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OVERVIEW

Globalization and industrialization have had their impact manifested in almost every lifestyle, either in a positive or in a negative sense. It has equipped the modern world with information and communication technologies that helped man win against various odds. One of the prime contributions made by information and communication technology has been in the field of education. With the introduction of information and communication tools in the domain of education, there has been a radical change both in education standards as also in the way education is imparted. ICT tools have helped improve the quality of education by using multimedia and broadcast technologies to change the manner in the delivery of education. By doing so it has succeeded in drawing more students to schools that are attracted by audio and visual techniques and thus find it interesting to be associated with the same. Incorporation of ICT in education has also helped in extending the periphery of education and assisted students to gain the latest knowledge relating to a particular topic. Their queries are

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Focusing on ICT in Rural and Regional Education in Australia

*Chris Reading, Andrew Fluck, Sue Trinidad, Howard Smith,
Greg Shaw, Neil Anderson, Catherine McLoughlin and Bruce White*

National priorities set by an Australian ministerial taskforce provide clear guidelines to develop pedagogy that integrates ICT. Although these guidelines do not specifically address rural and regional schools needs, the two priorities: promoting pedagogic leadership and creating new learning environments, are of particular interest. But how are these priorities reflected in the realities of rural and regional schools? Focus group interviews were conducted at a selection of rural and regional schools in each state and territory across Australia. These provided teachers, parents and students with the opportunity to identify key issues in relation to ICT in their schools. Issues identified by the focus groups were; the state of equipment in schools, comparability between home and school ICT experiences for students, pedagogical approaches, leadership, professional development and availability of ICT specialist teachers.

Introduction

The Australian ICT Taskforce, commissioned by the Ministerial Council on Education, Employment, Training and Youth, has developed national priorities for the development of pedagogies that integrate Information and Communication Technology (MCEETYA, 2004). While all these priorities are applicable to rural and regional schools, two are particularly relevant: promoting pedagogic leadership and creating new learning environments. Government and jurisdiction responsibility, in demonstrating leadership, is to 'ensure that teachers and support staff have access to professional development, training, support resources and technical support' (MCEETYA, 2004, p. 12). Such support is essential for rural and regional teachers who are more professionally isolated than their urban counterparts. Teachers are being challenged to create blended learning environments that bring more possibilities to students by connecting them 'from home to the learning program and to worlds outside the classroom' (MCEETYA, 2004, p. 8). The priority statements promote the use of technologies to support dynamic relationships between families, schools and communities to reduce the sense of remoteness that is experienced.

Although these national priorities acknowledge the importance of ICT as a driver for the transformation of pedagogy, the authors are concerned that in rural and regional Australia provisions made for infrastructure, training and support are not sufficient to facilitate such transformation. What is the real situation in rural and regional schools? Focus group interviews for a national survey gave teachers, students and parents a voice in highlighting some key issues.

National Survey

The National Centre of Science, Information and Communication Technology, and Mathematics Education for Rural and Regional Australia (SiMERR) was established at the University of New England (Australia) to support student achievement and enhance teacher growth. This is to be achieved by working collaboratively to develop research-based solutions to the problems faced by teachers, particularly those who are professionally isolated. To assist in managing this process SiMERR-Australia (www.simerr.une.edu.au) has been created, consisting of the SiMERR National Centre and a series of SiMERR hubs, named SiMERR-TAS, SiMERR-WA, etc, based in

universities. This structure provides a truly national organisation and supports the implementation of national projects at the state/territory level.

Rural and regional schools face a variety of problems (Commonwealth of Australia, 2000) and SiMERR was funded by the Australian Government to conduct a National Survey in 2005. This was the first coordinated national approach to determining the extent of these problems. The structure of SiMERR allowed the National Survey to be a cooperative venture between the University of New England and other universities.

The survey, administered by the SiMERR National Centre, aimed to identify the key issues affecting student outcomes in Science, Information and Communication Technology (ICT) and Mathematics education in different parts of Australia. The intention was to generate high quality base-line data about rural and regional teachers involved in these subject areas, and the issues that may be limiting the achievement of learning outcomes by their students. Online, and paper, copies of the survey were distributed to 5669 primary and secondary schools across all eight states and territories of Australia. In the first phase of the study primary teachers, secondary teachers of Mathematics, ICT and Science, and parents were surveyed. In the second phase, focus groups were set up in each state and territory to generate qualitative data to complement the data collection in the survey questionnaire. See Lyons, Cooksey, Panizzon, Parnell and Pegg, (2006a) for a full report of the findings of the National Survey and Lyons, Cooksey, Panizzon, Parnell and Pegg, (2006c) for an abridged version.

Focus Groups

The focus groups, conducted by the SiMERR hubs, involved teachers, parents and students in selected schools. Each hub chose their schools to be representative of rural and regional schools (in centres with a population of less than 25000) in their state/territory. The schools covered a variety of sectors (government/independent/catholic) and types (primary/secondary/combined). The National Survey results were not available to inform the choice of schools. In total 37 schools were involved; TAS 4, WA 4, NSW 4, NT 4, QLD 9, ACT 2, SA 4 and VIC 6. At each school key stakeholders were interviewed, approximately six of each of teachers, students and parents. The relevant questions from the minimum protocol for these interviews is presented in Figure 1. The results of the interviews are presented in Figure 2.

when discussing the necessity of ICT resources in the school. Having students gain basic computing and Internet skills was seen to be very important as when they leave the remote community they must be able to cope in the wider world.

Many of the remote communities were connected by satellite and this posed a problem also. Such communities were often unable to access the Internet at times due to cloud cover or other technical issues. There was a lack of technical expertise within the school and two of the schools indicated the frustrations when their connection was not working or they were unable to have it fixed immediately as they had to wait for technicians to travel to their schools.

New South Wales

Two prominent issues in the four rural and regional schools are the standard of the computer facilities, with flow on difficulties for students and teachers, and the need for technical support staff in schools. Students and teachers, especially from the low socio-economic areas, expressed concerns about the number of computers available and access to those computers. One teacher observed that: '[We] only have 16 computers in the computer room so we can't fit a whole class in from the primary anyway.' Students without computers at home found it difficult to complete required computer-dependent tasks, one stating that 'when we do our extension work for English we found it really difficult to find computers'. One student commented on the age of the school computers, 'there are some new computers but there's a lot of dodgy ones', and another on the time wasted due to technical difficulties, 'don't even bother going there ... it's half an hour just to get logged in and get on the Internet'. Another described the Internet as 'really slow, really really slow'. However, not all difficulties were Internet related: 'the other day we're [typing] up our PE assignment and right at the end we got told save it and print it out, we couldn't save it, and the printer wasn't working.' These problems caused students to rely on home computers for school work but this was problematic as two teachers indicated that at least 50% of students did not have computers at home. Even those with computer access at home were frustrated by 'painfully slow' download speeds and competition from family members for use.

Teachers also expressed frustration with the schools' computer systems and the limited support from district offices, but were supportive and complementary of the

efforts of the teachers and parents. The workload for teachers with system administrator and/or application support jobs was described as 'obscene', recognising that they were 'the person on the ground 24/7' with 'much work being done in their own time'. In one school, the teachers were fortunate in the short term as they had 'a very interested parent who looks after and administers our network ... and without him, we would be totally stuffed' but this would end when his daughter finished Year 12. Teachers considered that there was a need for education authorities to commit to providing 'technicians in every school to maintain computer network'.

Northern Territory

The Northern Territory reflects all aspects of rurality and regionality, with the added concept of remote. The four schools involved were located in a small rural town and in a regional centre. The success of teaching ICT in schools and integration of ICT-based pedagogies across the curriculum is dependent upon the skill, knowledge and enthusiasm of key people in the school. Schools who have a teacher with such attributes reported a greater importance attached to ICT in the school, from the points of views of the teachers, students and parents. This related also to the ability of a school to get and maintain ICT infrastructure. Schools that had strong leadership in the teaching and use of ICT reported that they possessed more technology and it was better utilized. Such leadership was not limited to senior staff but often came from innovative and knowledgeable users, often an individual teacher, though also some students and parents. Where there was broad use of ICT in a school both teachers and students indicated that teaching and learning was more interesting. Attracting and keeping such ICT innovative teachers in schools is a significant problem in the NT and high teacher turnover has damaging effects on students learning and on parents' attitudes towards, and support of, the school.

In contrast, schools with a lack of ICT infrastructure and a lack of ICT leadership, have under-utilized ICT resources. Teachers noted that opportunities for staff development in both ICT skills and ICT-based pedagogies was an issue, and that such staff development needs to be classroom contextualised. Support for teacher professional development needs to be matched with further curriculum innovation to provide strategies and techniques that allow teachers to work better in using ICT for teaching across the curriculum. This would also assist in developing an interest in

ICT and improving ICT skills, in both teachers and students. Addressing this problem would require significant ongoing provision of ICT infrastructure, hardware and software, and on-the-ground support and maintenance.

Queensland

The Queensland focus group spanned nine schools in regional, rural and remote areas and included Torres Strait Islander communities, Aboriginal communities in the Cape and Gulf region, along with far western schools. This mix included a farming community and mining communities, across government and non-government schools and various models of schooling, such as a one-teacher school, general primary and secondary schools as well as a P-10 school and a P-12 school. Despite this diversity, some common themes emerged.

One recurrent positive theme was the confirmation that many rural and remote schools have ICT resources that are the equal or better than their city peers. In one remote island school, the teachers reflected that they now had more computers and hardware than their previous city schools. Schools generally reported a good computer to student ratio and highly satisfactory levels of peripheral and associated ICT devices. In a remote western school, one of the teachers remarked that, 'I think that ICT-wise, computers per kids, we are right up there. We have got a lot of computers, the ratio of kids to computers is quite high.' Parents and students also confirmed the high levels of resources.

On the negative side, the most commonly reported challenge was the distance from technical assistance and repair agents. Breakdown of critical servers and associated networks was a major issue, compounded by the long wait for repairs to be completed and machines returned. One example spanned a twelve month period: 'wait for a technician to come out and fix it up and after 12 months of waiting, we're still waiting', while another commented on the lack of support for reconfiguring replacement parts after computer breakdowns.

A commonly cited problem was the slowness of Internet connections resulting in frustration and time wastage. One student associated the term 'Internet' with 'slowness.' One parent described the problems caused by many students logging on to share a fairly slim ISDN connection.

Another common issue was the perception that specialist teachers capable of teaching higher level ICT subjects were not as readily available in regional and remote areas. One parent from a small cane farming community explained that students were being given ICT-based work at secondary school, which was not as advanced as their primary school work. Parents expressed the view that teachers did not have access to adequate professional development.

Australian Capital Territory

Perceptions and expectations of all parents, teachers and students varied considerably, and this brought to the fore a number of competing discourses and views on the role of ICT, and to a widening gap in how different groups understand technology at home and in school. Three major issues emerged: the need for transformational and integrated usage of ICT across the curriculum; digital literacy skills for teachers; and the growing disparity between home and school usage of ICT, and lack of home-school links to build on existing ICT skills.

First, the models of ICT usage showed that technology was used for limited purposes and that it was not integrated across all subject areas. Students perceived computer usage as a stand alone activity that occupied a small portion of their weekly schedule, rather than a tool that was used across all subject areas. Teachers perceived that the impediments to ICT integration in pedagogy and in innovative applications across the curriculum was due to limited ICT infrastructure and technical support.

A second and related issue voiced as a common concern by parents and teachers, was the need for skills development in more advanced forms of ICT usage, innovative pedagogy and digital literacies. As one teacher said 'professional support [is needed] to give us a kick start where you actually see the ideas and how it would happen in your setting'. There was a high level of awareness among teachers of the need to have: access to ongoing professional (development) support in emerging technologies; access to enabling technologies; and opportunities to improve ICT skills and be conversant with innovative pedagogies. Parents were supportive of teachers who demonstrated high levels of ICT literacy and anxious about student being denied essential skills opportunities due to under-equipped schools.

The third issue was a clear and well-articulated gap between home and school usage of ICT. Home computers, with Internet access, were widespread but there was a lack of linkage with school based activity. While ICT was increasingly part of students' lives at home, for fun, entertainment, networking and research, limited school resourcing meant that activities with ICT were often constrained and less engaging for students. Students remarked that teachers used the computer to 'show us things' or 'make reports and check spelling' and less as a means of integrating online services into teaching practice, or of engaging students in collaborative research tasks requiring higher level cognitive demands.

South Australia

The findings need to be viewed in the context of a population highly centralised in Adelaide and with no country centres classified as 'regional'. In fact there are few centres of any significant size, i.e., greater than 10000. In many cases the students need to study by distance mode or to move to Adelaide to study specialist subjects, particularly in the senior years of school.

For most students ICT use was associated with working on the computer using software programs such as *Publisher*, *PowerPoint*, playing games and researching on the Internet. Many students said that they had access to the Internet at home, although teachers at one remote school indicated that Indigenous students had significantly less access to computers at home. ICT as a specific subject was mentioned at only one area school, as an option in Year 10.

Access to computers for students was considered by most of the students, teachers and parents as being satisfactory, although there were some comments from the Primary group that resources were a bit thin. One group mentioned issues with computer reliability and lack of local expertise to assist teachers to fix problems, 'there is no-one available in town.'

The core concern of teachers was lack of access to professional development. Given that most professional development outside of schools is held in Adelaide, the time and travel costs are large and often prohibitive. Another constraint on participation in professional development is the capacity of the school to find replacement staffing. In many areas of the state there are simply not people available

for casual relief teaching. In all of the schools, but in particular a number of the primary schools, teachers indicated that they felt that they are 'spread too thinly' and 'wearing so many hats' that their capacity and time to be involved in professional development and other projects was limited, even though they are aware of needs.

Issues Requiring Attention in Rural and Regional Schools

These insights into a selection of rural and regional schools in seven Australian states and territories identify key issues that stakeholders see as needing attention if the learning outcomes of students are to be improved. The six main issues recommended for attention are:

State of ICT Equipment in Schools

Lack of equipment in rural and regional areas was a problem in some states, although others reported a more favourable situation. Major concerns for most states were unreliable equipment and slow Internet access. Particularly frustrating was the unstable satellite-based Internet access in remote locations. A related problem is the lack of technical support, especially noticeable when critical equipment fails and there is a delay of a week, or more, for expertise to become available.

Comparability between Home and School ICT Experiences for Students

Some areas reported better ICT in homes and others in schools. Student and parent expectations, of up-to-date ICT at schools and innovative use of the ICT, are not always realised. Students need, in fact expect, a more seamless and consistent experience between home and school. For schools, ICT facilities need to be improved, and for homes, better access could be achieved with increased use of 'community' resources.

Pedagogical Approaches

Students studying online complained of a 'transmission of content' approach and wanted more 'connection' with others during learning. Also, more ICT-related opportunities are needed to allow students to work at their own pace. One state attributed lack of ICT integration to limited infrastructure and support, and another signalled the need for a more suitable ICT curriculum for indigenous students.

Figure 1: Focus Group Interview Protocols

Teacher Interviews

Strengths of rural/regional schools in helping students achieve their potential in science, ICT and mathematics (Examples of successful initiatives/programmes).

Obstacles to helping students achieve their potential in science, ICT and mathematics in rural/regional schools.

Views on attraction and retention of good science, ICT and mathematics teachers.

Parent Interviews

Strengths of rural/regional schools in helping students achieve their potential in science, ICT and mathematics (Examples of successful initiatives/programmes).

Obstacles to improving your child's outcomes in science, mathematics, and ICT education?

Community influences on your child's outcomes in science, mathematics, and ICT education?

Student Interviews

Reflections on ICT as a subject, if applicable (positive and negative).

Reflections on using computers in school (positive and negative).

Analysis of focus group data sought common themes raised by each group (parents, teachers, students) in response to the questions. Results from the National Survey and the focus groups will be detailed in a report to the Department of Education, Science and Training (DEST). The focus of this paper is to report on key issues that emerged in relation to ICT in the focus groups for seven of the states/territories: Tasmania, Western Australia, New South Wales, Northern Territory, Queensland, Australian Capital Territory and South Australia. For more detailed case study reports of the focus groups in each state and territory see Lyons (2006).

Tasmania

The Tasmanian focus groups were conducted in four diverse schools. Two were government district high schools (K-12), one in arguably the most remote area of the state and the other rather less remote but with its feeder area including parts of Tasmania's central highlands. The third government school was one of very few 'stand alone' primary schools that exist relatively distant from a major centre. The fourth school was a Catholic secondary school in a regional city. In two schools the teachers considered ICT to be a strength, and said they had easy access to computers. For various reasons in all the remaining interviews, ICT was highlighted as a weakness or not mentioned.

In-school computers were judged by parents and students to be rarely available, inadequate or out of operation. Students were particularly worried by the poor infrastructure, citing low speed of operation, old operating systems and the frustrations of working through an Internet filter. At one school, students said: 'They have got *Google* images blocked so if we need a picture for a *PowerPoint* presentation we are doing for assembly or something, we can't...'. Almost all students had access to computers at home. At home there were few time restrictions or Internet blockages. Parents at one school were concerned about the inequities contingent on a few students not having this facility out of school.

None of the students were taking ICT as a separate subject; rather its use was integrated into other learning opportunities, predominantly for Internet research and publishing. A majority of in-school ICT use revolved around Internet research and word processing, with little or no opportunity to learn about the technology itself. Some on-line courses were being studied, especially at the more remote schools (more than three hours drive from a city). One particular student spoke of her difficulty studying an on-line course entirely independently. She wanted the support of peers or a teacher to complement the on-line materials, improve concentration and speed up the learning process: a simple query could take days to receive an e-mail reply, delaying her progress and demotivating her learning.

Western Australia

The Western Australian focus group data from three of the four schools showed that schools in remote areas are using ICT to motivate indigenous students to come to school and be involved more in the school community. Very few indigenous students have computers at home so the school is often the only place where they can be exposed to ICT, bridging the 'digital gap' between home and school ICT usage. ICT was being used to link these remote communities to the outside world and to bring the outside world into the community. Teachers working with indigenous students believed that the current Curriculum Framework outcomes do not cater for indigenous students especially when it comes to developing ICT skills. Students in remote communities do not have the same environmental factors or experiences or resources as city kids. 'Many do not even see street signs, lights, advertising', one teacher was quoted saying at a remote community school 200 kilometres from the nearest town

Leadership

In one state, stakeholders identified a link between strengths in ICT-based pedagogies and teachers showing leadership in ICT skills, knowledge and enthusiasm. The problems for these schools, however, was attracting and keeping those innovative ICT teachers.

Professional Development

Parents expect teachers to have a high level of ICT literacy and to receive up-to-date training. Teachers stated that they wanted to improve their expertise in digital literacies and also in ICT-based pedagogies, but believed that training is most effective when it is experiential and applied, with opportunities for direct transfer to the classroom context. Greater importance being placed on ICT in schools was linked to key people with leadership skills in the school having relevant 'skill, knowledge and enthusiasm'. This signals the need for a more systematic approach to professional development in ICT skills and pedagogy.

Availability of Skilled ICT Teachers

One state identified shortage of skilled ICT teachers as a key issue. This has impacted negatively on students when learning experiences in secondary schools that are less advanced than those taught in primary schools.

Overall Conclusions

These findings indicate the extent of ICT needs in rural and regional schools. These needs are more diverse than those reported in the themes emerging from the National Inquiry into Rural and Regional Education (Commonwealth of Australia, 2000, pp. 36-40) that only focused on 'access to appropriate technology infrastructure and maintenance support'. Although the previously identified needs still exist, there are now added concerns centred on the dearth of leadership skills, the need for ongoing and systematic professional development, and the development of improved pedagogical approaches. Another significant issue to emerge was the importance for students of having more continuity and linkage between their ICT experiences at home and school. A recent investigation of how ICT impacts on

... that the way Australian school students

communicate, socialize and learn is changing. Schools need to keep pace with these changing social and community practices.

These key issues have been highlighted by stakeholders from a representative selection of schools and are typical of the immediate and pressing problems that rural and regional schools in Australia are experiencing. More action, improved policy and initiative are needed from the relevant governments and jurisdictions to address these issues. There has been some recognition of the need for action, with teacher development, and the changing nature of learning, being set as national research priority areas (MCEETYA, 2003, p. 5). Forthcoming findings of the SiMERR National Survey will provide an opportunity to source detailed data to confirm the issues emerging from the focus groups as reported here. The challenge for all stakeholders is to continue to support rural and regional schools in finding workable and sustainable solutions.

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