

# Using information communication technologies in remote school communities

## ABSTRACT

*In 2003 the authors visited four schools in the Western Australian Department of Education and Training's Kimberley Education District to investigate the use of Information Communication Technologies (ICT) in the curriculum for students who have diverse needs. The visits also provided an opportunity to investigate how teachers in remote school communities were using ICT in the overall school curriculum, the use of ICT to facilitate effectiveness of school administration and the extent of ICT professional development opportunities for teachers in remote locations.*

## Background

Many students in Western Australia (WA), due to the geographical isolation of many parts of the state, are educated in remote and rural community schools. In late 2003 the authors visited four schools in the Kimberley Education District in WA to document (Forlin & Lock, 2006) and film (Forlin & Lock, 2004) the use of Information Communication Technologies (ICT) with students who have diverse needs. These visits also provided an opportunity to interview teachers about how they use ICT to enhance the general school curriculum, improve administrative efficiencies and review issues associated with ICT-related professional development.

## Using ICT in Schools

In commenting on the use and outcomes of ICT in the curriculum, the British Educational Communications and Technology Agency (Becta) refer to a variety of studies. Research conducted by Harrison, Comber, Fisher, Haw, Lewin, Lunzer, McFarlane, Mavers, Scrimshaw, Somekh & Watling (2002) show that Internet use increases access to a wider range of resources, while improvement in levels of motivation among demotivated and disaffected students who use ICT (Duckworth, 2001; Passey, 2000; Harris and Kington, 2002) has also been noted. In addition to increasing student motivation, research has demonstrated that ICT use increases student confidence (Hennessy, 2000) and provides more opportunities for independent learning (Becker, 2000). Comber, Watling, Lawson, Cavendish, McEune & Paterson (2002) and Parker (2002) observe improvements in student behaviour, communication and process skills when using digital video, noting also rises in literacy levels.

ICT use has been shown to increase efficient completion of administrative tasks by teachers and support staff (Greene, Lee, Springall & Bemrose, 2002). Flecknoe (2001) reports that the efficiency of communication within and between institutions is also enhanced by the use of email and virtual messageboards, while Greene et al. (2002) comment that ICT facilitated access to, among other information, the collection and analysis of student data.

Studies conducted by Bly (1993) and Atkins (1997) both indicate the need for teachers to receive appropriate time and training to develop ICT skills, with a subsequent improvement in their attitudes towards and use of ICT in the curriculum. Overall, instructional technology authorities seem to agree that appropriate, meaningful staff development is the solution to the problems surrounding instructional technology integration and teachers' attitude towards ICT (Rhodes, 1998).

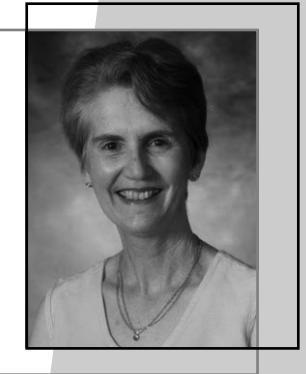
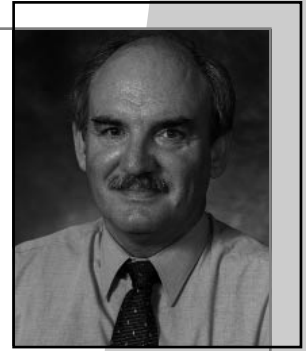
## Aims of the research

While the main aim of the research was to document and film the use of ICT with students in rural and remote schools who have diverse needs, an opportunity presented itself to also investigate how teachers in remote school communities were using ICT in the overall school curriculum, the use of ICT to facilitate effectiveness of school administration and the extent of ICT professional development opportunities for teachers in remote locations.

## School and Teacher Characteristics

Four schools in the Western Australian Department of Education and Training's remote Kimberley Education District were visited during the research investigation. Student populations at these four schools ranged from approximately 150 to 800, with each school enrolling students from kindergarten to post compulsory years. All schools had high proportions of students from Indigenous backgrounds: ranging from 40 per cent to 99 percent. One school reported a noticeable proportion of the student population had an Asian background.

Semi-structured interviews were conducted with twenty-two staff (12 male and 10 female), including two education assistants, three school administrators, eight classroom teachers, three ICT specialist teachers, two



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special needs coordinators and four other specialist teachers. Their length of teaching experience extended from two to over thirty years. In terms of their self-assessment of personal ICT ability and use of ICT in the curriculum, 90% of teachers interviewed can be described as being competent to highly skilled in their ability and use of ICT.

### Methodology

As outlined previously data were collected by semi-structured interviews. The interview questions relevant to the present discussion considered:

- Current use of ICT in the school curriculum
- Administrative uses of ICT in their schools
- Infrastructure and professional development opportunities in ICT

Teacher responses to the questions were noted or videotaped during the interview and the teachers read the transcriptions to ensure accuracy of recording. The responses were then read by the researchers and analysed to identify any themes that had emerged within each of the broad questions, with these themes providing the framework for the subsequent discussion. In essence, the data were coded, a process that, according to Wiersma and Jurs, (2005), involves "... organising data and obtaining data reduction ". In other words, it is the process by which qualitative researchers "... see what they have in the data" (p. 206).

### Results and Discussion

#### ***Current Use of Learning Technologies in the School Curriculum***

In commenting about the use of ICT to enhance student learning outcomes, teachers identified accessing information, gaining knowledge in learning areas and improving ICT skills. Teacher discussion on accessing information referred to Internet use, with ease and speed, together with the amount of available information being highlighted, findings also identified by Harrison et al. (2002). Teachers in these schools suggested that such access is particularly important in remote areas where learning resources might be limited, and that it enabled students to more readily explore beyond their immediate, somewhat limited, local environment. They also indicated that Internet use enabled students to gain greater knowledge of their own community: for example, local indigenous stories.

The use of ICT enabled students to demonstrate educational outcomes specific to learning areas in a variety of ways. Each school had the technological capacity to edit and produce digital photographs and films, and students used this capacity when relevant. Examples included completion of assignments using

Word, the work of early childhood students being presented through PowerPoint, the production of an orientation video for new staff members, the production of music CDs (original compositions) and the design and programming of robots. In one school, students had won an Australian Film Institute award in 2002 for a video production. Other examples of educational output through the use of ICT included the completion of assignments, recording the oral histories told by local tribal Elders and videoing local Aboriginal tribal days and celebrations, such as the Crocodile Festival and NAIDOC week.

In addition to the more explicit evidence, teachers also referred to the educational benefits gained by students through the actual use of ICT. Teachers commented that some students were on a significant learning curve in simply using ICT, particularly comprehending "ICT language". One area of concern was identified regarding students who did not have access to ICT at home "falling behind". This could pose future challenges for both teachers and students alike, with teachers having to develop appropriate teaching/learning activities, and for students the possible effects of self-perception of being an underachiever. A potential impact on parents of their children "falling behind" in the development of ICT skills is financial pressure to provide the necessary ICT. A second example to which teachers referred was that students were relying on learning ICT skills as an integral part of their education. Teachers also frequently observed that through the cross-curricular use of ICT in teaching/learning activities, students were developing an understanding of the use of technology in society.

Similar to the findings of Duckworth (2001), Passey (2000) and Harris and Kington (2002), staff members in all schools commented on the high degree of motivation and engagement demonstrated by students when using ICT. Teachers observed that not only did motivation and engagement increase, but as student learning skills developed so did their self-esteem, self-respect, willingness to accept responsibility, and an increased ownership and pride in their work. One observation of concern, however, was that some students develop an over reliance on solving problems through the use of ICT.

Without exception teachers commented about the enhancement of curriculum and pedagogical development through the use of ICT. This was exemplified by improvements in literacy levels (also noted by Comber et al. (2002) and Parker (2002)), the ability to contextualise learning activities, increased communication between classrooms within the school and with other schools (both national and international) and allowing students to work independently; the latter being similar to the observation made by Becker (2002). Teachers also discussed how they used ICT to improve student levels of oral communication, writing, cooperative learning skills and computer skills.

Teachers noted that ICT contributed to the provision of inclusive educational experiences for their students.

Typical of such comments were those that suggested the use of ICT addressed different student strengths and that students were able to work at any level. In addition, teachers observed that, for many students, the use of ICT increased self-confidence. Such occurrences might be related to the frequent incidences of incidental peer teaching and the use of ICT as a tool to enhance reflection, including critical analysis of work.

Overall, teachers observed that ICT use increased and enhanced student and teacher knowledge, from local, community-based areas such as local dialects/languages and culture to worldwide issues and themes. ICT also aided the actual output of students' schoolwork. Assignments were completed using computers and accompanying software, and work rewritten, easily corrected and then "published".

Particular emphasis was noted in both the music and media learning areas with digital video cameras, imaging software, and music creation and editing software employed by teachers to enhance pedagogical strategies and student achievement. Indeed, one teacher commented that, "The more traditional purist music teacher needs to get into the 21st century and embrace technology".

In commenting on the use of ICT regarding student behaviour management, administrators noted that allowing students to access ICT was used as a reward. Similar to the findings of Comber et al. (2002) and Parker (2002) teachers and administrators alike observed that student behaviour and focus on learning tasks improved when ICT was an integral part of learning activities.

The use of ICT in these four schools also revealed a seamless integration into the curriculum. The various technologies do not appear to stand alone, but rather support, enhance and allow deeper investigation of all curriculum learning areas. Evidence also points to strong support of pedagogy, including increasing student confidence and allowing students to naturally explore their own strengths, with teachers also commenting that the use of ICT was seen as being cross curricula. In other words, the teaching staff members in these remote schools are viewing ICT as an integrated and cross-curricular "teaching tool" and not a distinct area of the curriculum, a strategy described neatly by one teacher who stated, "It is a tool, not a subject ... like a library".

### **Administrative Uses of ICT in Schools**

As discussed previously, research has shown that ICT use increases efficiencies in completing administrative tasks, collection and analysis of student data (Greene et al., 2002), and communication within and between institutions (Flecknoe (2001), all of which were confirmed by the present study. All three administrators interviewed agreed that the use of ICT made access to student records more efficient and, when necessary, contact between and within schools was enhanced. Information was more quickly retrievable and, where the infrastructure existed, there was potential to email parents. Furthermore, ICT use facilitated the efficiency of communication preparation through the use of mail merge and other software applications such as Microsoft Publisher.

In addition to its usefulness in learning activity preparation, teachers also were of the opinion that ICT facilitated the maintenance of, and access to, student records. They acknowledged this to be of particular assistance when reporting on

student progress.

### **Infrastructure and Professional Development**

Without exception all teachers in the four remote schools commented on the importance of infrastructure and professional development to ensure effective use of ICT in the curriculum. During the period of this study infrastructure work was being undertaken in two of the schools: one was installing fibre optic cable to link all classrooms, while the other was being connected to the Internet. However, while infrastructure was either in place or being installed, teachers noted that merely having the required infrastructure was often insufficient. They were critical of inconsistencies in service provision, particularly the lack of reliable access to technical support, with teachers in two schools commenting on lengthy time delays in solving infrastructure problems. The geographic location of these schools also contributed to problems with reliable infrastructure with high temperatures, high humidity and fluctuations in diesel-generated power supplies often meaning ICT was unavailable for periods of time.

All teachers indicated that the provision of infrastructure and the purchase and maintenance of ICT equipment was having, and in their opinion would continue to have, a significant impact on school budgets. However, teachers could not discern sources of potential funding to help expedite potential future budgetary challenges.

The importance of developing ICT skills among teachers was discussed in the literature by Bly (1993), Atkins (1997) and Rhodes (1998). However, teachers in these remote schools identified high staff turnover, together with difficulty in attracting and retaining staff members with specialist ICT skills as precluding implementation of effective long-term professional development programs. This was exemplified in one school where video-editing equipment was available, but not used due to a lack of the required knowledge and skills among staff members. At the time of the interviews there was a general agreement about the hard work that teachers were undertaking to ensure adequate use of ICT in the curriculum.

Notwithstanding the observed limitations, teachers interviewed recognised that the use of ICT is extremely relevant to today's global environment. Learning which utilised ICT is seen to be enhanced by the use of technology and is regarded as an almost essential component of a well-rounded education that will equip students to survive in the future.

### **CONCLUSION**

The results of the present research, conducted in schools located in remote geographic locations, are consistent with those found in previous studies. The significance of the findings of this study, however, is related to issues associated with the unique characteristics of these remote locations and has implications for all educational systems in which there are geographically remote schools.

Teacher comments on the use of ICT in the curriculum to gain knowledge and skills emphasised the advantage of Internet use to obtain quick and easy access to information. They noted that this was particularly important given the geographic isolation of the schools in which they worked. Of interest were the observations

that Internet use contributed to increased student knowledge of the local area. Students in these remote schools, in addition to demonstrating learning outcomes through software such as Word and PowerPoint, also used digital video and original music production to demonstrate achievement of learning outcomes.

Teachers referred to the improvement in ICT skills shown by students, but sounded a note of caution about students who do not have access to ICT at home. Additionally, they indicated that some students were becoming reliant on learning ICT skills through curriculum implementation and that cross-curricular use of ICT contributed to student understanding of wider societal use of technology. A further teacher observation was that as students' ICT skill level increased, so did their levels of self-confidence, pride in work, motivation and ability to work independently.

When asked to discuss the impact of ICT on enhancing curriculum and pedagogy teachers emphasised improved student literacy levels, communication skills and cooperative learning skills. Inclusive educational experiences were enhanced, as was the output of student schoolwork. Music and media attracted emphasis in teacher comments, while the seamless integration of ICT into the curriculum was noted as being significant.

Administrators acknowledged that ICT contributed to effectiveness of maintaining and retrieving student records and facilitating communication with the school community. Teachers also commented on facilitation of maintenance of student achievement records, while administrators and teachers agreed that allowing student access to ICT was used as a reward within management of student behaviour strategies.

The importance of professional development was emphasised unanimously by the interviewees. However, and peculiar to the geographic location of these remote schools, a number of concerns were raised. Inconsistencies in service provision due to climatic impact, unreliable power generation and lengthy delays in solving infrastructure problems received particular attention. Inroads into school budgets attracted comment, while high staff turnover was noted as precluding the development of long-term professional development programs. Geographic isolation was also noted to impact on the schools' ability to attract and retain staff members who have ICT expertise.

The results of this study showed that teachers in these isolated schools were making every effort to seamlessly integrate ICT into the curriculum. Teachers and administrators acknowledged the beneficial impact of ICT on student attitude to learning and demonstration

of learning outcomes, together with improved efficiencies in completing administrative tasks.

The findings of this research have implications for governments and education authorities, both nationally and internationally, in which there are geographically isolated schools. The effective use of ICT such schools requires continued focus by governments and educational authorities on the challenges being encountered. Additional resources are required to attract and retain staff, which in addition to ensuring much-needed stability, should allow the implementation of more long-term professional development regarding staff ICT skills. Greater accessibility to technical support and provision of more reliable power supplies will contribute to the effective use of ICT in remote school curricula, while additional budgetary allocations will ensure that provision of ICT infrastructure will not come at the expense of other educational programs. The present study showed the educational advantages ICT brings to schools located in remote geographic locations and it is these, rather than non-educational issues, that should guide policy decision-making.

#### BIOGRAPHY

*Dr Graeme Lock is a senior lecturer in the School of Education at Edith Cowan University. He is currently Director of the Primary Program (which includes both the undergraduate Bachelor of Education and the Graduate Diploma of Education) and coordinator of the Diploma of General Education course being taught in Singapore. Graeme's career has included 25 years teaching in government and independent schools and 4 years at the Curriculum Council. His areas of teaching include pedagogical strategies, curriculum, educational policy and behaviour management. Research interests include the use of ICT in school curricula; the learning, cultural and religious needs of international students enrolled in offshore university courses; the experiences of pre-service and graduate teachers in rural educational settings; curriculum development and implementation; and developing pre-service teacher education courses.*

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