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STUDENTS’ AND TEACHERS’ USE OF ICT IN PRIMARY MATHEMATICS

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As part of a large research study, the authors explored the use of ICT in rural and urban Victorian primary schools. Some forty-five teachers and nearly seven hundred students were surveyed and a small number of them were interviewed. An important feature of this study was the investigation of students’ use of ICT at home as well as at school for mathematics. This paper reports the findings of some aspects of the study, together with implications for teaching and learning.

Introduction

The imminent introduction of the Ultranet, “a state-of-the-art Web 2.0 system that reflects the modern classroom by breaking down the traditional walls” (Media Release, 2010), to Victorian schools prompted our 2009 small-scale base-line study investigating the ways in which primary students and their teachers were already using Information and Communication Technology (ICT) in the learning and teaching of mathematics. A significant feature of this study was that students were asked about their use of ICT both at home and at school.

This paper reports on some of the results of this study and its implications for teaching.

Background

Research has shown that ICT has been used with varying success to scaffold learning in schools (see, for example, Muspratt & Freebody, 2007; Selwyn, Potter, & Cranmer, 2009; Smeets, 2005). Selwyn et al’s (2009) study on children’s engagement with ICT inside and outside of the school context showed that children’s engagement with ICT was often perfunctory and unspectacular, especially within the school setting. This prompted them
to suggest that schools develop meaningful dialogue with students about future forms of educational ICT use. On the other hand, Becka (2009) found a significant positive association between students' home use of ICT, for educational purposes, and improved attainment in national tests for mathematics and English.

Thus, in order to examine these different findings in a Victorian context, the focus of our 2009 study was primary school teachers' and students' use of ICT for mathematics learning and teaching, at home and at school.

The project

A total of 45 primary school teachers (34 urban and 11 rural) and 676 Year 3 to 6 students (488 urban and 188 rural) from six urban schools and seven regional schools in two school networks participated in this project.

Participation in the project involved teachers completing an on-line survey, with a small number of teachers also participating in a half-hour interview in which they were asked to elaborate on their survey responses. These interviews were audio-taped and transcribed.

Students were asked to complete a 20-minute written survey in their classroom, with questions read aloud to them. The survey questions included:

- How often did you use [different types of] ICT tools for mathematics, at school and at home, during the preceding week? (Types included computers, calculators, and specific software such as Excel.)
- What do you think about mathematics, and the use of ICT to learn mathematics?

A small number of selected students were invited to take part in half-hour interviews, to elaborate on their written responses. As with the teacher interviews, these interviews were audio-taped and transcribed.

Findings

This paper compares students' use of computers and the Internet, at home and at school, in urban and rural contexts. Other aspects of the project findings are reported elsewhere.

Computer and Internet use at home and at school

Figure 1 shows a comparison of the responses relating to computer use for mathematics at home and at school during the week preceding the survey.

While it is not surprising that a greater percentage of students used the computer at school than at home, it is revealing that quite a large number of students (50%) say they used computer software for mathematics at least once at home in the preceding week.
Among those who indicated they had used computer software at school and at home, 79% said they used games at school to learn mathematics, while a slightly larger number (82%) used games at home (see Figure 2). Mathletics, a web-based mathematics educational site, had been used at home by about 30% of students. Although this proportion may not seem large, it is interesting to note the number of students who were engaged in doing mathematics at home on-line.

A smaller percentage (19%) of students also used tutor programs at home for mathematics. One student said "Dad bought a $6 000 tutoring program ... It is called the Mathmagic Computer Tutor. It helps you with algebra, percentages. Then we have English, it helps you with spelling, vocabulary". Other software mentioned were SmartKiddies and Maths Circus.
Of, perhaps, more interest is the proportion of both Mathletics and tutoring programs being bought and used by schools (31% and 19% respectively). It raises the question, for teachers, of how consistent children’s mathematical advice really is, and who is the main source of their learning: the home tutor, or the classroom teacher?

Generic software was also used for mathematics at school and at home (see Figure 3), the most common being Word (40%) and Excel (32%). A Year 3/4 boy said “Last term we used Excel to find out what country most people originated from in our grade ... We printed out all sheets. We had to write down what country most people came from in our books ... We made the graph on Excel ... Like, what percent of people.” A Year 6 girl said “We sometimes for maths, use Word where she [the teacher] makes objects which have fractions and decimals”.

At home, the frequency of use of these software packages was generally slightly lower than that at school (Word 37%, Excel 27%). A small percentage used Microworlds and other generic software in mathematics such as PowerPoint. One Year 5 boy said “We use Word at home for writing stories and PowerPoint at home for making slide-shows about myself telling everything about me, what I like doing ... [for mathematics]. In Word, I make a chart as well as Excel”.

Most students used the Internet for mathematics at least once in the preceding week, 50% using it at home and 70% at school. These uses included searching for information, using electronic mail (e-mail), using mathematics sites (e.g. A Maths Dictionary for Kids, Coolmaths for Kids) and blogs. Other uses of the Internet included playing mathematics games (e.g. fraction games). One Year 3/4 boy said “Maths 300 that we have on school...
computer. It has fun maths games. There is one, *Funbrains* ... There are little maths questions: division, plus, take away ... [I use it] once a week at home .... At school, we have computer lab on Wednesday. We do it for half hour every week.

![Internet use at home and at school](image)

*Figure 4. Internet use for mathematics at home and at school*

More students used the Internet for searching, e-mail and blogs at home than at school (see Figure 4). This may not be surprising given that students have more time at home to do searches, send e-mails and write blogs. It is also not surprising that more students used mathematics sites at school than at home, but what was surprising was that 76% of students used mathematics sites at home and that they used the Internet in such a variety of ways at home.

One Year 5/6 student said he went to the Internet "a couple of times in a week ... to play games ... Sometimes I get a chart from the Internet, like Roman Numerals that will help me in homework in future like in High School". Although the numbers are small, students also used blogs. One Year 6 girl said "Now we do [use blogs]. We have just started using *Glogster* in the last couple of days".

**Computer and Internet use in rural and urban regions**

Urban students' use of computer software did not differ significantly from those of students in rural schools with 66% of urban students saying they used computer software for mathematics at least once in the preceding week compared to 64% of rural students (see Figure 5).
Figure 5. Computer software use for mathematics at school by region

The use of computer software at home differed only slightly between urban and rural students, with 47% of urban students saying they used computer software for mathematics at least once during the preceding week, compared to 55% of rural students. This difference, however, is not significant, particularly given that a higher percentage of urban students never used computer software for mathematics at home.

Figure 6. Computer software use at home by region

However, the situation was different with Internet use. Chi square test showed that there was a significant difference in Internet use by students in rural and urban schools ($\chi^2 = 20.462$, df = 2, p=.00) – see Figures 7 and 8. A comparison of responses from students in urban and rural schools shows that 77% of students in rural schools used the Internet for mathematics at school at least once during the preceding week, compared with only 68% of students in urban schools.
On the other hand Internet use at home was not significantly different for students in the two locations, with 44% of rural students saying they used the Internet at home at least once compared with 53% of urban students. This seems to suggest that where there is access to the Internet in rural locations, students are in no way less engaged with the Internet at home than their urban counterparts. What was surprising was that the use of the Internet at school was significantly higher for rural students compared to urban students. This could, perhaps, indicate that rural students and their teachers are more inclined to use the Internet in the teaching and learning of mathematics given easiness of access to information via the Internet.

Conclusion

Similar to Selwyn et al.'s (2009) study, we did not find computer and Internet use in school settings to be spectacular, but were impressed by the fact that half of the students surveyed use computer software and the Internet at home for mathematics. This has implications for teachers. Where students have access to computers and the Internet, they are often motivated enough to use tutoring programs, software, games and the Internet for mathematics at home. From the interviews, it seemed that family affluence and parental guidance plays a major role in promoting the use of ICT at home. Teachers could work in tandem with parents to promote the use of ICT for mathematics at home, given that computer games seem to be a major draw-card for students. SmartKiddies seems to be a popular website among the students surveyed, but there was no mention of the The Learning Federation by students, although most teachers in Victoria have access to this website.
It will be interesting, too, to follow the development of ICT, as Professional Learning for teachers becomes more available, and the amount of technology in the classroom increases. Or, should we wait for some of the current generation of primary school children to become primary teachers?

References


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