lessons, because:

- computer cabling needs replacement to at least two-thirds of the school, which means that many of the classroom computers run so slowly that teachers and students do not want to use them
- until recently the school had no teacher with the skills to plan and maintain the computer network
- using the computer laboratory and the library at the same time is difficult because there is no means to separate the two areas effectively.

DET does not receive funding for all of these areas, like providing the cabling within the school. Schools need to find ways to meet any such gaps. This school has limited fundraising capacity. It has used or plans to use recent grants for non-ICT infrastructure priorities, like upgrading the electricity supply and air conditioning the classrooms.

However until the school can also fix its ICT problems, it is at risk of falling on the wrong side of the digital divide.

Source: Audit Office observations from school visits

DET told us that in 2003 and 2004 it conducted an evaluation of the networks in all schools, looking for problems including poor cabling. It provided funds for essential rectification work that the survey identified. If a school needed further work, it remained the responsibility of the school. We found that some schools still appear to be experiencing difficulties.

DET needs to know where the gaps are

We recognise that there will always be differences in schools in regards to infrastructure, technical support and their capacity to respond to such problems. Therefore it is important that DET knows where these gaps are.

The T4L Program is still in progress. There are likely to be continuing concerns as the new system of technical support is established, and as the common internet portal is bedded down. It is important that DET continue to monitor and address concerns in these areas.

DET expects schools to develop school management plans which include an ICT component. The regional schools management team reviews these plans annually in consultation with the principal. Within this framework, the principal sets the school priorities each year. DET reports that they can use these plans to help identify any ICT gaps.

Recommendation That DET identifies ICT needs in schools and develops strategies to systemically address the needs of any schools falling behind in the use of computers.

2 Integration of computers into teaching and learning

At a glance

The key question we wanted to answer was:
Has computer use been integrated into teaching practice and student learning needs?

Our assessment:
There have been great strides in the integration of computer use into teaching practice and student learning needs since 2000. We saw many examples of integration on our visits to schools, and more and more teachers and students are accessing ICT resources. There is also evidence that students are achieving a high level of competence and using technology as a key part of their school work.

There is an extensive and growing range of quality support materials. However the extent of integration in some schools is still limited by problems with infrastructure and technical support.

2.1 Are staff becoming more skilled in integrating use of computers into teaching?

Our assessment

Overall, most principals and teachers have become better trained and confident in integrating computers into teaching in their schools. We saw examples of teachers taking advantage of the available technology, with many eager to go further and faster with it.

Teachers have developed ICT competency

Many teachers have developed competency through:

- attending external training courses
- assistance from colleagues, including those passing on skills from other training courses
- using computers for email, student assessment and other non-teaching tasks
- studying to meet the new teaching standards developed by the NSW Institute of Teachers.

In association with the original Computer In Schools Program, DET provided two rounds of formal external courses. These were the Technology in Learning and Teaching (TILT) and TILT Plus courses. They provided a basis for most teachers to get started. Both TILTs trained 37,000 teachers and the course evaluations were largely positive.

Schools can use training funds for ICT

DET's Teacher Professional Learning funding of \$36 m annually now goes directly to schools for professional training, including ICT training. This has been welcomed, as it gives schools flexibility to best meet local needs and allows teachers to learn faster.

Some teachers we consulted wanted to see some core training relevant to classroom situations offered directly by DET. They felt that courses provided by commercial training companies were expensive, and not always tailored to the needs of teachers.

DET also oversees a training program with one of their suppliers. This program gives intensive training to selected Master Teachers who then train and support other teachers at their school. Since 2003 it has trained over 2,500 teachers from around 200 schools.

Reluctant teachers now more confident

Several schools reported that the training had made the most reluctant teachers confident enough to try using computers in their classes. Now all teachers have to do administrative tasks like student reports on their computers. This has meant that resistance to their use has largely broken down. Staff reported that using computers in teaching has given some teachers a 'new lease of life', and has revitalised their teaching.

Some schools allocate laptops from the T4L program to teachers. This means that they can become confident in using computers faster. In Victoria, teachers are subsidised \$150 to lease their own laptop.

One indicator of increasing teacher familiarity with use of computers is their use of email. In January 2006 2,000 staff in NSW schools used emails. In December 2006 the figure climbed to 10,000 staff.

Another indicator of familiarity is the use of interactive whiteboards.

Exhibit 4: Flexible new technology
Teachers we interviewed were enthusiastic about interactive whiteboards as teaching tools, saying that: <ul style="list-style-type: none">▪ they provide a social learning focus for the whole class▪ their flexibility allowed activities such as safe demonstrations of science experiments. A small-scale trial of using them in schools with intensive support indicated improved learning outcomes for their students.

Source: Audit Office observations from school visits and interviews with DET staff

Professional standards for ICT introduced

The NSW Institute of Teachers has developed a set of Professional Teaching Standards. Two of these include knowledge and integration of ICT in teaching. There are four accreditation levels. To date the Institute of Teachers has accredited 940 teachers at the mandatory level. The Institute expects that around 14,000 more teachers will achieve this level of accreditation within the next five years.

DET is setting up the Connected Learning Advisory Service, a web-based resource to help teachers with their use of ICT in teaching practice. It offers examples of good practice, professional learning activities and other resources. Teachers can also work towards accreditation with the NSW Institute of Teachers by recording examples of their use of ICT in teaching.

It is encouraging that many teachers have become better trained and confident in integrating computers into teaching. However teachers in schools with infrastructure problems as discussed in Section 1.2 are less likely to integrate computers into teaching. For example:

- where high-speed cabling might not extend to all classrooms
- where schools might not have enough rooms for a computer lab, or not have rooms with appropriate security for their computers.

That is why its important for DET to identify such schools and help improve their access to ICT so all teachers can integrate technology into teaching.

2.2 Are students achieving an improved level of competence in computer skills?

Our assessment Students are increasingly familiar with computers, and are now using them more routinely in daily school work. The NSW Board of Studies has recently assessed 100 per cent of NSW Year 10 public school students as 'competent' or better in using computers.

There are three computer competency tests There are three major tests of student competence in computer skills:

- the NSW Board of Studies Year 10 Computer Skills Assessment
- the DET Year 6 Computer Skills Assessment
- the National Assessment Program ICT literacy assessments.

Of these, only results for the Year 10 Computer Skills Assessment are available.

In late 2006, the Board of Studies carried out external testing of Year 10 students' computer skills for the first time. It is a compulsory component of the School Certificate, and is based on curriculum requirements across all subjects. The test results showed that 53.3 per cent of public high school students were rated 'highly competent' and 46.7 per cent 'competent'. That means they rated 100 per cent as competent or better.

DET carried out Computer Skills Assessment testing for Year 6 students for a number of years. First run in 2002, it has evolved into a non-mandatory online competency assessment. Now any students from Years 4 to 8 can log-on, do the test, make multiple attempts, and get an instant report.

DET does not record the results. The test is for the individual student wanting to self-assess.

National sample assessment introduced The National Assessment Program (NAP) is run every three years, on a sampling basis. The ICT assessment measures the ability of students to use ICT to access, manage and evaluate information, and communicate with others.

In late 2005 samples of Year 6 and Year 10 students in schools across Australia participated. No results are available yet. DET is confident that the results will measure overall progress on achieving computer literacy at the end of primary school.

Other indicators of proficiency As results are available for only one of these three tests, we looked for other examples of computer proficiency among students.

Exhibit 5: Other examples of computer proficiency

- In seven years the number of HSC Online website pages accessed has increased from 4.4 million to 13.6 million, a 209% increase.
- All students and teachers now have individual email addresses that they can use both at school and from home. They also have filtered access to the internet and can participate in electronic chat groups.
- The DET Annual Schools Web Design Awards experienced a five-fold increase in entries over six years. Entrants included remote schools collaborating online in web site design.

Source: Audit Office interviews with DET staff

International assessment allows interstate comparisons

The Programme for International Student Assessment (PISA) report is an independent source of data. Participating countries developed it as an international assessment, which is administered to 15 year olds in schools every three years. Results for the latest test in 2006 are not expected to be available until the end of 2007.

The 2003 PISA report is therefore the last available. We cannot assume that the results are accurate today, as the rate of change of computer use in schools has been so rapid. However, it remains a valuable independent snapshot of where our students were at the time.

Some highlights of students computer use at school and home:

- 74 per cent of NSW students used the internet to look up information
- 64 per cent used word processing frequently
- 20 per cent used spreadsheets frequently
- 31 per cent used graphics programs frequently.

PISA 2003 also reported that 47 per cent of NSW students frequently used computers in school, below the national average of 59 per cent. Also, 19 per cent of them said their school teaches them most about computer use, against the national average of 25 per cent.

2006 study needs to be monitored

We recognise that DET has done a lot to improve access to ICT since 2003. It should closely monitor the 2006 PISA results when available to find out whether the frequency of computer use at schools has improved.

PISA 2003 reported that 96 per cent of students have access to a computer at home. Our school visits confirmed this. Teachers felt many of those students without access at home were generally catching up without specific intervention, particularly by seeking more frequent access during non-class time. They also reported that students are more willing to ask for assistance from peers with computing issues than they would be for other problems like literacy issues.

We found no information on how students with low academic success are coping with the use of computers. It is possible that specific coaching or catch-up strategies may need to be developed. We heard encouraging anecdotes about some of these students finding niches, like graphics, where they can find greater success and self-confidence.

Need to check for 'information poor' students The fact that all Year 10 students were assessed as 'competent' or above in the computer skills assessment suggests that not much catch-up work for students is needed. However finding out in Year 10 that a student is lacking in computer literacy might be too late.

If the next NAP assessment results show that not all students sampled are competent, we would encourage DET to develop plans for earlier assessment.

DET could develop school-based strategies to identify and assist any students not achieving competency in computer use. This needs to start early in the student's school career, no later than the last years of primary school.

2.3 Are students integrating use of computers into their learning?

Our assessment While this area is difficult to measure, it is clear that computer use in learning is widespread and growing quickly. It is now part of the curriculum for all subjects. Students are creatively using computer applications in learning.

Mandatory curriculum requirements on computer use In 2002 the NSW Board of Studies developed a curriculum with computer skill requirements up to Year 10 for each subject. They introduced it in 2004 for staged implementation to 2006. These mandatory requirements are to ensure that students are integrating use of computers into their learning.

This area is not measured. Neither schools nor the Board of Studies directly test it. However, all schools we visited gave anecdotal evidence of how well and how rapidly integration is progressing.

Many schools reported that students now submit most assignments in electronic format. This includes Word documents, PowerPoint presentations, and a wide variety of creative formats.

Another positive step we observed is allocating laptops to students with a disability. Having their own computer, modified as necessary, is allowing a number of these students to overcome barriers to achieving their full potential at school more effectively.

Some teachers said that integration has gone so far that asking how much students use computers will soon be like asking how much students use pens. The following case study is an example of a cross-disciplinary project that depended on advanced computer applications at key stages.

Connected learning is working

Exhibit 6: A high school builds a trebuchet

A group of high school students and staff used computers to bring an object from a history lesson to life, working across three subject areas, culminating in a series of experiments watched by the whole school.

- A history class studied the ‘Trebuchet’, a medieval catapult-like machine dating back to the 12th Century.
- Technological and Applied Studies students researched the design of the trebuchet, produced scaled drawings and created working models.
- Students and staff from Industrial Technology constructed a full-size working model from those plans.
- Physics classes used video analysis and data logging software to carry out experiments on catapulted objects.



Source: Audit Office observations from school visits; photo courtesy of the school

2.4 Are support materials available to schools across key learning areas?

Our assessment

There is a wealth of high-quality support materials available to schools across all key learning areas. Collectively, they have the potential to turn computers into useful teaching tools.

Resource support centre established

DET established the Centre for Learning Innovation (CLI) in 2004. It has developed a wide suite of high quality ICT support resources across all curriculum areas, increasingly in interactive web-ready and CD formats. It has extensive in-house production facilities, including a television studio.

DET reports that it is helping teachers and students to use these and other resources for teaching and learning. For example teachers can:

- select the parts of the resources that they need
- use online tools to create their own learning resources.

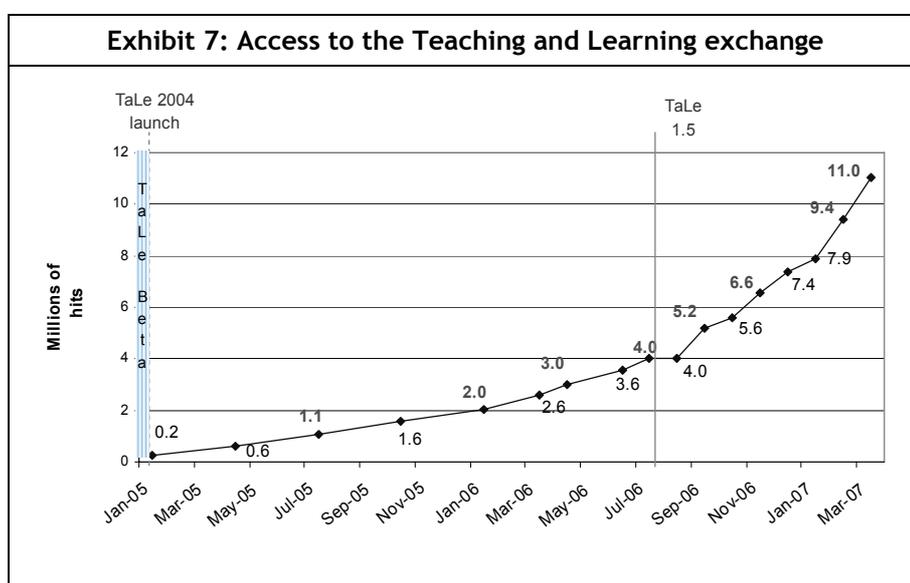
DET also introduced the Teaching and Learning Exchange (TaLe), a portal for an online resource available to teachers and students. It facilitates sharing of ideas between teachers, and provides extensive information for parents and other interested people.

TaLe allows access to:

- over 2,400 professional development resources for teachers
- 15,000 online links with 48,000 student learning resources
- a Professional Learning Exchange
- links to development and curriculum websites, including an Early Career Teachers Website, attracting 30,000 hits per month.

Growth in TaLe access

TaLe records show a dramatic growth in access, from one million hits in the first seven months of 2005, to well over a million hits per month by the start of 2007.



Source: The Centre for Learning Innovation

DET is also closely involved in national ICT projects. This includes:

- the Australian Government Quality Teacher Program which supports 40 schools in projects focussing on ICT in teaching and learning
- the Learning Federation project which is producing online curriculum resources, up to 4,500 resources so far.

Extensive computerised resources available

Computerised resources and materials are available in each key learning area. The materials include extensive interactive multimedia units developed by CLI for mathematics, history, science, languages and art. CLI develop these in house, and they are available online and on CD. Over 4,300 curriculum hours of student work is available. There are also links to units produced in other states or countries.

While there are numerous resources available in each key learning area, we do not know how comprehensively these resources cover the syllabus in each subject. DET has advised that it is developing a process for setting future priorities for curriculum material and professional learning needs. It is a consultative process which aims to reduce duplication and ensure that curriculum and professional learning resources meet the needs of schools. This should also give teachers the opportunity to give feedback on where curriculum materials need further development.

Appendices

Appendix 1: About the audit

Audit Objective	This audit examined progress by the Department of Education and Training (DET) in integrating computers into teaching and learning in NSW government schools, since the time of our first audit in 2000.
Lines of Inquiry	<p>In reaching our opinion against the audit objective, we sought to answer the following questions:</p> <ul style="list-style-type: none">▪ Do students and teachers have better access to computers compared to 2000?▪ Has computer use been integrated into teaching practice and student learning needs?
Audit Criteria	<p>In answering the lines of inquiry, we used the following audit criteria (the ‘what should be’) to judge performance. We based these standards on our research of current thinking and guidance on better practice. We have discussed them, and wherever possible, agreed on them with those we are auditing.</p> <p>For line of inquiry 1, we assessed the extent to which:</p> <ul style="list-style-type: none">▪ DET standards for availability of computers to schools are being met▪ students have enough access to computers to meet requirements. <p>For line of inquiry 2, we assessed the extent to which:</p> <ul style="list-style-type: none">▪ staff are becoming more skilled in integrating use of computers into teaching▪ students are achieving an improved level of competence in computer skills▪ students are integrating use of computers into their learning▪ support materials are available to schools across key learning areas.
Audit approach	<p>We acquired subject matter expertise by:</p> <ul style="list-style-type: none">▪ interviewing staff involved in the Computers in Schools and T4L Programs▪ interviewing or inviting submissions from stakeholders outside DET▪ visiting a small sample of metropolitan schools, and interviewing staff and some students in them▪ reviewing DET documents.
Audit selection	We use a strategic approach to selecting performance audits which balances our performance audit program to reflect issues of interest to Parliament and the community. Details of our approach to selecting topics and our forward program are available on our website.
Audit methodology	Our performance audit methodology is designed to satisfy Australian Audit Standards AUS 806 and 808 on performance auditing, and to reflect current thinking on performance auditing practices. We produce our audits under a quality management system certified to International Standard ISO 9001. Our processes have also been designed to comply with the auditing requirements specified in the <i>Public Finance and Audit Act 1983</i> .

- Acknowledgements** We gratefully acknowledge the co-operation and assistance provided by the Department of Education and Training. In particular we wish to thank our liaison officers Raju Varanasi and Bill Middleton, and staff who participated in interviews, assisted with file review or provided other material relevant to the audit.
- Audit team** Our team leader for the performance audit was Tiffany Blackett, assisted by Rod Plant. Sean Crumlin provided direction and quality assurance.
- Audit cost** Including staff costs, printing costs and overheads, the estimated cost of the audit is \$158,800.

Appendix 2: Glossary

Board of Studies	The NSW Board of Studies, a Board independent of DET with responsibility for external examination and assessment of educational credentials, and for developing school curricula.
CISP	Computers in Schools Program
CLI	Centre for Learning Innovation within NSW DET
Content prepositioning caches	Intermediate servers (between the main server and the school) that store digital materials so they can be accessed on a local area network, thus avoiding delays in downloading the material due to heavy traffic on the main network.
CSA	Computer Skills Assessment - this refers to testing done in Years 6 and 10.
DET	NSW Department of Education and Training
Digital divide	The concept of a gap between people's access to information tools, such as the personal computer and the internet. Those with good access are referred to as 'information rich'; those with poor or no access are referred to as 'information poor'.
ICT	Information and Communication Technology. The term is used to broaden the focus from just computers to associated technology like the internet, and various (generally computer-based) means of digital communication.
NAP	National Assessment Program. A set of assessments for school students developed by the Commonwealth Government, which include a national sample assessment of Information and Communication Technology literacy.
P&C	Parents and Citizens Associations. Bodies associated with most schools to allow parents and others to contribute to the running of the school. Many have a significant fundraising role which schools rely on to provide extra resources.
PISA	The Programme for International Student Assessment, an internationally standardised assessment jointly developed by participating countries and administered to 15-year-olds in schools every three years.
Portal	A portal is a site that may direct you to further information. It may also have search features, and general information like news and weather.
T4L	Technology for Learning Program
TaLe	Teaching and Learning exchange
TILT	Technology in Learning and Teaching - a series of computer training courses provided to teachers by DET. TILT Plus was a continuation of this program.

Performance Audits by the Audit Office of New South Wales

Performance Auditing

What are performance audits?

Performance audits determine whether an agency is carrying out its activities effectively, and doing so economically and efficiently and in compliance with all relevant laws.

Performance audits may review a government program, all or part of a government agency or consider particular issues which affect the whole public sector.

Where appropriate, performance audits make recommendations for improvements.

If you wish to find out what performance audits are currently in progress, visit our website at www.audit.nsw.gov.au.

Why do we conduct performance audits?

Performance audits provide independent assurance to Parliament and the public that government funds are being spent efficiently and effectively, and in accordance with the law.

Performance audits seek to improve the efficiency and effectiveness of government agencies so that the community receives value for money from government services.

Performance audits also assist the accountability process by holding managers to account for agency performance.

What are the phases in performance auditing?

Performance audits have three key phases: planning, fieldwork and report writing.

During the planning phase, the audit team will develop audit criteria and define the audit field work.

At the completion of field work we will meet with agency management to discuss all significant matters arising out of the audit. Following this, we will prepare a draft performance audit report.

We meet with agency management to check that facts presented in the report are accurate and that recommendations are practical and appropriate. Following this, a formal draft report is provided to the CEO for comment. The relevant Minister is also provided with a copy of the final report. The final report, which

is tabled in Parliament, includes any comment made by the CEO on the conclusion and the recommendations of the audit.

Depending on the scope, performance audits can take several months to complete.

Copies of our performance audit reports can be obtained from our website or by contacting our Office.

How do we measure an agency's performance?

During the planning phase, the team develops the audit criteria. These are standards of performance against which the agency or program is assessed. Criteria may be based on best practice, government targets, benchmarks, or published guidelines.

Do we check to see if recommendations have been implemented?

Every few years we conduct a follow-up audit. These follow-up audits look at the extent to which action has been taken to address issues or recommendations agreed to in an earlier performance audit.

The Public Accounts Committee (PAC) may also conduct reviews or hold inquiries into matters raised in performance audit reports. Agencies are also requested to report actions taken against each recommendation in their annual report.

Who audits the auditors?

Our performance audits are subject to internal and external quality reviews against relevant Australian and international standards. This includes ongoing independent certification of our ISO 9001 quality management system.

The PAC is also responsible for overseeing the activities of the Audit Office and conducts a review of our operations every three years.

Who pays for performance audits?

No fee is charged for performance audits. Our performance audit services are funded by the NSW Parliament and from internal sources.

Further information

Further information can be obtained from our website www.audit.nsw.gov.au or by contacting us on 9275 7277.

Performance Audit Reports

No	Agency or Issues Examined	Title of Performance Audit Report or Publication	Date Tabled in Parliament or Published
85*	Internal Financial Reporting	<i>Internal Financial Reporting including a Better Practice Guide</i>	27 June 2001
86	Follow-up of Performance Audits	<i>The School Accountability and Improvement Model (May 1999)</i> <i>The Management of Court Waiting Times (September 1999)</i>	14 September 2001
87	E-government	<i>Use of the Internet and Related Technologies to Improve Public Sector Performance</i>	19 September 2001
88*	E-government	<i>e-ready, e-steady, e-government: e-government readiness assessment guide</i>	19 September 2001
89	Intellectual Property	<i>Management of Intellectual Property</i>	17 October 2001
90*	Intellectual Property	<i>Better Practice Guide Management of Intellectual Property</i>	17 October 2001
91	University of New South Wales	<i>Educational Testing Centre</i>	21 November 2001
92	Department of Urban Affairs and Planning	<i>Environmental Impact Assessment of Major Projects</i>	28 November 2001
93	Department of Information Technology and Management	<i>Government Property Register</i>	31 January 2002
94	State Debt Recovery Office	<i>Collecting Outstanding Fines and Penalties</i>	17 April 2002
95	Roads and Traffic Authority	<i>Managing Environmental Issues</i>	29 April 2002
96	NSW Agriculture	<i>Managing Animal Disease Emergencies</i>	8 May 2002
97	State Transit Authority Department of Transport	<i>Bus Maintenance and Bus Contracts</i>	29 May 2002
98	Risk Management	<i>Managing Risk in the NSW Public Sector</i>	19 June 2002
99	E-Government	<i>User-friendliness of Websites</i>	26 June 2002
100	NSW Police Department of Corrective Services	<i>Managing Sick Leave</i>	23 July 2002
101	Department of Land and Water Conservation	<i>Regulating the Clearing of Native Vegetation</i>	20 August 2002
102	E-government	<i>Electronic Procurement of Hospital Supplies</i>	25 September 2002
103	NSW Public Sector	<i>Outsourcing Information Technology</i>	23 October 2002
104	Ministry for the Arts Department of Community Services Department of Sport and Recreation	<i>Managing Grants</i>	4 December 2002

No	Agency or Issues Examined	Title of Performance Audit Report or Publication	Date Tabled in Parliament or Published
105	Department of Health Including Area Health Services and Hospitals	<i>Managing Hospital Waste</i>	10 December 2002
106	State Rail Authority	<i>CityRail Passenger Security</i>	12 February 2003
107	NSW Agriculture	<i>Implementing the Ovine Johne's Disease Program</i>	26 February 2003
108	Department of Sustainable Natural Resources Environment Protection Authority	<i>Protecting Our Rivers</i>	7 May 2003
109	Department of Education and Training	<i>Managing Teacher Performance</i>	14 May 2003
110	NSW Police	<i>The Police Assistance Line</i>	5 June 2003
111	E-Government	<i>Roads and Traffic Authority Delivering Services Online</i>	11 June 2003
112	State Rail Authority	<i>The Millennium Train Project</i>	17 June 2003
113	Sydney Water Corporation	<i>Northside Storage Tunnel Project</i>	24 July 2003
114	Ministry of Transport Premier's Department Department of Education and Training	<i>Freedom of Information</i>	28 August 2003
115	NSW Police NSW Roads and Traffic Authority	<i>Dealing with Unlicensed and Unregistered Driving</i>	4 September 2003
116	NSW Department of Health	<i>Waiting Times for Elective Surgery in Public Hospitals</i>	18 September 2003
117	Follow-up of Performance Audits	<i>Complaints and Review Processes (September 1999) Provision of Industry Assistance (December 1998)</i>	24 September 2003
118	Judging Performance from Annual Reports	<i>Review of Eight Agencies' Annual Reports</i>	1 October 2003
119	Asset Disposal	<i>Disposal of Sydney Harbour Foreshore Land</i>	26 November 2003
120	Follow-up of Performance Audits NSW Police	<i>Enforcement of Street Parking (1999) Staff Rostering, Tasking and Allocation (2000)</i>	10 December 2003
121	Department of Health NSW Ambulance Service	<i>Code Red: Hospital Emergency Departments</i>	15 December 2003
122	Follow-up of Performance Audit	<i>Controlling and Reducing Pollution from Industry (April 2001)</i>	12 May 2004
123	National Parks and Wildlife Service	<i>Managing Natural and Cultural Heritage in Parks and Reserves</i>	16 June 2004
124	Fleet Management	<i>Meeting Business Needs</i>	30 June 2004
125	Department of Health NSW Ambulance Service	<i>Transporting and Treating Emergency Patients</i>	28 July 2004

No	Agency or Issues Examined	Title of Performance Audit Report or Publication	Date Tabled in Parliament or Published
126	Department of Education and Training	<i>School Annual Reports</i>	15 September 2004
127	Department of Ageing, Disability and Home Care	<i>Home Care Service</i>	13 October 2004
128*	Department of Commerce	<i>Shared Corporate Services: Realising the Benefit including guidance on better practice</i>	3 November 2004
129	Follow-up of Performance Audit	<i>Environmental Impact Assessment of Major Projects (2001)</i>	1 February 2005
130*	Fraud Control	<i>Current Progress and Future Directions including guidance on better practice</i>	9 February 2005
131	Follow-up of Performance Audit Department of Housing	<i>Maintenance of Public Housing (2001)</i>	2 March 2005
132	Follow-up of Performance Audit State Debt Recovery Office	<i>Collecting Outstanding Fines and Penalties (2002)</i>	17 March 2005
133	Follow-up of Performance Audit Premier's Department	<i>Management of Intellectual Property (2001)</i>	30 March 2005
134	Department of Environment and Conservation	<i>Managing Air Quality</i>	6 April 2005
135	Department of Infrastructure, Planning and Natural Resources Sydney Water Corporation Sydney Catchment Authority	<i>Planning for Sydney's Water Needs</i>	4 May 2005
136	Department of Health	<i>Emergency Mental Health Services</i>	26 May 2005
137	Department of Community Services	<i>Helpline</i>	1 June 2005
138	Follow-up of Performance Audit State Transit Authority Ministry of Transport	<i>Bus Maintenance and Bus Contracts (2002)</i>	14 June 2005
139	RailCorp NSW	<i>Coping with Disruptions to CityRail Passenger Services</i>	22 June 2005
140	State Rescue Board of New South Wales	<i>Coordination of Rescue Services</i>	20 July 2005
141	State Budget	<i>In-year Monitoring of the State Budget</i>	28 July 2005
142	Department of Juvenile Justice	<i>Managing and Measuring Success</i>	14 September 2005
143	Asset Management	<i>Implementing Asset Management Reforms</i>	12 October 2005
144	NSW Treasury	<i>Oversight of State Owned Electricity Corporations</i>	19 October 2005
145	Follow-up of 2002 Performance Audit	<i>Purchasing Hospital Supplies</i>	23 November 2005
146	Bus Transitways	<i>Liverpool to Parramatta Bus Transitway</i>	5 December 2005

No	Agency or Issues Examined	Title of Performance Audit Report or Publication	Date Tabled in Parliament or Published
147	Premier's Department	<i>Relocating Agencies to Regional Areas</i>	14 December 2005
148	Department of Education and Training	<i>The New Schools Privately Financed Project</i>	8 March 2006
149	Agency Collaboration	<i>Agencies Working Together to Improve Services</i>	22 March 2006
150	Follow-up of 2000 Performance Audit	<i>Fare Evasion on Public Transport</i>	26 April 2006
151	Department of Corrective Services	<i>Prisoner Rehabilitation</i>	24 May 2006
152	Roads and Traffic Authority	<i>The Cross City Tunnel Project</i>	31 May 2006
153	Performance Information	<i>Agency Use of Performance Information to Manage Services</i>	21 June 2006
154	Follow-up of 2002 Performance Audit	<i>Managing Sick Leave in NSW Police and the Department of Corrective Services</i>	29 June 2006
155	Follow-up of 2002 Performance Audit	<i>Regulating the Clearing of Native Vegetation</i>	19 July 2006
156*	Fraud Control	<i>Fraud Control Improvement Kit: Meeting Your Fraud Control Obligations</i>	20 July 2006
157	Roads and Traffic Authority	<i>Condition of State Roads</i>	16 August 2006
158	Department of Education and Training	<i>Educating Primary School Students with Disabilities</i>	6 September 2006
159	NSW Health	<i>Major Infectious Disease Outbreaks: Readiness to Respond</i>	22 November 2006
160	NSW Health	<i>Helping Older People Access a Residential Aged Care Facility</i>	5 December 2006
161	Follow-up of 2003 Performance Audit	<i>The Police Assistance Line</i>	6 December 2006
162	NSW Health	<i>Attracting, Retaining and Managing Nurses in Hospitals</i>	12 December 2006
163	Legal Aid Commission of NSW	<i>Distributing Legal Aid in New South Wales</i>	13 December 2006
164	Department of Juvenile Justice NSW Police Force	<i>Addressing the Needs of Young Offenders</i>	28 March 2007
165	Homelessness	<i>Responding to Homelessness</i>	2 May 2007
166	Follow-up of Performance Audit Department of Education and Training	<i>Using computers in schools for teaching and learning</i>	May 2007

* Better Practice Guides

A list of performance audits tabled or published since March 1997, as well as those currently in progress, can be found on our website www.audit.nsw.gov.au.