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Girls and ICT Survey: initial findings

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The ICT profession in most Western countries is predominantly male (Millar & Jagger 2001). The *Overview of the Australian ICT Industry* reported that women comprised only 15% of ICT specialists within Australia in 2005 (DCITA 2005). Senator Coonan, Australia's Minister for Communications, Information Technology and the Arts, recently stated that women currently comprise 'only about one-fifth of the ICT workforce (Coonan 2005).

Advanced computing subjects are recognised as leading into ICT career pathways (Anderson, Klein & Lankshear 2005), yet the number of girls enrolling in these subjects is falling (Anderson et al. 2005; Timms, Courtney & Anderson 2006).

There is widespread concern at this situation. Within the job market the demand for high skill levels continues to increase (Queensland Government 2003), so the relative absence of women from the industry has implications for their economic security. There is also concern that the dialogue among computer scientists should represent the range of views of users of modern information technology, including those of women (Margolis & Fisher 2003).

An Australian Research Council Linkage Grant Project is currently examining factors that deter women from ICT-related occupations and study. The project is investigating attitudes toward ICT held by girls in senior secondary school in Queensland through a study conducted by a research team from James Cook University (JCU). The project will also include a study of women in industry. Partners involved in this research include Education Queensland (EQ) and Technology One. The project is distinctive in that it involves industry partners in the data analysis. It is due to be completed in December 2006.

The school-based component of the project is referred to as the Girls and Information Communication Technology (ICT) Survey. Girls in Years 11 and 12 from 26 Queensland secondary schools answered a survey, and their perspectives are now being further explored through focus groups. The current article describes some initial findings from the survey phase of the research.

The survey

The survey asked participants to give their perceptions of the two advanced computing subjects available in Queensland schools, Information Processing Technology (IPT) and Information Technology Systems (ITS).

Two populations of female students approximating to 'typicality' by socio-economic status, location and school type, government school (GS) and non-government school (NGS), were identified for survey purposes. One group comprised students taking Board Level ICT subjects (IPT or ITS), these were the 'Takers'. The second group comprised 'Non Takers' of IPT or ITS. A total of 131 respondents (9%) were Takers and 1,322 respondents (91%) were Non Takers.

Subject choice

The pen and paper survey, consisting of a mixture of Yes/No, Likert scaled questions and open questions, was administered between August and November 2005. Drawing on information gained in the initial pilot study (Anderson et al. 2005), questions for Takers were framed positively and questions for Non Takers were framed negatively. However, for the purposes of statistical comparison between the two groups, the responses of Non Takers were reversed on those questions that demonstrated polarity with those of the Takers. The main findings of statistical comparisons between Takers and Non Takers are summarised in Table 1.

Table 1: Mann-Whitney U comparisons of relationships between Takers and Non Takers and study variables

	N Takers	*N Non Takers*	*Mean*	*SD*	*U value*	*Significance*
The subjects are interesting.	130	1314	2.72	1.29	37402.00	.000***
I am very interested in computers.	130	1314	2.93	1.32	51609.00	.000***
I have a lot of experience using computers.	129	1315	3.52	1.16	79032.00	.186 (ns)
I thought it would help my OP score.	130	1308	3.53	1.10	78626.50	.142 (ns)
The subject will be helpful to me in my chosen career path after school.	130	1314	2.63	1.28	39046.50	.000***
It suited my timetable.	130	1306	3.46	1.18	72152.00	.003**

Note. Discrepancies in participant numbers reflect missing responses for these items.
*** $p < .001$

** $p < .01$

The significant findings are further plotted in Figure 1, where it can be seen that Takers agreed with (and Non Takers tended to disagree with) 'The subjects are interesting', 'I am very interested in computers' and 'The subject will be helpful to me in my chosen career path'. Non Takers tended to agree with 'It suited my timetable', whereas Takers tended to disagree with this statement. This would indicate that timetable anomalies were not responsible for these girls' decision not to take ICT classes.

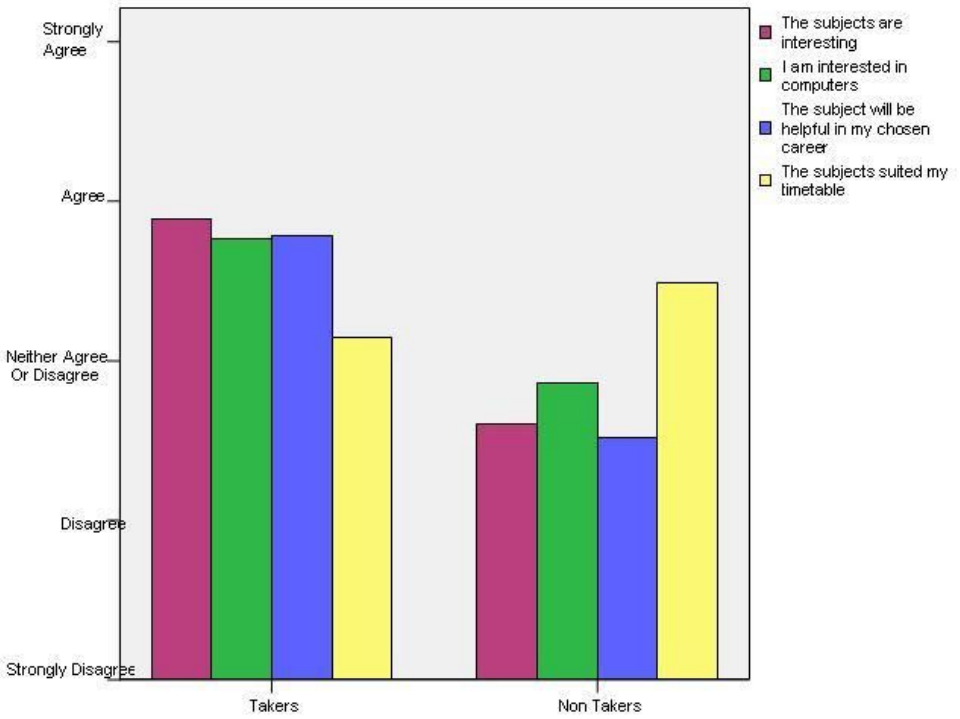

Figure 1: Significant findings of comparisons between Takers and Non Takers

In the interest of exploring Non Takers' perceptions further, Figure 2 graphs the means for Non Takers (n=1322) on a number of questions as they were responded to (in negative format). It demonstrates that of all the variables, only 'The subject is boring', 'I am not interested in computers' and 'The subjects would be helpful in my chosen career' appeared above the 'Neither Agree or Disagree' line, indicating a trend among Non Takers of IPT/ITS to agree with these three statements only. It is noted that some of the usual reasons advanced for reduced numbers of girls taking these subjects, such as 'There are too many boys in these subjects' (Gurer & Camp 2002) and 'I don't have much experience in using computers' (Beckwith et al. 2005) were not supported in this study.

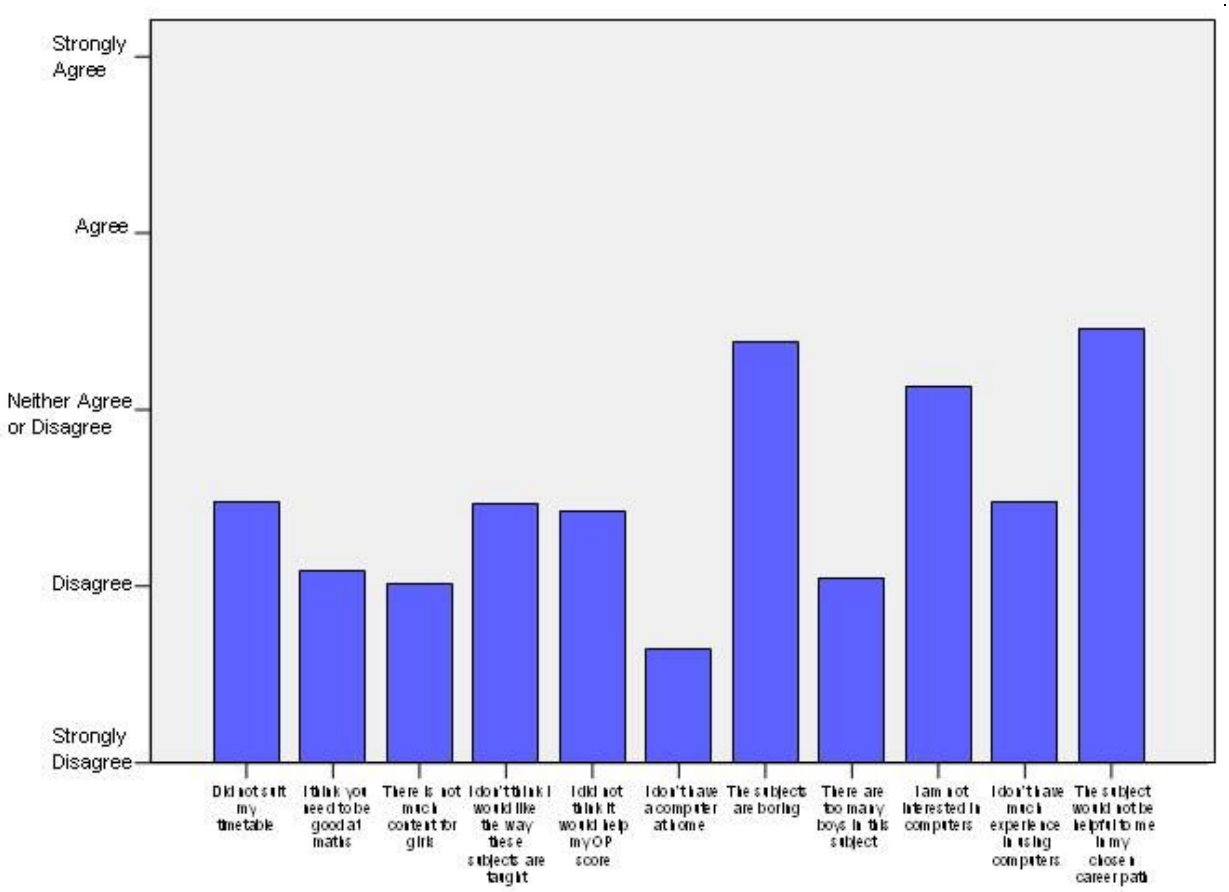

Figure 2: Non Takers' responses to important survey questions

Special ICT events and plans to undertake future ICT study

Attention then turned to examining reasons behind participant decisions to undertake future studies in ICT and whether special ICT events conducted by universities, government and/or industry had any bearing on student choices. Additional analyses examined a number of relationships to the future plans of 84 respondents to undertake ICT studies at university. Of these participants, 45 were Takers and 39 were Non Takers. The relationship of Takers/Non Takers to future ICT study plans demonstrated significance in a Pearson's Chi Square analysis (c^2 (1) = 274.37, $p < 0.001$), indicating that Takers were more likely to undertake ICT in future study than were Non Takers. In addition, statistical analysis using Fishers' exact test ($p < .001$) confirmed that special ICT events had a significant relationship with student plans to study ICT in the future; the strength of this relationship is further illustrated in Figure 3.

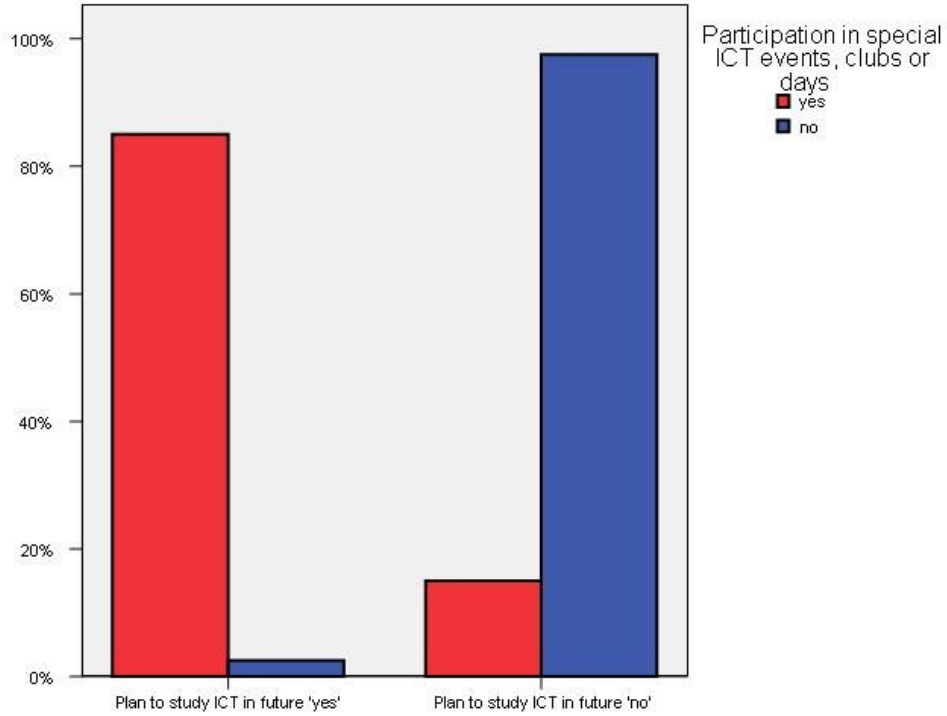

Figure 3: Relationship between special ICT events and plans to study ICT in the future

Metropolitan/provincial city – rural/remote differences

Further comparisons were drawn between Takers and Non Takers who fell into two groups derived from the EQ 'zone system'. The system uses four zones (Metropolitan, Provincial City, Rural and Remote) to describe schools within its jurisdiction. These categories have been adapted from the 'Accessibility/Remoteness index of Australia (ARIA) Plus Scores', which are widely used in Australia to determine economic advantage (MCEETYA 2004). For purposes of parsimony, 'Metropolitan' and 'Provincial City' were collapsed into one group and 'Rural' and 'Remote' were collapsed into another group. Table 2 summarises participants' distribution by geographic area.

Table 2: Participant distribution by geographic area

	Metropolitan or Provincial City	*Rural or Remote*	*Total*
Takers	95	36	131
Non Takers	1074	248	1322
	1169	284	1453

When Metropolitan or Provincial City Takers' responses were compared to those of Rural and Remote Takers, the only significant difference between the two groups noted was on the question 'The subjects are interesting' (χ^2 (1) = 4.73, p < .05). Rural or Remote Takers were more likely to disagree with this statement than were Metropolitan or Provincial City Takers. On the other hand, when Metropolitan or Provincial City Non Takers' responses were compared to those of their Rural and Remote counterparts, the only significant difference between the two groups noted was on the question 'I don't have a computer at home' (χ^2 (1) = 12.52, p < .001). Rural and Remote Non Takers tended to agree with this statement more than did Non Takers in more urban environments.

This article reports on research that has confirmed the complexity of the problem of declining numbers of girls studying ICT subjects in secondary schools. However, the study results have not been able to provide the research team with more than a glimpse of the processes taking place in girls' minds. It is anticipated that the focus groups, which is the research phase currently underway, will shed light on the polarised views of the subjects held by the Takers and Non Takers.

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Subject Heading

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