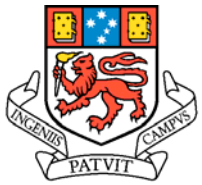


UNIVERSITY OF TASMANIA

CHILDREN, ON-LINE LEARNING AND AUTHENTIC TEACHING SKILLS

ARC Linkage Project 2002-04, LP0210823

Progress Report December 2003

Project Partners:

University of Tasmania

Department of Education

Catholic Education System

Telstra

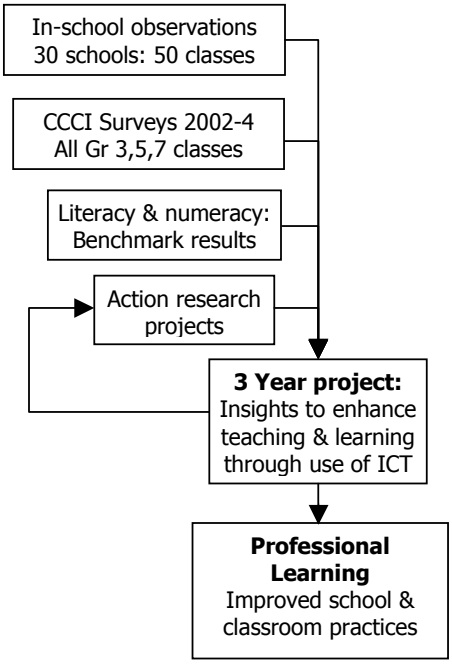
List of Contents

Executive summary

The ARC Linkage research project *Children, Online Learning and Authentic Teaching Skills* has comprised five major strands in 2003

- Classroom Computer Climate Survey
- Classroom Computer Climate Index (CCCI) and Literacy & Numeracy
- In-school Observations of ICT use in primary schools
- Professional Learning in relation to ICT: action research projects
- Learning Objects: an investigation

These strands are linked in the following way:



- Currently in its second year, this is a longitudinal three-year study (2002-04) of children and teachers in Years 3, 5 and 7 of Government and Catholic Education Schools in Tasmania.
- The study investigates the relationship between ICT integration into classrooms, learner behaviours with ICT, and their learning outcomes in terms of literacy and numeracy.
- The specific aims of the project are to:
    - Determine whether the link between an ICT rich environment and improved student learning outcomes can be substantiated (in terms of student national benchmark literacy and numeracy test scores);
    - Investigate the extent and nature of integration of ICT into classrooms, and the enhancers and barriers to this process; and
    - Develop, trial and publish a professional development ICT related pedagogy package for teachers.

- Project partners include the Tasmanian Department of Education, the Tasmanian Catholic Education Office and Telstra.
- The main research instruments are teacher survey questionnaires and school and classroom observations using web quests, small group interviews, individual student, teacher and principal interviews. The research instruments have demonstrated their applicability over time and across school systems and locations.
- Full analysis of the data is not expected to be complete until about April 2005 as longitudinal tracking of student data will occur only after analysis of the 2004 survey and student performance data is complete.

1. The 2002 Classroom Computer Climate Survey (CCCS)

Findings

The most significant findings are provided here, with others in the body of the text.

1.1 The priority for teacher professional learning appears to have moved away from ICT.

1.2 Computing equipment was rated by teachers as being increasingly available within the classroom itself, although still insufficient in numbers.

1.3 Teachers had concerns about reliability of the infrastructure

1.4 Middle distance schools (25 to 50 km from a district office) have lower computing resources and training than more centrally located or remoter schools.

1.5 While student use of ICT at home and in school was unaffected by these resource constraints in Middle distance schools, student reading, writing and spelling scores were lower.

1.6 The personal use of ICT by students was associated with better performance on the national numeracy test for Year 5 students and literacy tests for both Year 3 and Year 5 students.

Recommendations

1.7 The issue of school computer reliability needs to be examined by a sub-project to find out the reasons why teachers rate this aspect of infrastructure so lowly.

1.8 ICT funding for Middle distance schools should be investigated to find out if there are ways to ameliorate their lower scores for the teacher and school CCCI.

1.9 In particular, this may mean more computers in the classrooms of these schools.

1.10 The importance of student CCCI in relation to improved performance in national tests (independent of Educational Needs Index) could be augmented by policies which roll-over ICT equipment into homes without current student computer access.

1.11 Strategies need to be investigated to increase the time teachers spend maintaining the currency of their ICT skills, possibly utilising the high proportion of home computers.

2. Inschool Observations of ICT use in primary schools

To date, observations, lasting two days or more, have been made in 29 classes in 17 schools. Observations have included data gathering based on the following instruments.

- Class discussion about uses of computers
- Interviews with eight student 'subjects' for more detailed insight into their use of computers, their thoughts about ICT, where they learn about ICT...
- Monitoring computer use in the classroom is monitored on an on-going basis
- Observations of students undertaking ICT based tasks as part of the normal class program (as they occur - no special arrangements required)
- Interactions involving students as a normal part of the class program
- Interactions involving the Teacher as a normal part of the class program
- Interviews with staff members
- Teacher
    - Principal
    - ICT coordinator (if available)
    - Other staff as appropriate

These observations are used to identify:

- The School's rationale for using ICT
- The Teacher's position on outside use of computers by students
- The stage of integration of ICT in the classroom (ACOT)
- The transformation of classroom practice (ACOT)

And to learn more about:

- What is working and why
- The costs and benefits of incorporating ICT into the class program
- The development of the use of ICT within the School

From these observations, data have been analysed for meaning through extensive coding and categorising. This part of the analysis is ongoing. However, there a pattern is appearing which supports a tentative theory which includes:

2.1 As a generalisation there is currently large variation in several aspects of the use of ICT in the classes observed
   (a) Quality of ICT provision: latest PCs to unused (idle) old machines
   (b) Range of peripherals available: none to extensive
   (c) Teacher comfort: zealous to bewildered
   (d) And so on…

2.2 Such variation is frequently observed within a single school, between schools, and within the programs of individual classes

In attempting to account for the variation observed several important understandings have emerged. Specifically:

2.3 Reliability is a complex issue relating arrangements, devices, knowledge, actions & time limitations

2.4 Working Knowledge is a (potentially) shared resource enabling users of ICT to operate the devices and to troubleshoot the situations arising

(1) Key Success Factors that help to ensure the successful use of ICT include: Shared meaningful purposes for the use of ICT
(2) Available and 'reliable' ICT that matches the chosen purposes
(3) An adequate working knowledge
(4) Cost effectiveness in that the outcomes warrant the effort, time, cost of provision….

2.6 Achievement of intended outcomes is highly dependent on the alignment between

(a) Purposes, policies and practices, at each of three levels, viz,
(b) School/system level, class level and activity level

2.7 School governance in relation to ICT appears to be a critical factor for the achievement of consistency across the school. Central to that governance is clarity of purpose in relation to teaching and learning.

The inschool observations will be on going in 2003. They are currently informing the directions of the developing professional learning project which will be one of the important products of the project.

3. Professional Learning in relation to ICT: action research

To date there have been four school-based action research projects focusing on professional learning in relation to ICT. These were undertaken in Term 3, 2003. The projects involved:

- An introductory workshop
- The development of an action
- Implementation and review of the initiative
- Presentation and sharing of the findings at a project workshop

3.1 Findings: The collated findings of the four projects together with supporting insights from the inschool observations define a **second generation of professional learning** based on

(a) A focus on practices and the contribution of ICT
  - Improved ways to do old (easier and better)
  - Ways to do new things
(b) Specific situated collaborative learning
(c) Transfer of the learning into the classroom
(d) Embedding the new or improved practices into the class/school
(e) Within a short time frame

3.2 A **professional learning cycle** has been derived from the case studies. The cycle has several steps

(a) Beginning with achieving an informed focus
(b) Learning and planning the transfer of learning
(c) Apply, review and share experiences → embed and transfer
(d) Revisit, refocus…

3.3 Implications: **A problem solved?** Almost universally school staff report considerable difficulty in transferring their ICT professional learning into their inclass practices

3.4 The case studies have demonstrated several important **principles** that may help inform the design, development and delivery of professional learning.

3.5 The project illustrated the very significant contribution of collaboration to **cost effectiveness** through

(a) Adding value (introduction of new or improved practices…)
(b) Increasing resources (working knowledge, support…)
(c) Increasing sustainability (shared responsibility, less vulnerable, properly integrated more embedded…
(d) Reducing costs (JIT, tapping least costly resources, integration of work and professional learning, less waste, less rework…)

4. Learning Objects: an investigation

A brief report of a pilot investigation is attached to this report (see Appendix A)

Introduction

This study investigated the relationship between ICT integration into classrooms, learner behaviours with ICT, and their learning outcomes in terms of literacy and numeracy. It provides an analysis of the factors affecting this relationship and that contribute to an 'authentic pedagogy' for ICT usage in schools.

The specific aims of the project are to:

- Determine whether the link between an ICT rich environment and improved student learning outcomes can be substantiated (in terms of student national benchmark literacy and numeracy test scores);
- Investigate the extent and nature of integration of ICT into classrooms, and the enhancers and barriers to this process; and
- Develop, trial and publish a professional development ICT related pedagogy package for teachers.

This is a longitudinal three-year study (2002-04) of children and teachers in Years 3, 5 and 7 of Government and Catholic Education Schools in Tasmania. Project partners include the Tasmanian Department of Education, the Tasmanian Catholic Education Office and Telstra, the dominant telecommunications company in Australia. The project is funded by the Australian Research Council Linkage Scheme (http://www.arc.gov.au/funded_grants/selection_linkage_projects.htm). The main research instruments are teacher survey questionnaires and school and classroom observations.

Part A: Classroom Computer Climate Survey

Introduction

The project is currently in its second year and the Classroom Computer Climate Survey has been completed twice, providing data for the 2002 and 2003 school years. In addition, a pilot study (Fluck and Robertson, 2002) was conducted in 2001, providing encouraging results prior to the commencement of the main study.

The Classroom Computer Climate Survey (CCCS)

The survey is designed to gather longitudinal data on children's classroom ICT environment. The questionnaire is distributed in each of the project years (2002-04) to all teachers of Years 3, 5 and 7 classes in Tasmania. Survey items are of two main types:

- The majority are categorical, allowing for rapid quantification of responses;
- The final two questions are open-ended, requiring written, qualitative responses.

The categorical type questions relate to three main areas relevant to an assessment of the classroom ICT environment - teacher, student and school characteristics. The items investigate classroom teachers' assessment of:

- *Teacher* personal characteristics in relation to the use of ICT (for example, their estimate of their ICT skills, hours spent in formal professional development in ICT, personal and professional use of ICT),
- *Student* use of ICT at school and access to ICT at home, and
- *School* ICT resources.

The final two questions give teachers the opportunity to comment on:

- How ICT in the classroom influences student learning outcomes;
- The likely effect of ICT on teaching practice in the future.

The CCCI (Classroom Computer Climate Index)

Quantitative responses to the three categorical sections of the survey – teacher, student and school – enabled a 'score' to be assigned to each of these three elements of the classroom computer climate. By adding up the score for each section, a composite measure of the ICT teaching and learning environment, or Classroom Computer Climate Index (CCCI) was produced. Each class CCCI was then compared with student national benchmarking literacy and numeracy scores to identify any relationships.

Findings

The Classroom Computer Climate Survey (CCCS)

Responses to selected categorical questions in the survey questionnaire are presented in Table 1 below. It is evident that the majority of respondents (teachers) were female, 40 years of age or older, believed their ICT skills were better than average, have access to a computer and the internet at home, and spent less than 10 hours a year on professional development in ICT. The most likely computer usage in classrooms, by both teachers and students, was for 'publishing' and 'research'. Teachers' estimates of the amount of time they spend each week on a range of ICT tasks exceeds considerably their estimates of the amount of time their students spend on these types of tasks. This may, however, be in part because teachers were asked about both their personal and professional time spent on these types of tasks while only being asked to estimate children's *in-class* use of ICT.

Table 1: Selected categorical data from survey questionnaire 2002

	Category	%	n
Age of respondents	20-29 years	20%	94
	30-39 years	20%	90
	40-49 years	36%	166
	50-59 years	22%	102
	60+ years	2%	10
Gender	Female	70%	121#
	Male	30%	52#
ICT teachers/support staff as a proportion of respondents		12.50%	57
ICT professional development time (hours per year)	0-10 hrs	58%	267
	10-20 hrs	25%	116
	>20 hrs	17%	65
Respondent estimate of their own ICT skill level	Below average	8%	35
	Average	34%	156
	Good	40%	184
	Very good	19%	88

Home access to ICT		Computers	Internet
	Teachers	88% (n=408)	72% (n=334)
	Students	66% (72%)*	50% (45%)*

Weekly use of ICT (proportion spending more than one hour per week on a task area)		Teachers (personal + professional)		Students (classroom only)	
	Task area	%	n	%	n
	Publishing	83%	382	59%	270
	Research	67%	304	50%	226
	Communication	46%	211	9%†	39†
	Independent learning	46%	209	18%	81
	Problem solving	39%	181	14%	62

N = 466;#Only 173 respondents answered this question possibly due to a survey design fault;*Figures in parentheses are ABS (2003) national estimates of computer and internet availability in households with children under 18 for the year 2000; †Figures averaged across three communication categories (local, Tasmania, world).

In summary, the categorical responses reveal that although the majority of teachers were relatively confident in their ICT skill levels and have access to ICT at home, they spent little time on ICT professional development. Further, they and their students' use of ICT were concentrated on two main types of tasks, 'publishing' and 'research', with student use of ICT in other task areas particularly limited. These results suggest there are factors constraining the wider adoption of ICT use in classrooms. The open-ended questions, for which the major themes are reported below, shed light on some of these constraining factors.

Survey comparisons 2002-2003

Preliminary data from the 2003 survey show similar trends to the 2002 survey data reported above. Table 2 displays a comparison of the number of responses received with the notable difference in an increase in the proportion of Government teachers (from 70% to 86% of the sample) and decrease in Catholic teachers responding (30% to 14%).

Table 2: Survey questionnaire returns for 2002 and 2003

	2002	2003
Schools	213	140
Students	4794	?
Catholic classrooms	132	71
Government classrooms	306	436

Table 3 presents information about teachers across a range of parameters for the 2002 and 2003 surveys. The amount of time spent on ICT professional development deteriorated slightly, while home computer and internet access increased for both teachers and students.

Table3: Teacher ICT PD and teacher and student home ICT access for 2002 and 2003

Teachers….	2002	2003
Proportion with <10 hrs of ICT professional learning	60%	69%
Have a computer at home	88%	91%
Have home Internet access	72%	76%
Estimate of students with a computer at home	61%	64%
Estimate of student home internet access	45%	47%

Table 4 presents responses about computer availability in schools from 2001 to 2003. The availability of computers in classrooms appears to have risen dramatically however responses regarding reliability have fluctuated widely over the three years.

Table 4: Computer availability in schools from the 2001, 2002 and 2003 surveys

Teachers reported…	2001	2002	2003
Computers are available to my students throughout school hours	NA	90%	82%
The computer(s) are in my classroom	NA	46%	66%
Computer(s) are fast enough	NA	79%	74%
Computers are reliable and hardly ever break down	48%	70%	55%

These data comparisons present a mixed picture of change with home and classroom access appearing to increase while professional development time declines. The variability of the data, together with the fact the 2003 data are preliminary and have not been adjusted for the increase in the proportion of government teachers responding, suggests caution in interpretation is required.

Open-ended Question 1: How does the computer help students achieve their learning outcomes across the curriculum?

The most common reported benefits of ICT related to the access and presentation of information as well as how ICT could be used as a tool in various ways to enhance learning. It was also often mentioned as a motivator and in terms of student communication and connectedness.

Open-ended Question 2: How do you see computers affecting the future of classroom teaching?

ICT was generally acknowledged as a growth area in schools with increased use and usefulness predicted as teacher familiarity and integration of ICT improved. Constraints and concerns were the second major theme, with the main issues being adequate resourcing (mainly number of computers, reliability of ICT equipment, ICT support, and teacher time for management of ICT in the classroom and for professional development) and the need to keep ICT in perspective and not neglect other valuable teaching and learning tools. The future value of ICT was also perceived in its ability to facilitate improved communication and connectedness and student centred learning.

Together, the open-ended questions revealed the broad range of tasks through which teachers are putting ICT to use. However, teachers were careful to note positive future outcomes are largely reliant on improved resourcing of ICT. The responses highlight the ICT awareness of teachers and their recognition of the need for more support to develop their capacity to use ICT in classrooms. In this context it is a matter of concern that the categorical data from the survey report a minimal time commitment of teachers to related professional development. However, although 10 hours per year appears limited, McRae *et al*. (2001) noted that, in 2000, ICT ranked as one of the highest professional development priorities in schools nationally. Further, this emphasis has continued since the late 1980's when ICT professional development was attended by a greater proportion of teachers than any other topic area. One dimension that needs to be considered in light of these observations is the impact of recent change in education policies and priorities. Of particular note are compulsory national curriculum requirements in primary schools for literacy and numeracy testing and adoption of the 'Essential Learnings' as a curriculum framework by the Tasmanian Department of Education. It is likely that professional development priorities are increasingly aligned with these current policy decisions.

Connecting the CCCI with student literacy and numeracy performance data

The Classroom Computer Climate Index was analysed as four discrete measures:

- The composite or 'Total CCCI' and the three sub-components that make it up:
    - Teacher CCCI
    - Student CCCI
    - School CCCI

Statistical analyses have demonstrated few relationships between the CCCI's and student literacy and numeracy test results:

- Numeracy: for Year 5 (but not Year 3), test scores increased with increasing *Student* CCCI only
    - This relationship was statistically very significant (regression coefficient significance (RCS) = 0.7%) but the differences were small, Student CCCI=0.217*Numeracy Class Mean + 9.62
- Literacy: for both Year 3 & 5, overall literacy performance scores increased with increasing *Student* CCCI only
    - Again, this relationship was statistically significant (RCS = 2.8%) but small
    - This effect was also consistent (and statistically significant) for each of the three separate performance measures – reading, writing, spelling – that make up the overall literacy score:
        - Reading by Student CCCI: F ratio = 29.87 at probability level 0.0%
        - Writing by Student CCCI: F ratio = 7.72 at probability level 0.0%
        - Spelling by Student CCCI: F ratio = 18.70 at probability level 0.0%

School attributes

A number of school attributes were analysed for possible relationships with the CCCI's and student test scores:

- Educational Needs Index (ENI)
    - Only applied to DOE schools
        - Showed no statistically significant relationship with the CCCI's
        - Numeracy and literacy means declined with increasing ENI (The means were highly significantly different: Numeracy: the F statistic from the ANOVA procedure has a value of 25.8 with a 0.0% probability level; Literacy: the F statistic from the ANOVA procedure has a value of 48.1 with a 0.0% probability level).
- Rurality
    - Rurality was divided into three categories: Inner, Middle and Outer schools.
        - These categories were derived from the more extensive categorisation system used by the Tasmanian Department of Education (DOE) that uses seven distance categories depending on distance from urban centres containing a District Office
        - The 'Inner' category equates to DOE Distance Category 1 (schools less than 25km from a District Office) and included 144 of the total of 214 classrooms in this analysis (67%)
        - The 'Middle' category equates to DOE Distance Category 2 (25-50km) and included 34 classrooms (16%)
        - The 'Outer' category equates to DOE Distance Categories 3 to 7 (all schools greater than 50km from a District Office) and included 36 classrooms (17%)
    - Rurality categories were applied to both DOE and Catholic schools

- **The "dip in the middle"**
  - Teacher, School and Total CCCI's (but not Student) were lowest in middle schools and higher in inner and outer schools. These differences were statistically significant:
    - Teacher CCCI: The χ^2 is 21.15, giving a probability level of 0.7% on 8 degrees of freedom. Thus the distance category has a very significant association with the Teacher CCCI
    - School CCCI: The χ^2 is 27.71, giving a probability level of 0.1% on 8 degrees of freedom. Thus the distance category has a very highly significant degree of association with the School CCCI.
    - Total CCCI: The χ^2 is 18.63, giving a probability level of 1.7% on 8 degrees of freedom. Thus the distance category has a significant degree of association with the Total CCCI.
    - Student CCCI: The χ^2 is 2.41, giving a probability level of 96.6% on 8 degrees of freedom. **Thus the distance category has absolutely no degree of association with the Student CCCI. This may well be a most interesting result.**
  - Although overall numeracy and literacy means showed a small and non- significant decline with rurality/distance, the dip in the middle distance category was consistent (and statistically significant) for all three separate measures of literacy – reading, writing and spelling:
    - Reading: F ratio = 15.72 at probability level 0.0%
    - Writing: F ratio = 27.64 at probability level 0.0%
    - Spelling: F ratio = 24.73 at probability level 0.0%

- School Year
  - The analyses concentrated on Year 3 & 5 data and largely excluded Year 7 data due to difficulties in matching Year 7 student data to classroom survey questionnaires.
  - There were few differences in results by year level:
    - Student and Total CCCI were higher in Year 5 than Year 3
      - These relationships were statistically significant but small:
        - The square root of the Student CCCI was highly significant (at the 0.1% level; R^2 = 18%)
        - The square root of the Total CCCI was significant (at the 1.0% level; R^2 = 17%)

- Interaction effects
  - The interaction of ENI, rurality and year level also produced significant relationships with literacy and numeracy test scores
    - The main effect was that as ENI and distance from large urban centres increased, literacy and numeracy test scores declined (Numeracy: sig. at 1.6% level; Literacy sig. at 1.1% level)

        - A further Year level effect occurred in this case as, for numeracy scores, this decline was more pronounced for Year 5
    - The interaction of ENI, rurality and year level appeared not to produce stronger relationships with the CCCI's than the individual variables alone.
    - Analyses of these interaction effects are continuing

Summary

The school attributes affect the performance scores, and to a small degree the CCCI's. The priority for teacher professional learning appears to have moved away from ICT, but this means the majority are now getting less than the 10 hours per year deemed necessary to stay current with the continuous updating of core Office applications and operating systems (Software & Information Industry Association, 1999).

Students and teachers rarely used ICT for communication, problem solving or independent learning. Computing equipment was rated by teachers as being, increasingly available within the classroom itself, although still insufficient in numbers. They had concerns about reliability of the infrastructure.

Teachers viewed ICT as a motivator that could enhance learning, and expected growth in its use. They presumed increasing familiarity would extend the use of ICT into the areas of communication and student centred learning.

Schools 25 to 50 km from a district office have lower computing resources and training than more centrally located or remoter schools. However, student use of ICT at home and in school was unaffected by this finding. This personal use of ICT by students was found to have highly significant statistical links to slightly better performance on the national numeracy test for Year 5 students and literacy tests for both Year 3 and Year 5 students.

References

McRae, D., Ainsworth, G., Groves, R., Rowland, M. and Zbar, V. (2001) *PD 2000 - A National Mapping of Teacher Professional Development*, Produced for the Department of Education, Training and Youth Affairs. National Curriculum Services: Abbotsford, Vic.

Software & Information Industry Association (1999) *1999 research report on the effectiveness of technology in schools: Executive summary 6th Edition*. Author. Online at http://www.siia.net/pubs/education/99effrptexecsum.htm

Recommendations

The issue of school computer reliability needs to be examined by a sub-project to find out the reasons why teachers rate this aspect of infrastructure so lowly. ICT funding for Middle distance schools should be investigated to find out if there are ways to ameliorate their lower scores for

the teacher and school CCCI. In particular, this may mean more computers in the classrooms of these schools. The importance of student CCCI in relation to improved performance in national tests (independent of Educational Needs Index) could be augmented by policies which roll-over ICT equipment into homes without current student computer access. Strategies need to be investigated to increase the time teachers spend maintaining the currency of their ICT skills, possibly utilising the high proportion of home computers.

2004 Commitments

We will collect the final set of data to complete the longitudinal set, and hence perform analyses to determine whether student performance improves when learning in a generally higher classroom computer climate, or otherwise. Links between these statistical data and the classroom observations will be made more explicit and inter-related.

Part B In-School Observations

Introduction

A substantial number of inschool observations are central to this investigation. These provide a basis for pursuing factors that might inform a better understanding of the contribution of ICT to teaching and learning. The inschool observations are related to other aspects of this investigation as shown in the following diagram.

Inschool Observations

- Observations are made in Grade 3, 5 or 7 classes
- In both Department of Education and Catholic Education Office schools
    - Inclass observations: organisation; layout; provision, use & role of ICT
    - Interviews - Teachers of classes, Principal, ISM…others if appropriate
- Typically 2 classes per school → 2 days per class
- To date observations have been made in 27 classes (grade 3 & 5) in 17 schools
- Arranged collaboratively between the respective school systems and the schools

Sample Case Studies

The flowing table provides a summary of two case studies. These schools and classes are representative of, and illustrate, the range of schools and classes observed to date. Interestingly it is possible to make the generalisation based on observations that the incorporation of ICT into class programs varies significantly

- From school to school
- From class to class within a school and
- From time to time (within most classes) (see Findings below)

See Table 1. Sample Case Studies on the following page

Sample Case Studies

Characteristic	School A	School B
Size	Single stream (1 class at each grade)	Single stream (1 class at each grade)
Location	Large rural service town	Large rural service town
School system	Same	Same
Teaching style	Focus on learning purposes: Indicators include – Higher order thinking Attention to experience & process Collaborative approaches with students, peers, colleagues… Learners exercise initiative	Focus on tasks (such as literacy & numeracy). Indicators include – Teacher led 'didactic' activity with close supervision by teacher Whole group approaches Students work in parallel Students dependent on teacher for learning direction
Number of PCs	2-5 PCs in classroom as required	3-4 PCs in adjacent closed classroom annex shared by unmatched classes
Internet connection	Slow	Slow
PC concept	Shared resource → tools for action	Single user device for experience
Supplementary ICT	Data projector, camera, video, laptops, other devices. Easy access to supplementary resources by negotiation • Within class & school • With other schools	Some laptops by arrangement, camera Little access to additional resources
ICT concept	Set of tools for applying to learning tasks	Important to know & experience
ICT application	Supporting explicit core values • Higher order thinking • Collaboration • Teams, class, school, community	Presenting/promoting school to the community • Effective administration • Newsletter • School website • Reporting to parents
ICT use	Continual use: integrated/embedded in and across programs and activities (esp. Gr 4-6) • Individual • Class • School & community	Episodic use in class programs • Depending on circumstances (events and opportunities) • Not embedded in class program • Quite limited use
Sources of support for classroom use	Peers, teachers, aides, colleagues, technicians…	Aides, technicians
Limited by	Collective working knowledge which is rapidly increasing	Uncertainty about purposes Individual working knowledge
Professional Leadership (ISM)	Strong focus on in-class activities: using ICT within teaching & learning + troubleshooting → effective practices	Focus on school website and computerised reporting - no current involvement with classes per se
Teacher well-being (comfort) in using ICT	High (Grades 4-6) • Confident • Committed • Enjoying the challenges and achievements	Low (one exception - own resources) • Lacking confidence • Uncertain and 'bewildered • Feelings of guilt and dependency
ICT resources	PCs and wide range of peripherals	PCs & software (CDs) in Library
Core configuration	PCs + Presentation software Data projector … Readily & frequently reconfigured & supplemented to match purposes	PCs CDroms … Little or no reconfiguration observed

Findings

Sample findings:
1. There are four common learning structures according to the number of computers and student ICT competence & independence.

Table 2. Common Learning Structures

# PCs	Learning Structure	ICT Competence	Student Independence
1-3	Withdrawal from class	Low-Medium	Medium
4 or more	Rotation of tasks in groups, eg, webquests	Low - Medium	Low- Medium
	Rotation of team tasks, eg, group projects	Medium to High	Medium - High
3 or more	Collaborative class projects - dynamic groupings	Medium to high	High

The first two structures are generally consistent with the notion of computers as single user devices. The last two structures increasingly include the notion of computers as a shared device.

2. Most students only use ICT for a small proportion time in their school week - in many classes it is 2% to 4%. Many factors contribute to this phenomenon including competition for time within the demanding class program, 'unreliable technology', the competition between doing ICT-based activities and participation in the class.

3. 'Reliability' is a complex issue that goes well beyond whether the devices containing the technology are in working order. It includes many management and operational issues such as access, permissions, auto-correct functions, user routines, configurations, compatibilities, maintenance… and so on. The important requirement is that the technology is usable by the people in the class within the available window of opportunity. This window of opportunity is often quite brief given the age, abilities and commitments of most of the users.

4. *Development is disruptive!!* There is always a cost (sometimes quite severe) to achieving better arrangements.

5. *Variation is endemic!!* As a generalisation there is large variation in several aspects of the use of ICT in the classes observed

(e) Quality of ICT provision: latest PCs to unused (idle) old machines
(f) Range of peripherals in use: none to an extensive range
(g) Reliability of equipment: very good to out of action items
(h) Continuity: episodic to integrated use of ICT in the class program
(i) Speed of internet connection: (typically slower in rural schools)
(j) Concept of ICT: single user devices to a set of shared tools and resources

(k) Policies for use: open and independent to highly controlled and directed
(l) Support for the use of ICT: vague/occasional to explicit/fulltime
(m) Teacher comfort: zealous to bewildered
(n) Learning structures: withdrawal to dynamic integration of individuals, teams, the class and …
(o) And so on…

Emerging Theoretical Framework

From the inschool observations it has been possible to begin generalising some notions in relation to

- The ways in which teachers are incorporating (or not incorporating) ICT in their programs
- The role of the school in the use of ICT
- The impact of the technology itself
- The factors that need to be in place in order to help ensure the successful and sustained use of ICT in class programs

About Technology

Technology is used in activities (actions on objects)

- The application of technology requires knowledge and insight into both the technology itself and the activities involved
- Technology changes the boundaries on what activities are possible in two ways: it may extend or curtail what is possible in terms of
  - Actions (and choices)
  - Products
  - Experiences
- May reduce or increase the need for action, knowledge, resources and effort.

Success Factors

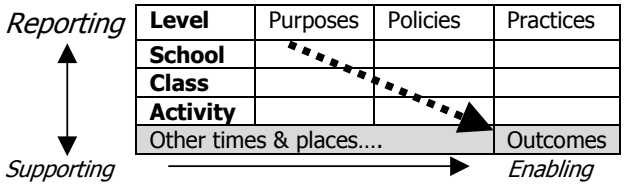
The in-school observations and survey responses indicate a set of four success factors that combine to help ensure the successful use of ICT.

1) **Shared purposes** - There is support for the use of ICT to achieve important outcomes. Cultural aspects included membership of a community of practice - this may be the school staff and/or a loosely managed 'professional' group of friends, family and associates.
2) **Matching technology** is available for use in a timely manner. The teacher can rely on being able to use the technology within the window of opportunity for teaching and learning.
3) **Working knowledge** - The users have the ability to select and operate the technology for the intended purposes and to promptly troubleshoot the situations that arise.
4) **Cost effectiveness** - The value gained in terms of knowledge, experiences and products is worth the time, effort, cost of devices and consumables ... involved in the using ICT.

Three levels of consideration

In order to align teaching, learning and the use of technology it is also necessary to achieve align purposes, policies & practices. However purposes, policies and practices are addressed at each of three levels:

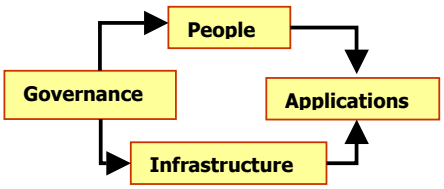
- **School** - governance and development to guide and facilitate teacher action
- **Class** - teaching and learning programs to support the students
- **Activity** - typically leading to knowledge, experience and products



School level considerations

Governance deals with vision, policies, and deployment of resources…

- **People** with clarity of direction and the required capabilities…
- **Infrastructure** including facilities, access to equipment and support services…
- **Applications*** the purposes for which ICT is intended

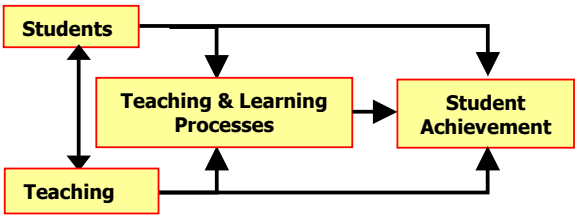


*Many schools were vague and/or ambiguous about the applications (uses) to which ICT might be put in the school and its classes.

- *'It is important for children to be able to use ICT'* was a common position held by schools.
- Other schools made claims of commitments to the education uses of ICT but closer examination showed their actions were to apply ICT in other areas such as the school website, computerised reporting, the school newsletter…
- Many teachers in such schools reported being uncertain, confused or even bewildered in the face of the possibilities provided b the available technology in their classrooms. As a result their use of ICT is infrequent and or episodic

Class Level considerations

At the class levels teachers need to give consideration to the **students** (expereince, prior knowledge, capacity to work indepedntly and/or collaboratively…) in order to make the best provision. Not all **students** are motivated by ICT and many find the perforamance of the classroom technology unsatisfactory. Notions of **teaching** and of ICT, and the capacity of the teachers to use ICT are all significnat factors in the classroom.



It is reasonable to consider the two major possibilities introduced by ICT for **teaching and learning processes**

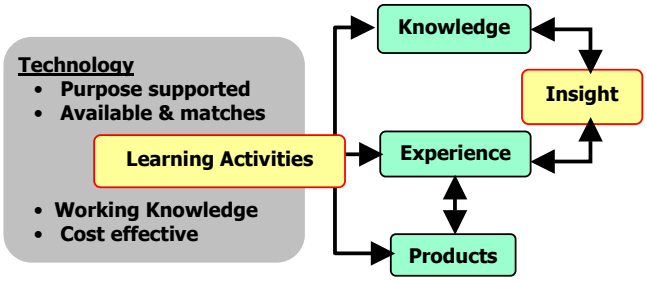
- Doing traditional things easier and better
- Doing new things that could nor have been done before

In many instances teachers and students were using ICT to do the kinds of things that have long been part traditional class programs. However such uses are not always easier or better (publishing stories already written is a good example)

In relation to **student achievement** ICT often masks lack of achievement through its automated functions. Teachers were observed not utilising ICT at times for this very reason - they wanted to know about student achievement

Activity Level

Learning and activity are closely related. ICT is valued in classrooms for its capacity to support activities that provide new **experiences** (despite a 20 year history of ICT in Tasmanian classrooms the discourse is still about the novelty of ICT).
Using ICT to access information as a form of **knowledge** acquisition is common. The quality of the products (documents, presentations…) that children can produce with the assistance is often deemed to be significant and used as evidence of learning. A significant recent development has been the small but growing interesting in learning activities that result in real knowledge acquisition including insight into experience and the construction of **products** that are useful for further activity and for others.



NOTE: More detail is available from the project website at
http://www.educ.utas.edu.au/users/ilwebb/Research/index.htm

Commitments 2004

Observations

In 2004 observations will be made in another 20 classes in 10 schools using an approach similar to that used to date.

In addition to the types of data previously gathered attention will also be given to aspects of ICT use within the classes and schools that might elaborate on the veracity (or otherwise) of the emerging theory outlined above

Data Processing

Templates have been developed to summarise case studies and these will be used to organised and analyse comparative aspects of all inschool observations.

In addition coding of qualitative data will continue and all data will be analysed to provide evidence as part of the Project Report and to support (or challenge) the emerging theoretical notions.

Part C Professional Learning Pilot - Action Research

Introduction

After considering the results of the inschool observations it was clear that it was not possible to identify a single professional learning package that would make a meaningful contribution to the incorporation of ICT into class programs. The issues were simply too complex and the variation (in purposes, capabilities, needs and practices) from school to school and even within schools was clearly too great to be met by a single specific response.

A decision was therefore made to offer supporting guidance for schools to undertake an action research project of their choosing - one addressing a current priority in relation to professional learning and ICT.

Action Research Case Studies

In Term 3 2003 four Tasmanian primary (K-6) schools engaged in action research projects focusing on the provision of professional learning for staff members. Each of the projects had unique characteristics reflecting significant cultural and historical factors at play.

In each project a team of three or four leading staff members (including the Principal) engaged in developing and implementing an action plan with the following steps:
Assess the current situation (general) - initial workshop and follow-up reflection

1. Choose a professional learning focus for action
2. Gather information about the present situation (focus)
3. Implement initiatives
4. Study results
5. Act in response to findings

Individual School Action Plans

School #1: Mapping ICT knowledge and use across the school

1. Develop and refine a tool mapping the use of ICT across the school
    a. **Who** is using
    b. **What** ICT application, device... for
    c. What **purpose**
    d. And **when**?
2. Collate and consider data
3. Sectorial groups to consider & respond
    a. Short term recommendations
    b. Long term recommendation
4. Develop ICT knowledge & skills multi-level framework (not grades) using
    a. Teacher modules
    b. Existing Evandale documentation
    c. Identified user routines

    d. Current best Evandale practices
5. Develop a framework for considering how ICT can help staff with...
    a. Knowing what's happening
    b. Knowing about children
    c. Getting professional information
    d. Supporting Teaching and Learning activities
    e. Other
6. Use the mapping tool to monitor the effectiveness of ICT provision & and related plans, policies and support

School #2: Two projects

Project A. Staff perceptions & issues re ICT

1. Survey staff (purposes & related issues)
2. Collate results
3. Consult with staff (sectorial groups)
4. Work from perceptions to achieve greater consensus amongst staff re purposes
5. Prioritise possible responses to issues
6. Act to achieve short term gains for staff and their classes
7. Incorporate long term initiatives into school planning
8. Evaluate and share findings

Project B. Real learning with ICT

1. Two classes to undertake joint learning project
2. Focus on using ICT to address real problem
    a. Collaborative teams
    b. Gathering & processing information
    c. First hand experience
    d. Useful products
    e. Insightful questions
    f. Shared learning
3. Observe closely for (and make explicit)
    a. The role of collaboration
    b. The emergence of ELs outcomes
    c. The contribution of ICT
4. Share the 'stories' of activities, experiences, insights, learning, products... at several levels
5. Use model as a model basis for
    a. Future ICT professional learning workshops
    b. Placing use of ICT within school's ELs initiatives
6. Evaluate and share findings

School #3: Value adding to professional learning by team learning

1. Check with staff (AD, CF) (individual summaries)
    - Current level of confidence, experience in using Inspiration & what they can offer peers.
2. Create capture and storage arrangements (SH)
    - Arrange Inspiration workshop for 8 -10 teachers:
    - Explain Plan-Do-Share& Evaluate strategy
    - Using Inspiration (training)
    - Plan possible individual or world futures unit or similar
    - Arrange some participants as individual, others paired

- Make products available for other purposes, eg, publish to intranet...

3. Monitor staff use of Inspiration: - simple staff logs
   - Extent of use
   - Kinds of use
   - Problems encountered
4. Review experiences (Team + Participants)
   - (Group meeting - October 30)
   - Value of using Inspiration
   - Value of visual planning
   - Problems encountered
     - How problems solved
     - Who provided support
     - How support was arranged
   - Differences in professional learning: paired or individual
   - Summarise experiences & findings
5. Utilize in the school as appropriate, e.g., planning for 2004

School #4: Professional Learning in a team context

1. Develop and trial staff professional learning survey with the Grade 1 - 3 team (in a team workshop)
   - Current confidence using computer applications, e.g., PowerPoint, Kidpix, email...
   - Current needs: computer applications
   - Hopes and needs: using ICT for literacy purposes
   - Other areas of interest in using ICT in class/grade programs
2. Plan and provide one or two items of professional learning (short term) in response to 1. above. Possible strategies include...
   - In class 1:1 peer demonstrations/mentoring
   - Using group planning to include consideration of, demonstrations, coaching in ICT use
   - Building in accreditation for modules using evidence from in-class activities, peer support and group planning times.
   - Include longer term professional learning needs in school PL plan for 2004
3. Review experiences with staff:
   - Design of staff professional learning survey how well did it work, how can it be improved for more extensive use
   - Effectiveness of the new accreditation strategy
   - Provision of professional learning activities: what worked (and why)? Implications for 2004?
   - Individual & team progress as a result of PL activities (includes
   - Usefulness of this action research approach to achieving Module 5 (team members

Individual accounts of the case studies are available at: http://www.educ.utas.edu.au/users/ilwebb/Research/proflrng_case_studies.htm

Professional Learning	Traditional	Case Studies
Content	ICT Knowledge & skills	Practices: tools, artefacts, action & experiences
Educational Focus	General: eg, software	Specific: ICT device + use + action → practice
Initiation	Offer of training	Negotiated, co-planned, situated
Intended outcomes	New ICT knowledge & skills	New or improved classroom practices
Participants	Individuals	Learning group (collaboration)
Learning context	Institutional (push)	Community of practice (pull)
Participant roles	Largely formal & fixed roles	Situational & dynamic (within working relationships)
	Novice & expert	Learner, co-learner, tutor, mentor, facilitator, supervisor...
Timelines	Episodic	Ongoing & revisited
Learning cycle	Incomplete (event)	Complete, short and integrated into classroom/school practices
Cost effectiveness	Low (waste, rework...)	High (practices, JIT, sustainable...)
Sustainability	Variable (often low)	High (embedded in culture, aligned with school purposes & vision...)
Information base	Variable (limited)	Explicit: participants and context
Transfer of learning into practices*	Intended, optional, hoped for...	Built into professional learning with direct or indirect support
Requirements of the institution (school)	Minimal	Sound governance, clear concept of ICT, endorsed purposes in using ICT ...

Each of the participating schools provided presentations of their case studies for RazzamaTas 1 - *'Capturing and Sharing the Learning'* a project workshop held on 20 November at the Utas, Launceston. The workshop considered the case studies and the following findings emerged.

Findings

Each project is still ongoing at this time (December 2003). However, the experiences of the participants and the findings of the projects are such that the projects have redefined professional learning in several important ways. This redefinition is supported by the in-school observations made in the larger research project. While the information in the following table is somewhat over simplified it represents a broad-brush summary of the findings:

The Professional Learning Cycle

The above elements were consistently brought together in the action learning projects as a series of steps in what is emerging as a cycle of learning. While no participating schools completed the cycle there is a strong intention in each case to do so.

At each step, the roles, responsibilities and tasks change according to the intentions, opportunities and capacities of the group. Management of the cycle is shared and collaboration allows for customisation to meet the needs of particular learners. Management is more a matter of leadership and facilitation rather than direction.

The results include greater knowledge of. And access to, available knowledge resources. In many ways the process is one of knowledge management rather than simply training and skill development.

The following model is an attempt to summarise the professional learning cycle:

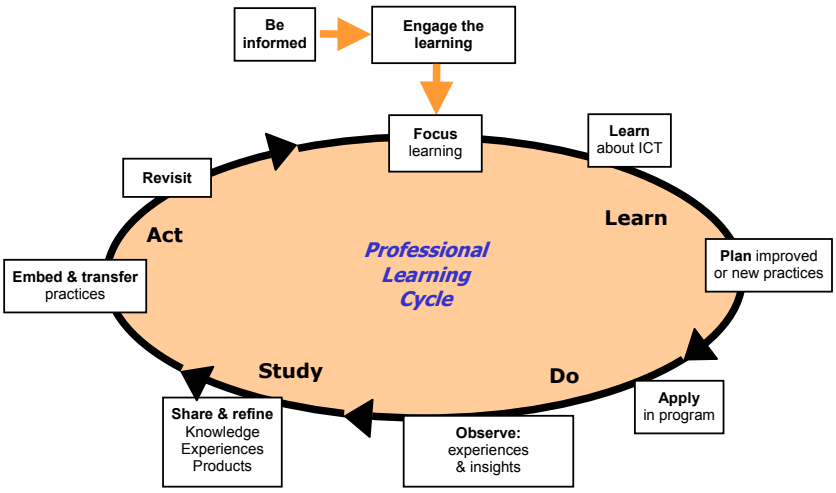


Figure 1 The Professional Learning Cycle:
Learn - Do - Study - Act

The action research projects that enabled the uncovering of the above cycle also demonstrated the principles on which it is based.

Basic principles for planning professional learning

The flowing principles were derived from the case studies and are also consistent with the in-school observations made as part of *Children, Online learning and Authentic Teaching Skills*, University of Tasmania

P.1 Professional learning results in new and improved professional practices

This emerged strongly from all action research projects

P.2 ICT may provide the practitioner with

- **New ways to do old things easier and better**
- **Ways to do new things**

This is the rationale for learning about ICT. However, knowledge of ICT is not enough -professional learning is about situating the use of ICT professional practices.

P.3 Professional learning will include learning to manage better.
The use of ICT requires the management of resources and ICT can assist with management of resources and practices

- Making arrangements and getting organised
- Using the technology:
  - Applying technology in the class, office…
  - Achieve purposes using known processes

P.4 Purposes and processes should be meaningful.
A key aspect of making arrangements will be about ensuring that the **purposes and processes** used in the professional learning activities

- Have meaning for the participants
- Are (likely to be) endorsed, supported and encouraged by the school

P.5 Being informed is essential.
From information gathered from staff in the project schools needs, interests, experience and capabilities (in relation to ICT) are not distributed in any consistent way, hence those making the arrangements for professional learning should be

- Informed about who knows, or wants to know, what?

P.6 Build the outcomes in the school culture through collaboration
The arrangements help to ensure that outcomes of the professional learning are built into the school culture through collaboration. This will mean:

- Working & learning with meaningful groups to develop communities of practice.
- Extending the collaboration to teaching, technical & other staff.
- (Beginning with staff induction?)

P.7 Starting with situated samples and credible experiences
These provide meaning not promises and help to bring out shared purposed and experiences.

P.8 Keep timelines short and the focus specific (KISS)
The action research findings indicate that shorter time lines 'work better'. Staff reported their appreciation of the shorter timeframe used in some of the projects: they found it easier to manage for one or more of the following reasons:

- Effort is more sustainable over the shorter period!!
- There are more people doing similar things (overlap of activities) leading to:
  - Greater consciousness of what is happening
  - Informal sharing of experience
  - More incidental learning
  - More assistance with trouble shooting
  - Greater intensity & less distraction/disruption -> more attention
  - More attention -> more awareness and more familiarity
  - Greater confidence and comfort
- Sharing the load was easier: tutoring = learning again and more!!

P.9 Take ICT into the classroom with modelling and support

- Share & review the experiences within the learning group
- Share the experience and results beyond the learning group
- Knowledge of ICT is not enough

P.10 Apply, learn, share and take it forward

Learning continues beyond the trialling of a new practice in the classroom (or office...). There will be different things to learn each time ICT is used. As demonstrated in the enhances the progress of learning, projects, sharing within the learning group and into the wider staff and community.

Recommendations

1. **New projects**: In 2004 similar opportunities and support should be offered to a range of schools willing to engage in action research around professional learning with respect to ICT and exploring the emerging theory including:
   - Three levels of consideration
   - Key success factors
   - The professional learning cycle
   - The principles for the design and delivery of professional learning

2. **Ongoing projects**: Where the opportunity arise the progress of the schools that participated in 2003 should be monitored and reported

Part D 2004 and Beyond

Background - An expanding scope

Learning Objects - A possible national initiative

(see Appendix A for initial project findings).

While the development of online learning objects by the Le@rning Federation proceeds with substantial Commonwealth government support there does not appear to be a major commitment to their evaluation by the users themselves. Notably the following remain unknowns.

- How 'online' and stand alone are the online learning objects, and
- How much teacher scaffolding is required and of what type?
- What DOES the student experience in these online spaces – i.e. the pedagogy of the 'Thirdspace' remains largely unexplored.

NB: For online material to 'work' with learners there is need to 'discover' the motivating components of this learning environment. We need to locate and describe the 'Thirdspace' of their experience. This is NEW for adult learners and teachers.

Mathematics and ICT Devices

The need to make young people active learners is serious. The obesity levels are alarming. Mathematics skills are tested nationally; they now require the use of wireless technologies including palms, and graphics calculators. We need to monitor these interventions and explore effects of more active participation involving on healthy learning outcomes.

RazzamaTas 2, March 26 & 27 2004:

Theme: "The 'C' is for Collaboration"
This conference will bring together all major stakeholders for a showcasing of activities and chance to be involved in 'hands-on' workshops with the new technologies. A national videoconference link with other states is planned. See brochure for details.

Future Directions –

The following themes are currently 'on the table' for the next funding application that will need to have partner approval for proceeding.

- Active Pedagogies and eLearning
- Online learning shared spaces or 'Thirdspace'

Appendix A - Learning Objects Pilot 2003- Report

Online Learning Objects

A Report from RazzamaTas 1

This project was organised to run for the first six weeks of the last term in 2003. It involved two classes from Launceston, Tasmania and two classes from Victoria in each of Year 5 and 9: a total of 8 classes. The Victorian classes were not able to join the project until the last three weeks of the scheduled duration. A course was established in WebCT containing six learning objects, a chatroom and discussion board, a calendar and 'Send in your Report' quizzes. The objects available to each year group are described in the following table.

Grade5/6	Grade 9
Grumpy in the desert: distinguishing compounds from chemical elements.	***Give Me A Brake***: predict the way different vehicles and weather conditions affect the length of a skid.
Inter-Galactic Cook Off: reactions that cause a chemical change.	***Biology Food Web***: Roll your mouse over each Antarctic creature to find what eats it, and what it eats.
Metal Munchers: Identification of metallic elements.	***It's About Numbers***: Find out how the numbers of one species affect the others in the ecosystem.
Ecosystem Game: Construct a food web.	***It's Not Just Wind***: Design a windmill to generate electricity throughout the year.
Field Trip: Load a field pack for a scientific trip in Antarctica.	***Far Out Lenses***: Simulation of building a telescope and discover the optical principles involved.
Gobbliser: compare your diet with the Recommended Dietary Intakes.	***The Robbery***: solve the crime using forensic science.

The objectives of the project were to investigate:

- What makes a good learning object (what are the characteristics which make an online objects work or not work well)?
- How are teachers able to capitalise on the opportunity to interact with another class using the same object?
- What are the implications for teaching when all students have access to the online learning objects outside school?

An average of three Pentium II computers loaded with licensed, free and open source software were supplied to each class in Tasmania to ensure every student had one at home. Some parents were also supplied with introductory internet connection kits which increased the proportion of students able to access the materials from home. Data were collected through teacher meetings, WebCT log files and quiz responses, presentations by teachers at the RazzamaTas1 sharing conference and individual teacher interviews.

Grade 5 Science

The following table shows the popularity of each online learning object. Gobbliser had nearly twice as many hits as the next most visited object, but each page was only looked at for a short time.

Page Name	Hits	Time	Time/Hit	Posts
Great Food! Great Health! - Gobbliser	**398**	18:22:09	2:46	0
Inter-Galactic Cook Off	**207**	20:08:06	5:50	0
Ecosystem	**164**	17:44:11	6:29	0
Grumpy in the Desert	**162**	12:26:32	4:36	0
Field Trip	**140**	13:35:40	5:49	0
Metal Munchers	**135**	12:47:21	5:41	0

The number of hits made by the 96 students enrolled in the course varied from 0 to 211, as shown by the following decile table:

students	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-96
max hits	0	6	13	21	29	37	46	57	74	211

The time of day indicated of out of school use. The mid-decile student was investigated to find out the extent of this non-school use.

students	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-96
number of school accesses (08:30-15:00)	0	4	11	5	12	17	27	16	12	0
number of home accesses	0	0	0	3	0	3	3	17	8	62

An analysis of time of day of the first and last access of the materials showed that 78% of these were at school, 22% from outside school.

AJ – P Primary, Tasmania

Accessing the learning objects became part of the daily routine for this class, which had 6 computers, and the children liked this. Towards the end of the project a link was made with a school in Victoria. Children used the chat rooms in the course to discuss the 'Field Trip' object. Although setting up this link was difficult (identifying common times within the schedules of different schools), children organised subsequent sessions themselves. They used the chat room link for socialisation as well as topic-focussed discussion. AJ soon found that the objects needed a class discussion to

clarify existing knowledge and introduce the concepts children would need to make the best use of them.

AL – AC Primary, Victoria

This class joined the project late but were very enthusiastic. They were studying 'Asia' but had previously done units on forensic science, so were able to tune into the Inter-Galactic cook-off online learning object by making sherbet in class and a discussion. The students tended to click through the introductory text of objects to get rapidly into the activity, and hence did not focus their learning on the intended outcomes.

The teacher would be happy to incorporate online learning objects into future planning, since they are far better than worksheets. The ability to track student learning in terms of responses to object-specific quizzes would be important [teachers in the trial did not have access to this facility]. Also, the interactive chat facility was a very good way to extend student learning – the students in this class were stimulated by online discussions with another class to investigate other learning objects, and consequently picked up specialist vocabulary such as 'decomposer' in ecology. The speed with which students shared collective knowledge was astounding "they had their own language, my head was spinning: one grade 5 student [from a school in another state] was chatting at 6pm and talking about individual children in my class!".

AE – St. M's School, Victoria

This class was comprised of mostly non-English speaking background children. AE initially directed the students to interact and play with the learning objects, but soon realised that there was a significant language barrier to overcome. For example the children had no concept of what a 'Penguin Rookery' was, and a hyperlink to a picture and short explanation/definition would have helped immensely. Larger font text and 'plainer English' would also have helped.

Positive object characteristics were sound effects, videos and the cartoon characters such as the alien in *Inter-Galactic Cook-Off*. AE modified the technique for accessing the objects by having the kids on the floor and talking about necessary concepts. For instance, she demonstrated light reflecting from a metal surface in preparation for the *Metal Munchers*. One of the effects of using the objects was a heightened awareness by pupils that too much sodium in your diet was bad for you (observed through overhearing pupil conversations).

Grade 9 Science

Page Name	Hits	Time	Time/Hit	Posts
Give me a brake	**179**	26:58:53	9:02	0
Investigate the robbery	**146**	22:13:06	9:07	0
Food Web	**103**	7:15:28	4:13	0
It's not just wind	**93**	8:09:34	5:15	0
It's About Numbers	**71**	7:34:08	6:23	0
Far out lenses	**49**	4:31:22	5:32	0

FP – P High, Tasmania
The school operates a high-level authentication environment: students need to type in a username/password for every new web-page they visit. Staff cannot use student computers and vice-versa.

FP found it very frustrating not to have designer access to the WebCT course containing the six learning objects. This is the way in which she normally scaffolds the learning of students – provides the introductory and reflective material they need.

EC – St. P's College, Tasmania
The students at SPC finished the project by writing reports on each of the objects they had used, and constructing some challenge questions for other students to respond to. These were posted on the bulletin board by the project team. All the online learning objects really needed an introduction for the students to really understand the potential for investigation. The students thought that overall there was too much repetition when using the objects (for instance, in most of the simulation they changed initial conditions and then re-ran exactly the same basic situation again). The Online learning objects were judged to be too shallow and not sufficiently challenging.

Comments on particular online learning objects

Grade5/6

Grumpy in the desert: distinguishing compounds from chemical elements.

Accessed from	Home =17%		School =83%
Loading speed	Slowly (took more than 3 minutes) 0%	Moderately (took about one minute) 33%	Fast (took less than 30 seconds) 66%
Smooth running	Yes - it was very quick to respond 42%	OK - I could see it working 50%	No - it ran so slowly I kept getting mistakes 8%
What was learned	I learnt that you use a magnet to separate tea leaves and iron fillings and you use paper filters to separate water and sand.		
Recommend to a friend?	75%		
Recommendations	This object would be better if you make Bruce nota wincer.		
Average rating	6.45		

Inter-Galactic Cook Off: reactions that cause a chemical change.
Good points:

- The graphics were animated and therefore much more interesting and colourful
- Alien creature was very entertaining
- Real life experiments – the children could actually do these themselves
- The video clips were realistic - actually combined the ingredients
- The ending was quite exciting

Recommendations for improvement:

- Fill the whole screen with the video clip
- Have the clip repeat without having to write the information again
- Provide multiple choice answers instead of repetitive writing
- Increase the speed for loading the video clip

As a teaching tool this was easier to manage than practical activities because there was no cleaning up. Also it was possible for students to test a much wider variety of combinations than if the experiments were all done 'for real'

Metal Munchers: Identification of metallic elements.
The videos were good, but needed to be bigger: for instance, the light bulb could not be seen to light up by many students.

Ecosystem Game: Construct a food web.
Good points:

- Information given about each animal, etc, was very informative
- A good range of animals was included, although some children would have preferred a few more

Recommendations for improvement:

- Provide a key or instructions as to what the "i", -> , red and green images refer to
- Need to improve speed of graphics coming up
- Graphics could have been more interesting and perhaps animated
- Keep the animals in the same position (if they move) for each attempt
- Provide the option of switching between the animals, etc, instead of having to get them all correct at once before moving onto a new animal
- The ending was quite well done but a further explanation of how the whole ecosystem works with different producers, consumers and decomposers relying on each other would have been better

Rather than outline silhouettes, photographs of real animals should have been used.

Field Trip: Load a field pack for a scientific trip in Antarctica.
Good points:

- Good range of objects to select from to go in the backpack
- Details given on each item for the pack was very informative
- Details and reasons given for incorrect items was also informative

Recommendations for improvement:

- Include a video clip of a real life expedition using the equipment at the end
- Keep all the correct items in the pack when you make a mistake and just delete the wrong ones
- Better ending: "Congratulations!" and then "Try again" is not motivating for this age group
- Include more follow up activities, eg a game based on a field trip

Gobbliser: compare your diet with the Recommended Dietary Intakes.
This object was so popular students went into it every morning before class in one school. Good for comparison of the dietary differences between age groups.