Conclusion

The study showed that ten and eleven year old children were able to discuss problem-solving strategies and they employed meta-cognitive skills by reflecting on the previous problems they had encountered. They were aware when they were employing domain specific or general problem solving skills. While most of the children were modest about their achievements, they recognised their move from computer novices, with little or no confidence, to confident computer users able to make decisions about when they should use their laptops and then what software to use. They overcame problems quickly and quietly and carried on with their work. This expertise was willingly and openly shared with peers, parents and teachers. Most of the children were aware of the choices and dilemmas created when using a laptop, but preferred the difficulty of having to make choices, to being told how, and with what, to do their work. Choice fosters ownership and if a piece of work is good, or not so good, then they accept the responsibility that comes with making choices. In the meta-cognitive learning process, previous choices were reflected upon, discussed and encouraged in a conjecturing atmosphere that promoted discovery and was founded on trust.

The constructivist model of teaching and learning espoused in this research was welcomed by every child in the study and found to support the shift from traditional instructional methods in a teacher-centred classroom to pupil-centred classrooms where ICT is woven integrally into problem solving activities and teaching, while handing over a greater responsibility for learning to the child. This study found that one-to-one access to laptops, using open-ended software was empowering for children and promoted learning and independence. The children were unanimous that one-to-one provision encouraged ownership of their work, better organisation and independence in their working.

Further reading

Cordes, C. and Miller, E. (eds.) 2000, Fool's Gold: A critical look at computers in childhood.
http://www.allianceforchildhood.org/projects/computers/computers_reports.htm

Crawford, R. (1998b) What is IT Capability?: An investigation into notions of what constitutes IT capability.
http://www.hud.ac.uk/ITsec/roger%20professional/itped.htm

Mason, J. (1996) Qualitative Researching, London: Sage.

Moseley, D., Higgins, S., Bramald, R., Hardman, F., Miller, J., Mroz, M., Tse, H., Newton, D., Thompson, I., Williamson, J., Halligan, J., Bramald, S., Newton, L., Tymms, P., Henderson, B. and Stout, J. (1999) Ways Forward with ICT: Effective Pedagogy using Information and Communications Technology for Literacy and Numeracy in Primary Schools, University of Newcastle.
http://www.ncl.ac.uk/ecls/research/project_ttaict/index.htm

Rockman Et Al (1997) Report of a Laptop Program Pilot - A Project for Anytime Anywhere Learning by Microsoft Corporation: Notebook for Schools by Toshiba America Information Systems. Rockman Et Al, San Francisco, CA.
http://www.microsoft.com/education/download/aal/resrch_1.rtf

Rockman Et Al (1998) Powerful Tools for Schooling: Second Year Study of the Laptop Program - A Project for Anytime Anywhere Learning by Microsoft Corporation: Notebook for Schools by Toshiba America Information Systems. Rockman Et Al, San Francisco, CA.
http://www.microsoft.com/education/download/aal/research2.rtf

Rockman Et Al (2000) A More Complex Picture: Laptop Use and Impact in the Context of Changing Home and School Access. Rockman Et Al, San Francisco, CA.
http://www.microsoft.com/education/download/aal/research3report.doc

Author and contact details

Dr. Danny Doyle
Les Landes School
Rue Des Cosnets
Millais
St. Ouen
Jersey
JE32BJ

doyle@localdial.com
admin@leslandes.sch.je

Tel. 01534 481013
Fax. 01534 481903

National Teacher Research Panel
engaging teacher expertise

This summary was commissioned by the National Teacher Research Panel for the Teacher Research Conference 2004, which explored and celebrated teacher engagement in and with research. All conference materials are available at www.standards.dfes.gov.uk/ntrp

Perspectives of One-to-One Laptop Access

Aim of the project

The research sought to explore the children's knowledge, views, understandings, interpretations and experiences of using laptop computers one-to-one and to gauge the effectiveness of the laptop use for the children's learning.

Context

Les Landes Primary School in Jersey is in its sixth year of one-to-one laptop computer access for all children in Years 5 and 6. This qualitative insider research was undertaken to represent the perceptions of the twenty-three Year 6 children of the school year 2001-2002. Interview and participant observations were the main methods used for this interpretive research.

Summary of main findings

- Every child in the study believed one-to-one access to a laptop computer promoted independence and that being independent had positively influenced other aspects of their work and their learning.
- There was a strong link between access to laptops and empowerment of children when used in a constructivist classroom.
- The children preferred a constructivist, autonomous approach to learning rather than the traditional behaviourist 'banking' approach.
- The children used their laptops as a tool and preferred authentic tasks using open-ended software rather than computer-as-tutor software.
- One-to-one access promoted real collaboration in a pupil-centred environment where independence was recognised and enjoyed by the children.
- Meta-cognitive skills and strategies were discussed and encouraged.
- The children were aware of their expertise and believed their current skills were transferable to new hardware and software, future education and employment.

Background

The UK Government has a vision of a school of the future where there are enough computers for children and teachers to integrate ICT into everyday practice. There will be an increasing number of portable devices, connected by wireless networks and children's own ICT will be welcomed. They suggest that traditional behaviourist pedagogy is to be replaced by a constructivist teaching and learning environment. Teachers will be liberated from the traditional role of 'fount of all knowledge' and will be given opportunities to be innovative to stimulate creativity in children.

Les Landes Primary School on the Island of Jersey has a history of computer initiatives, particularly with portable computers. In 1991 the school purchased Tandy laptops in a ratio of one to two pupils for the school's Year 5 and Year 6 children. The initiative led to the introduction, on a one-to-one basis, of Acorn Pocket Books for Years 5 and 6 and the Tandys were moved to the Year 3 and Year 4 classes. This commitment and background in ICT resulted in the school being selected by Microsoft in 1998 for the 'Microsoft UK Anytime, Anywhere Learning Pilot Programme' (AAL). Since 1998, all Year 5 and Year 6 children have had one-to-one access to a laptop computer. For five years, the laptops have been connected via a wireless network to give every child and members of staff in Years 5 and 6 access to printers, file sharing, internet and email. In addition, since 1998 the school has had a fixed Research Machine (RM) network (with a ratio of 6:1 pupils to computers).

The school currently has 160 children from age four to eleven on the roll. There are eight full-time and two part-time teachers, and four support staff. The parish in which the school is located has both rural and coastal aspects, with a mixture of small housing estates, farms and tourist facilities. Several generations of some families have attended the school. Les Landes School is a central part of the community in providing resources, training and encouragement towards lifelong learning.

A class of twenty-three Year 6 pupils took part in the study. Cognitive Ability Tests given to the children while they were in Year 5 showed the mean standardised assessment score of the children ranged from 85 to 124, with the class average of 105.

Teaching processes strategies

The children were familiar with open-ended software such as Microsoft Word, Excel, Publisher, PowerPoint, Internet Explorer, Paint and Logo. By Year 6, the software is chosen by the child to fit their task rather than the task created by the teacher to teach the software. ICT is rarely taught as a discrete subject. Laptop use is integrated into the curriculum and used whenever appropriate and not used when it is not the best, or preferred, tool for the job. The laptops are used as a tool in a constructivist approach where learners construct their own knowledge and understanding as opposed to using skill-based software preferred by traditional transmission approaches. Bruner's constructivist theory is based upon the study of cognition and stresses the idea of pupils making meanings rather than passively receiving them; and of learning methods of learning and thinking rather than how to recall set bodies of information. At Les Landes School we prefer not to use educational programs on the laptops that put the computer in the position of tutor.

Findings

Every child in the study believed one-to-one access to a laptop computer promoted independence and that being independent had positively influenced other aspects of their work and their learning.

The children felt that they were more independent, more organised and produced better work:

> *"I feel happy working independently on my laptop and asking a friend if I need help because working the laptop is more organised than having lots of pieces of paper all around you. It is a little easier because we have the experience working the laptop or computer. I can work independently at home on my homework without having to ask, if I checked with someone at school that day, but I don't have to do that all the time, I can do homework on my own and I have skills to do it."*

While the majority of children did not consider peer support to be contrary to independent learning, all of the children believed they were working independently when they did not need the teacher's help:

> *"I think we work independently with no trouble, if we are stuck we will ask each other but then again we don't need others that much. What will usually happen is that the teacher will give us instructions and we will go away and do them."*

The children were observed collaborating while either sharing a single laptop or working on a task with a laptop each:

> *"I would prefer to work with a friend because you can share your ideas with your friend and they can share ideas with you and it's quicker two of us than one and it could come out really good."*

In the past when there were fewer computers in school there were quite often two or more children gathered around a single computer. They realised for them to be able to 'have their go' on the computer they must take their turn and be patient. The last thing the children wanted to do was to make a fuss or argue and so give the impression they could not work together. Quite often these situations did not produce collaboration. They co-operated with each other rather than collaborated and did not work together to solve a problem. Several children remembered sharing a PC and said they believed they worked better with other people because they each had a laptop and could choose to work with another child or not:

> *"I think it's good to have your own laptop cause you don't have to discuss it and you can do it all yourself and not take turns. I work with other people more now though."*

The children were observed working on their own confidently and with increasing expertise. The laptops gave the children more options, but with more options came new problems that needed resolving using higher order thinking skills, e.g. problem-solving and decision-making skills. Many children linked independence with choice. Most children said they preferred to make their own decisions about their work on the laptop and such decisions promoted ownership:

> *"I think it is easier when you have less choice but it is nicer when you have more choice, but it is harder with more choice, so I don't really know! But your work seems better when you have more choice."*

The children who took part in this study demonstrated that while doing tasks involving higher order thinking skills, such as problem solving with unfamiliar software, they were aware of how they made decisions. They were able to reflect on their learning to help them cope with new tasks:

> *"I think in new programs we know what to do because either we have vaguely seen it somewhere else in our life, somebody on our table knows it or you can just explore and if you get it wrong start again or press undo or back. Also we find skills that we have used before."*

Many children were able to make explicit their meta-cognitive strategies. Meta-cognition is vital if children are to cope with, and make meaning of, the amount and range of information and knowledge they have easy access to today:

> *"Like riding a horse or a bike, you know what the pedals do and the handle bars and all the other things so you put them altogether and start riding, if you don't know how to stop ask a friend. You might have to practice a little bit but soon enough you will get the hang of it."*

The children appeared to prefer constructivist teaching, activity and assessment because they had greater autonomy and so developed independence in their work and their learning. They clearly did not see many learning opportunities from testing, compared to collaborating and co-operating with peers:

> *"I don't think giving you a test works because you don't learn much from a test. It's better with other people because every one knows something different and if you tell each other you'll know even more"*

Constructivist teaching encourages individuality and ownership and this type of learning fitted the preferences of these children who showed a tendency towards independent working and learning:

> *"When you [teacher/researcher] tell us what to do it isn't really the same, like it would actually be you telling us how to do it and we would mostly learn nothing because we really didn't do it ourselves, it would be mostly you that did it because you told us what to do."*

All the children in the study preferred to use their laptops for writing. Even those children who enjoyed handwriting chose to use the computer because of the ease of editing and the professional-looking outcome. Each had no doubt that the computer assisted them in the process of composing their work and given the ease that text can be edited, they felt their work was better:

> *"Well, computers take less time, because if you're writing, it takes you quite a while, and if you make a mistake you have to start all over again if you're using pen and on your laptop you can use one button and you can delete something."*

Every child in the study believed their understanding and experience of computer hardware and software would help in their secondary education and future careers. They saw their laptop experience and ICT understanding as a foundation for immediate and future learning in, and after, school. They were aware of the rapidly changing world of ICT and of the unfamiliarity many adults have of ICT. They were often puzzled by the fears and ignorance some adults have towards the technology which they have always known, and grown up with:

> *"I think that having your own personal laptop is good in some ways. It boosts ICT education at an early age and that would help in future jobs. What you write with pencil is done quicker on the laptop. We learn more skills on computer in Primary school, and that will be really useful when going on to Secondary. Computers are everywhere now; soon paper, pens and pencils will be forgotten."*

Research methods

The following research activities took place over the school year from September 2001 to July 2002:

- forty-five participant observations;
- fifteen taped interviews of children in pairs;
- twelve focus group interviews with five or six children;
- twenty-five non-participant observations; and
- seventy-three informal interviews.

Data from the focus group interviews and the informal interviews were systematically coded and put into categories, such as behaviour, independence and access. Analytical Statements were developed from the taped interviews. The analysis of the taped interview data became a starting point for the participant and non-participant observations and informal interviews.

Data from the participant observations, non-participant observations and informal interviews were also coded and put into categories. Most of these categories overlapped with the preliminary categories derived from the taped interviews. However, there were new categories that represented my observations of attitude, concentration, speed of work, amount of work. Having coded, sorted and organised the data, the data were brought together in order that they could be compared for emerging themes from the analytical statements.