The perceptions of school leavers towards information technology skills

This study sought to examine the computer exposure received by school leavers in Western Australian schools and to investigate the perceptions and judgements of these students in relation to the need for, and the importance of, information technology (IT) skills. Questionnaires were administered to a representative sample of 454 students in their final year of schooling, 119 teachers and 48 employers. The outcomes revealed that a large number of school leavers judged themselves to have low levels of IT skills and experience. Nearly 60% of students in the sample, claimed to have had no access to, or usage with, computers in the school setting. In relation to the need for IT skills, the study found the students perceptions to be low expectations and substantially different to their teachers and prospective employers. Students perceptions of the need for IT skills in employment and their influence on aiding job prospects, were significantly less than the perceptions of the employers. The study highlights the needs for schools to consider the provision of IT skills for students as an aim of whole school policy and to attach some importance to establishing frameworks and programs that can support this aim.

INTRODUCTION

The need for schools to provide all students with appropriate levels of skills in information technology (IT), has been the subject of debate for many years and there appears to be general concurrence today, that the provision of IT skills is a desirable if not essential outcome of contemporary schooling. Although there is concurrence that IT skills are an important outcome from schooling, there remains a high degree of uncertainty as to precisely what forms these skills should take (McCormick 1992).

There has been considerable expenditure of resources and efforts into programs within schools to promote the development of students' IT skills. Few schools today would not consider themselves well equipped to provide IT programs. One question that has not been well answered in the past relates to the overall success of school IT programs in providing students with the appropriate skills and experience. While vast sums of money and effort have been expended in this direction, the success and effectiveness of the programs are rarely assessed. The purpose of this study was to gain some measure of the outcomes of IT programs in local secondary schools. It did this by determining school leavers' perceptions of the quality, quantity and relevance of their school-based IT experiences. For comparison, perceptions of similar attributes were obtained from senior teaching staff in schools and a cross-section of employers.

BACKGROUND

The use of information technologies has emerged as a significant component of many school curricula and the importance of this has been reflected in the many statements on intended outcomes of schooling created in recent years. In 1984 the Commonwealth Schools Commission produced aims and objectives for a National Computer Education Program. A number of key areas of technological application in schools were defined and specific IT outcomes were stated (Commonwealth Schools Commission 1984). Information technologies play a significant role in the curriculum of all schools today and this role is set to increase as the National Curriculum statements emerge (McCormick 1992). The importance of IT in the school curriculum is reflected in the statement of the aims of schooling in Australia, of which one express aim is stated as 'the provision of skills in information technology (IT) and computing' (Australian Education Council 1989).
More recently, The Finn Report (Report of The Australian Education Council Review Committee 1991) identified a number of 'key areas of competence' that were seen as essential outcomes of post-compulsory education. Among the areas were skills and knowledge of computers and IT. The Finn Report made recommendations to The Australian Education Council among which was that, the key areas of competence be addressed through the integration of the necessary content and course work into the existing school curriculum. The recommendations of the Finn Report follow a growing trend in the provision of IT skills in schools.

Whether it is the place of schools to expose students to computers and IT for vocational purposes or simply for personal needs remains, a much argued point. It is clear from the thrust of the Finn Report that many in industry and government perceive the development of IT skills in schools as an economic and vocational imperative. This view is not shared by all and we are frequently reminded that the role of education is:

not so much to closely align to the ephemeral demands of industry but to equip students with the more fundamental, expansive skills of being able to critique and reflect on the changes taking place in their society.

(Watkins 1986, p. 85)

The growing dependence of our society on Information Technologies, however, tends to make this debate quite superfluous. The value to be gained from an informed citizenry capable of applying information technologies to meet personal needs is difficult to dispute. It tends to be on these grounds that the new information technologies have established themselves as an important components in school curricula.

Programs

A walk through most schools in Western Australia would appear at first glance to provide evidence of flourishing IT programs. Students are exposed to computers throughout their primary school years. A comprehensive policy planned and implemented at the state level by the Western Australian Education Department has seen computer education take a high priority in many of the primary schools. Few students leave primary school without any computing experience and for the majority, their computing experience has been quite substantial. That experience has typically been derived from exposure to computers through applied use of the technology in instructional settings and programs.

These students then enter secondary schools are in most cases are required to study a computing course, or courses, at the entrance level. These formal courses of study are conducted in a laboratory setting and aim to provide instruction in computer hardware, computer software and computer applications. Although such courses are designed as introductory programs, for many students in WA schools, they can represent the first and last use of computers in the school setting.

The emphasis within local secondary schools on formal courses of instruction has created thriving computing departments. In the main, most computing departments can legitimately claim to offer appropriate and effective programs. The problem is, that the scope of the programs can see the bulk of computer education in schools being given to a select few. This leaves the way open for other students to miss out on what many see as an essential component of schooling.

Inadequacies of existing programs

Despite the agreed importance and need, there is growing evidence that many students leave schools with low IT skills (e.g. Summer 1988; Kay 1989; Anderson 1991). There are broad variations to be found in the nature and organisation of school IT programs. A means to compare the nature of the programs in local schools was developed by the researcher and applied in a study among three local schools (Oliver, in press). In all instances, the administration had sound reasons and rationales to support the style of program in operation. The study found significant differences in learning outcomes among students from the schools and identified significant inequities in access to technology. From this study and others (e.g. Baack, Brown & Brown 1991; Weering & Plomp 1991), it has become apparent that the development of IT skills as an outcome of schooling varies in priority and attainment from one school to the next.

The potential for many students in local secondary schools, to elude or be eluded by computing experience is high. Such students are not likely to be identified within the school because there is frequently no means by which they could be identified. The students are often unaware that they are missing an important component of schooling and the assessment and evaluation procedures within schools are often not sensitive to such occurrences. Schools are not held accountable at this stage for the computer literacy levels of their school leavers, but this may not always be the case. The development of the National Curriculum and the emergence of established sets of subject performance indicators will likely lead to schools having to take a more proactive stance in this field.

Assessing outcomes

Assessment of the success of schools in the provision of IT skills among students is difficult to achieve. In the first instance, there is little agreement among educators as to whether it is possible to specify the specific skills and knowledge that constitute the state of 'computer literacy'. While some may argue that it is possible to be specific, the uncertainty surrounding the identification process makes the validity of any measures that may result. In instances where instruments have been created as measures of computer literacy and IT skills, they have really only served a single rather than general purpose. As with most outcomes of schooling, IT outcomes include components from the cognitive, affective and psychomotor learning domains. Prescriptions of learning states involving all these elements have been attempted. The results describe many different perceptions of instructional program and learning outcome (e.g. Rowe 1993).

One means to assess the outcomes from school programs in providing IT skills to students is through a determination of the perceptions and judgements of students (e.g. Krendl & Brohier 1992). If we consider students' to be the principal stakeholders in school IT programs, their views and judgements will provide a measure of perceived outcomes. Comparisons of the views of students with judgements of other stakeholders such as teachers and employers enables a form of scale to be applied to the student's responses and facilitates discussion on the general outcomes of school IT programs.

Research questions

The purpose of this study was to investigate outcomes of school-based IT programs in the local context. The study aimed to gain a measure of the levels of IT skills and associated perceptions of school leavers.
concerning the relevance and importance of these skills. To do this, the study sought responses to the following research questions:

- What levels of IT usage are evident among students in their final year of schooling?
- How strongly do students perceive the need for IT skills as an outcome of schooling?
- How successful do students judge to be, the IT programs in local schools?

METHODOLOGY

Data was gathered in this study through the administration of a questionnaire to a sample of students preparing to leave school, senior teachers and employers of school leavers. The nature of the questionnaire and the subjects to which it was applied, are described below.

Subjects

- **Students:** The students that participated in the study were in year 12, the final year of schooling in Western Australia. A stratified sampling method was used to gather data from a representative sample of schools. The sample included metropolitan, country government, private schools, single sex and co-educational schools. Questionnaires were sent to schools with the request that they be administered to students in established groups within year 12 such as tutor groups, form groups and home groups. Schools were requested not to administer the instrument to subject classes to remove the possibility of sampling bias towards atypical groups within any school. Responses were obtained from 454 students from twenty-seven secondary schools.

- **Teachers:** Questionnaires were administered to a small number of teachers and senior staff at each of the 27 schools. The sample of 119 teachers included senior and junior staff with the majority of responses coming from principals, deputy principals and subject coordinators. The questionnaire was administered to senior staff in order that the responses be from those teachers who participate in, and influence, the decision making processes within their schools.

- **Employers:** The employers chosen for this study were those who employ students directly from school. These employers were seen to be important stakeholders and important players in issues relating to the IT skills of school leavers. To obtain a sample for the study, the employment section of a weekend paper was used to collect the names of employers whose job descriptions required no further training beyond school. The employers were from such areas as local council, service industries, retail outlets, government departments, small business and positions within a number of professions. Questionnaires were sent to 70 employers and responses were gained from 48.

The questionnaire

The questionnaire was comprised of two parts. An initial section gathered information concerning each student:

- sex
- age
- weekly use of school computer
- weekly use of home computer
- perceived levels of computer experience, expertise, confidence and knowledge.

The second stage of the questionnaire contained items that sought responses to statements concerning perceptions of the need for IT programs in schools. For each statement, the respondents selected from among the choices that indicated agreement, disagreement or a neutral feeling towards the statement. There were 10 statements in all.

Figure 1 shows the statements from the student questionnaire. The questionnaire for the teachers and employers was semantically similar. The statements within the questionnaire were modified several times after reviews by peers and colleagues in order to ensure that each was clear in its meaning, and that all respondents would derive similar meaning and intent from each of the items.

The term *computer literacy* was used in the questionnaire as a generic term describing IT skills and IT knowledge. This term is quite broad in its meaning and is generally understood as describing competence and confidence in computer use. A brief description of this nature was given on the questionnaire to alert subjects to the intended meaning of the term in the context of this study. It was intended that the administration of the instrument among the three groups would provide data that reflected actual outcomes as judged by the interested parties and would provide a means to compare the perceptions among stakeholders.

The data was analysed by comparing the resulting frequencies of responses. The responses of students were compared to those of teachers and employers to establish the instances where differences existed in the areas under investigation.

RESULTS

Table 1 shows the average number of hours per week that students judged to have made use of computers in schools in the current year. Nearly 60% of all students in the sample claimed not to have used a computer at school at any stage in the past year. When the computing students are removed from the sample, the proportion of students

<table>
<thead>
<tr>
<th>Statement</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>It is the responsibility of the education system to ensure that students are computer literate when they leave school.</td>
</tr>
<tr>
<td>2</td>
<td>Schools should place a high priority on ensuring that students are computer literate when they leave school.</td>
</tr>
<tr>
<td>3</td>
<td>Schools should be accountable for making school leavers computer literate.</td>
</tr>
<tr>
<td>4</td>
<td>I am happy with amount of time that I have had with computers while at school.</td>
</tr>
<tr>
<td>5</td>
<td>If I need to use a computer after I have left school, I will have the knowledge and skills to do so.</td>
</tr>
<tr>
<td>6</td>
<td>After I have left school, there will be many occasions when I will need to use computers</td>
</tr>
<tr>
<td>7</td>
<td>I am likely to need to use computers at some stage when I get a job.</td>
</tr>
<tr>
<td>8</td>
<td>Employers should be able to expect that students are computer literate when they leave school.</td>
</tr>
<tr>
<td>9</td>
<td>Knowing how to use computers will help me to get a job when I leave school.</td>
</tr>
<tr>
<td>10</td>
<td>It is the responsibility of employers to provide computer training for their employees.</td>
</tr>
</tbody>
</table>

**Figure 1 Statements from the questionnaire**
not using computers at all is made even larger. In fact, the results show that among the students outside computing subjects, only 10% have an average weekly use of computers in school that exceeds one hour.

This information clearly shows that despite large amounts of computer technology, students within many of the local schools do not receive access to school computers in their final year of schooling. The results strongly suggest that computers are not being used by teachers as instructional tools in the teaching process, nor are they being used by students as productivity tools. This low level of application of computer technology within schools was surprising and unexpected.

The numbers of students with access to and using home computers was considerably higher than the numbers using computers in schools. In excess of 35% of the students claimed to have a weekly average use of a home computer that exceeds one hour (table 2). There was a large portion of the sample who claimed to have little or no access to home computers. It is important to note that when students refer to home computers, as well as personal computers, their references include specific purpose games computers. For many students, home use of computers is simply use of these games machines. The extent to which this usage is considered useful in the context of developing IT skills, is questionable.

When students were asked to state the principal use of the home computer and the school computer, personal productivity was given as the major use in both cases. Significant in both home and school use is the use of the computer for leisure purposes. Over one-quarter of the home users claimed leisure to be the major use of their home computer (table 3).

To provide more information on the background of the students in the sample, each was asked to judge aspects of their personal development in this area. Table 4 shows the responses of students to statements that had them judge their levels of IT usage, skills, knowledge and confidence. In choosing from the categories of low, medium and high, students were influenced by their own perceptions of usage and achievement based on past and present computing experiences and activities. It is not possible to make definitive statements based on data of this nature. What is possible though, is to consider the reasons that may have inclined almost half of the sample to judge their achievements and experiences in these areas to be low. Students' selections among the different response categories in response to these questions suggest their level of satisfaction with their achievements and experiences. With a distribution heavily slanted towards the lower levels of satisfaction, the results demonstrate some problems in the expectations and outcomes from this group of stakeholders.

**Place of IT in Schools**

There were three items in the questionnaire that sought to judge the perceptions of the stakeholders in terms of the responsibility of schools and the system, to provide students with IT skills. If schools were promoting the development of IT skills as an important outcome and actively pursuing this goal, it could be expected that students would respond positively to all three questions. Table 5 shows the responses of the students. The responses of the teachers are also shown in order that comparisons might be drawn.

Table 5 shows that the student population was quite mixed in its perceptions about the responsibility

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Low (%)</th>
<th>Medium (%)</th>
<th>High (%)</th>
</tr>
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<tbody>
<tr>
<td>Level of computer experience</td>
<td>45</td>
<td>40</td>
<td>15</td>
</tr>
<tr>
<td>Level of expertise with computers</td>
<td>59</td>
<td>32</td>
<td>9</td>
</tr>
<tr>
<td>Level of confidence with computers</td>
<td>36</td>
<td>42</td>
<td>22</td>
</tr>
<tr>
<td>Level of knowledge of computers</td>
<td>53</td>
<td>37</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 4: Student perceptions of personal IT skills
and importance of schools in providing IT skills. While an agreement rate of 70% to statements 1 and 2 might seem quite high, there are large numbers of students who do not consider that schools have a responsibility in this area. Responses of this nature are likely drawn from personal experience. The students’ responses reflect their experiences within schools and suggest a low priority being given to IT in a number of school programs. The teachers were considerably more focused and positive than students in their views on this matter with 90% being in agreement with the statement.

Statement 3, in seeking views on accountability returned wide variations in responses across both groups. It could be judged that accountability is a complex issue that is likely be interpreted and considered quite differently by students and teachers.

### IT Outcomes

Three items from the questionnaire sought to assess perceptions of the level of satisfaction with access to school computers and judgements of the skills developed and the need to use these skills out of school. Table 6 shows the results from these statement. Statement 4 saw only 42% of the students judging themselves to be satisfied with the access that they received to school computers. This is an understandable reaction given the low levels of computer usage that these upper school students seem to have received. It is interesting to note that 56% of the teachers judged students from their schools to receive adequate computer access. There was wide variance in the judgements of teachers and students about the access to IT provided by school.

Statement 5 saw 36% of students claiming confidence that their IT skills would extended beyond the school setting. When students respond to questions about ‘computer use’, they tend to consider a system comprising a personal computer and applications package of the form that might be found in a school laboratory. Given the low levels of school access, students’ low judgments of their ability to use such computers are probably quite accurate. The teachers were considerably more optimistic of the students capacities to use computers beyond school. More teachers than students agreed with the statement and fewer teachers than students disagreed with it. There was still a considerable proportion of teachers who felt unable to comment on this question, suggesting a high level of uncertainty among teachers concerning the outcomes from the schools’ IT programs.

Fifty-eight per cent of the students judged that they would need to make frequent use of computers once they had left school (statement 6). One may have expected more students to have judged this to be true. Once again, it is students’ images of the form that computers take, that influence their
response to such a statement. It would be quite accurate for many students to judge that they may not make frequent use of a word processor but there are many other instances of potential future computer use of which the students were perhaps not thoughtful. More teachers than students judged the need for frequent computer use beyond school. It is interesting to note that 30% of the teachers did not judge that students would make frequent use of computers out of school. It is possible that some teachers may have considered the likelihood of usage being frequent.

Computers in the workplace is often difficult to judge. Based on the results from this sample, it would appear that computer use is now very common. Among the 48 employers in the sample for this study, 43 considered that computer use was or would be a component of the jobs in their fields. The fact that 30% of the students considered it unlikely that they would use computers in employment suggests unrealistic expectations exist in large proportions. Forty-one per cent of the students thought that employers should be able to expect school leavers to be computer literate (statement 8). Eighty-nine per cent of the employers held this expectation. This represents a large and substantial difference of opinion. Students' perceptions of the importance of computer literacy are influenced to a large degree by the messages that are derived from its perceived place in the school curriculum. Among many students, there appears to be a common judgement of IT having a low priority in school programs. Given this, there is quite reasonable for students to hold the view that employers should not have high expectations in this regard. There were many students (21%) who could not give a definite response to the questions concerning the need for IT skills in employment. The frequency of the choice of the 'uncertain' option, suggested that many students had not previously given serious consideration to the need for IT skills in employment. The question of whether this is further evidence of a falling in the school programs, must be asked.

Responses to statement 9 showed that students and employers were in close accord in terms of the importance of IT skills and their potential aid that these might provide in job seeking. It is not likely that all employers would consider computing skills as an aid to employment. There are many instances when computing skills would be only a minor consideration in a job description. More important requirements might be the personal qualities of the applicants. In such instances, when applicants are equal on the major selection criteria, such attributes as general literacy, numeracy and computing literacy become the means by which job seekers can be distinguished. The responses of the students showed that while many were aware of this, an considerable proportion did not hold this view.

The final statement, statement 10, provided an insight to the views of teachers and employers concerning the responsibility of employers to provide computer training. Sixty-three per cent of the employers saw themselves as being responsible for the provision of computer training. It is important to remember that 90% of the employers claimed that their employees would need to use computers at some stage in their job. There appears an expectation on the part of many employers that employees will enter jobs with prior computer training. Previous responses indicate that many see school as the place where this computer training should take place. Teachers were very consistent in their responses to this statement. Most saw employers as being

<table>
<thead>
<tr>
<th>Statement</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
</tr>
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<tbody>
<tr>
<td>7 I am likely to need to use computers when I get a job.</td>
<td>Students (%) 9</td>
<td>21</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Teachers (%) 10</td>
<td>0</td>
<td>90</td>
</tr>
<tr>
<td>8 Employers should be able to expect school leavers to be computer literate.</td>
<td>Students (%) 35</td>
<td>24</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Teachers (%) 8</td>
<td>3</td>
<td>89</td>
</tr>
<tr>
<td>9 Knowing how to use computers will help me to get a job.</td>
<td>Students (%) 11</td>
<td>21</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Teachers (%) 9</td>
<td>21</td>
<td>70</td>
</tr>
<tr>
<td>10 Employers are responsible for providing their own IT training.</td>
<td>Students (%) 3</td>
<td>7</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Teachers (%) 29</td>
<td>8</td>
<td>63</td>
</tr>
</tbody>
</table>

Table 7 Students' Perceptions of the Need for IT Skills in Employment

Computer use in employment
An important aim in this study was to determine students' perceptions of the importance of IT skills for vocational purposes. The question of the needs of school leavers in relation to computers and employment appeared to be one where consistent responses might be expected. It is difficult to judge the individual needs of students and specific occupations because large variations will exist between students and the jobs that they will seek and receive. To gain some measure as to the conformity of students' opinions, their responses to questions relating to employment needs, were compared to the responses from employers to the same questions (table 7).

Statement 7 showed that while 70% of the students expected to use computers in employment, a much higher number of employers (90%) judged that school leavers would need to use computers if coming into their employ. The extent of the use of
responsible for the provision of computer training. This did not necessarily imply a view that lessened schools' responsibilities in this regard. More likely, it was an indication of a general perception among teachers of in-service training being an important part of any occupation.

SUMMARY AND CONCLUSIONS

In relation to the research questions that were posed, the results of this study show worrying trends in the extent and scope of IT programs in local secondary schools and resulting attitudes of school leavers towards the need for IT skills. The study revealed that many students appear to be leaving secondary schooling with minimal levels of IT skills. The common practice in Western Australian schools of providing computer training in the early years of secondary schooling leaves many students with little or no further access to computers in their remaining time at school. This was made evident by the significant number of students in this study who received little or no access to computers in their final year of schooling.

A worrying pattern in the response of students was in the low level of importance that many attached to the need for IT skills. Students' responses to statements in the questionnaire were frequently quite different to those of the teachers and employers. In all cases, the differences demonstrated less positive views and lower expectations. It is likely that students were guided by the activities of their schools in making these judgements. The limited access and use of IT in the schools is very probably a factor that contributed significantly to the negative perceptions and impressions demonstrated by many students.

The apparent low status of IT in schools and among school students would appear to be a self-sustaining feature within school programs. It could lead to a lessened tendency among students to choose to study computing units or computing related subjects at the upper school level. While student subject choices do not lead curriculum planning in schools, they would impact in some ways. Students' disinclinations to select computing courses as part of their subject choice could lessen their importance and place in curriculum planning. Such actions would similarly serve to further diminish both the profile of IT as a subject and the perceived need for IT skills as an important outcome of schooling.

Many students did not see that IT skills would be an asset for job seeking nor an asset in a job. The views of the majority employers were substantially different. This suggests that some students may have reduced prospects for employment due to their low levels of IT skills. It may well be that students do not need particularly well developed levels of IT experience and expertise but while employers judge this to be important, there will be critical fillers placed in employment procedures that will limit opportunities for those who do not match the employers' requirements. It would be argued that while this situation exists, schools should reflect these concerns in the programs that they offer.

This study did not empirically measure students' IT skills and compare these along baseline data. For this reason, some may argue that the findings are limited in many respects. The study used a rather small sample of stakeholders to seek answers to the research questions. Again, this limitation is acknowledged. The findings of the study suggest, but do not prove that a problem exists. When one considers the high levels of similarity in the provision of computers and computing among all schooling systems in Australia, the prospect of replicating these findings in other states is quite high. It would appear a prudent course of action for those with responsibility in this area of schooling to seriously consider whether similar findings would be apparent in their domains.

What is the solution to this problem if it is endemic and widespread among all our school systems? One solution is to create information technology plans and programs within schools that extend computers and computing to the school population at large. Students should see computers as productivity tools and have adequate access to use them as such (e.g. McCormick 1992). The provision of machines in cross-curriculum applications, as information sources in library settings and as productivity tools for school-based activities, are all strategies that could have effect in increasing the IT skills of mainstream students. A critical element for success in any solution is a more comprehensive evaluation of learning outcomes than is currently practised. In particular, considering the achievements and attributes of those with least access and usage of computers would be a useful starting place.

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