Fostering interest in Information Technology: running a vacation school for pre-university students

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Abstract

Fostering an interest in Information Technology (IT) in school students is important both for the IT industry and for universities: we therefore enthusiastically welcomed the opportunity to hold an Information Technology vacation school for year 12 students in April 1996. Initiated and sponsored by the Australian Computer Society and Rotary International, the school enabled 60 secondary students who were in the process of making decisions about tertiary study to spend three days participating in a variety of computer-related activities at The University of Queensland Department of Computer Science, and experiencing life as a university student. The students developed skills in programming in Smalltalk, and using information systems and Internet resources. In addition, they visited other departments on campus and companies in the city to see a variety of uses of IT. We hoped to give the students the opportunity to make an informed decision about their future careers.

A follow-up survey in early 1997 revealed that 80% of the students felt that attendance at the school helped them with their post-school career decisions. This paper describes our experiences with running the school: the program, components, feedback, and future plans. We hope that this paper will encourage other universities to attempt similar programs.

1 Introduction

The inaugural Rotary Information Technology Autumn School, sponsored by the Australian Computer Society (ACS) and the Department of Computer Science at The University of Queensland, was held during the Easter school break over three days in April 1996. The 60 participants came from the final year classes of 27 secondary schools in Brisbane.

The aim of this paper is to share our experience and describe the outcomes of the school. We believe that the school was very worthwhile and we hope this paper will encourage others to attempt similar activities.

The idea to hold the school came initially from the ACS and Rotary International. Early in 1995 Bruce McNaught, chairperson of the Queensland Branch of the ACS and a member of Rotary, contacted the Department of Computer Science to see if we were interested in being involved. From the beginning we embraced the idea enthusiastically as we saw it as an excellent opportunity to spread knowledge of and interest in information technology into schools, and in doing so, make contact with students who were in the process of making important decisions about their future careers. It has long been our belief that the true nature of a professional career in information technology has not been clearly presented to secondary students.

In consultation with the ACS, we identified that the following broad aims for the school were to:

- expose secondary school students to the wide variety of activities that computer professionals undertake in their work environment;
- develop their skills in programming and information systems;
- give them a taste of university life; and
- motivate an interest in further computer studies, and in particular give them information so...
that they can make an informed decision about courses of study.

Rotary and the ACS took responsibility for advertising the school, arranging the accommodation (in a University college) and supervising a half-day visit to computer-based industries in the city. We took responsibility for organising the two-and-a-half day academic programme of computer-based activities held within the Department of Computer Science itself.

In September, the ACS and Rotary sent posters about the school to all secondary schools north of the Brisbane river. As well as details about how to apply, the poster contained the following information:

“You do not have to be a computer wizz (sic) to be selected to attend. In fact Information Technology is a career that involves much more than programming. We need young people who are good communicators and who can help business managers develop a system that improves the business—whatever the business may be.”

The cost of the school was set at $100 for each student: Rotary clubs sponsored many of the students. The deadline for submission of applications was the end of October.

The school was seen as not just for students already computer aware, but as an opportunity to attract into the computing industry students who have other skills needed by the industry. In particular, it was felt that the school could give an opportunity to correct a common misunderstanding that the computer industry was just for “nerds”; on the contrary, the point needs to be put firmly that people with communication and other social skills are also vital. As it turned out, 63 applications were received for the 60 places, and as 3 students later withdrew, no selection was needed.

In planning the academic programme, we had several general goals in mind.

Make it interesting: the school was to be held during a vacation so it was important that the applications and teaching strategy were both exciting and motivating. Furthermore, this was to be a taste of the possibilities offered by a career in information technology so it had to suggest substantial and worthwhile possibilities.

Levels of difficulty: with a mixed ability group, the material needed to be challenging for the most able students, while offering something substantial for the less able students to achieve. In particular, it was necessary to set realistic tasks that could be achieved within the time available.

Immediate gratification: the students needed to be rewarded immediately and positively for their hard work. The programming environment used thus needed to produce exciting outcomes quickly.

After considerable discussion, we decided to focus on three main components for the academic part of the school:

- the creation of a simple database containing details of the students themselves;
- programming in Smalltalk using the Visual-Works environment; and
- surfing the Internet as part of an exploration of the underlying architecture structure of the World-Wide Web.

There was no single underlying educational strategy for informing the students throughout the school. In the Smalltalk sessions, we needed to inform by teaching, and we used a combination of problem based group work based on comprehensive worksheets, and brief lectures. In the database and Internet sessions, the students were informed by experience: although they were guided by worksheets, exploratory learning formed the main educational activity.

The final program for the school is shown in Figure 1.

Section 2 describes each of the three academic components of the school and the on and off-campus visits in which the students participated as part of the non-academic section of the school. In Section 3 we describe the feedback we received from participants at the end of the school, together with our own observations: we also analyse the success or otherwise of each component of the school. Section 4 summarises our conclusions on running the school and the changes we intend to make before the next school is run in 1997.

2 The components

2.1 Database

To achieve the goal of developing the students’ skills in information systems, two sessions were held that focused on database use. The purpose of the database sessions was not only to expose students to technology, but equally importantly to provide an experience of university life by encouraging informal interaction between the students. To this end, the sessions were not technical in nature and didn’t require heavy concentration. This allowed students time to talk with each other and become acquainted.

The first database session was the first session of the school and was broken down as follows:

2See Hussey, Leadbetter and Purchase (this volume) for more details of the educational strategy used for the Smalltalk component of the school.
**Wednesday April 10**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.30am</td>
<td>Introduction</td>
</tr>
<tr>
<td>9.00am</td>
<td>Database and Photographs</td>
</tr>
<tr>
<td>10.30am</td>
<td>Morning Break</td>
</tr>
<tr>
<td>11.00am</td>
<td>Visual Works Introduction</td>
</tr>
<tr>
<td>12.30pm</td>
<td>Lunch</td>
</tr>
<tr>
<td>1.30pm</td>
<td>Visual Works Familiarisation</td>
</tr>
<tr>
<td>3.00pm</td>
<td>Afternoon Break</td>
</tr>
<tr>
<td>3.30pm</td>
<td>Surfing the Internet</td>
</tr>
<tr>
<td>4.30pm</td>
<td>Return to International House</td>
</tr>
<tr>
<td>6.00pm</td>
<td>Formal Dinner</td>
</tr>
</tbody>
</table>

**Thursday April 11**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>9.00am</td>
<td>Visual Works Project (A Puzzle)</td>
</tr>
<tr>
<td>10.30am</td>
<td>Morning Break</td>
</tr>
<tr>
<td>11.00am</td>
<td>Visual Works Project (A Calculator)</td>
</tr>
<tr>
<td>12.30pm</td>
<td>Lunch</td>
</tr>
<tr>
<td>1.30pm</td>
<td>Campus Tours</td>
</tr>
<tr>
<td>4.00pm</td>
<td>Return to International House</td>
</tr>
<tr>
<td>6.00pm</td>
<td>BBQ with current UQ IT students</td>
</tr>
</tbody>
</table>

**Friday April 12**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.00am</td>
<td>City Tours</td>
</tr>
<tr>
<td>12noon</td>
<td>Lunch</td>
</tr>
<tr>
<td>1.00pm</td>
<td>Own database and web pages</td>
</tr>
<tr>
<td>2.00pm</td>
<td>Afternoon Break</td>
</tr>
<tr>
<td>3.30pm</td>
<td>Courses and Careers in IT</td>
</tr>
<tr>
<td>4.00pm</td>
<td>Return to International House</td>
</tr>
</tbody>
</table>

Figure 1: The Program for the Inaugural Rotary Information Technology Autumn School, 1996

**Icebreaker:** The primary purpose of the icebreaker exercise was to divide students into the groups in which they would work throughout the school, and begin the process of students becoming acquainted.

**Data entry and getting acquainted:** A further goal of the introductory session was for students to enter their details into a database. This both gave students the opportunity to experience current database technology, and to create a record of school attendees. Students worked in their groups, and were provided with a sample database. A guided worksheet described how to use Microsoft Access to enter details, including their name, school and personal interests.

This provided a way for the students to learn about each other, and stimulated discussion amongst students in each group. It was important that by the end of this session, students in each group felt comfortable with their other group members as the subsequent laboratory sessions relied on teamwork.

**Photographs:** Each student had their photograph taken during this first session, for later inclusion in the Microsoft Access database, and for use in creating a web page for each student. The photography was carried out with a digital camera, chosen for two reasons: it exposed students to current technology, and it provided a convenient way to have an electronic version of the photographs (rather than scanning conventional photographs).

Behind the scenes, school staff downloaded the photographs to a computer, converted them to a suitable image format, and cropped each image, checking that it was framed appropriately.

The second database session was at the end of the school as part of a more general "wrap-up" session. From the database perspective, this session was broken down as follows:

**Adding photographs to the database and issuing queries:** By this stage of the school, the photographs and a copy of the school database containing all the students' details were available to students. The primary purpose of this exercise was to give students experience using multimedia features of Microsoft Access by demonstrating the ease of adding photographs to the database. The secondary goal was to give students experience with issuing database queries.

**Copying the database to take home:** Students were encouraged to copy the database to a floppy disk to take home. In addition, students were given the opportunity to take their photograph file as well. The students were also given a print-out of the database information, with space for students to write other participants' phone numbers or contact details.

No worksheet was provided for this session, just an overhead transparency giving details of the hard disk locations of the various files the students could copy. Each student was given one floppy disk and had the opportunity of filling the disk with school files of their choice.

2.2 Smalltalk

The programming component of the school consisted of four sessions, each of 90 minutes duration, in which the students learned how to adapt existing programs. The programming sessions contributed toward the students' exposure to a variety of computer science activities and career options. Our immediate aim in the programming section of the course was for the students to develop some competency in programming using an emerging and popular programming environment (VisualWorks Smalltalk). By developing such competency, we considered that students would be better able to make an informed decision about study and career options in information technology. At the end of the programming sessions of the school, we hoped that students would have a better awareness of what was involved in a career as a programmer. In particular, we wanted to help the students understand what it would be like to study programming at the first-year undergraduate level at The University of Queensland.
To portray what we considered to be a truthful view of programming, we avoided unrepresentative material which would reinforce prevailing "myths" that programming is:

- either too easy or too difficult;
- solitary;
- repetitious and mathematical;
- boring.

2.2.1 Informing students of their career and study options

To provide students with an introduction to programming that would assist them in choosing their future career, we chose to:

- follow the current global trend towards object-oriented software development;
- teach a substantial subset of the object-oriented programming paradigm.

We chose VisualWorks Smalltalk as our language. Smalltalk allowed us to meet both these criteria. It is widely regarded as a "pure" object-oriented language and it is easy to learn. Because Smalltalk programs are easy to extend and modify, students are able to progress to the point of making significant changes to substantial programs in a relatively short time. In the process they also learn core object-orientation concepts. Smalltalk is also the language taught in first year Software Engineering at The University of Queensland.

We taught a subset of object-oriented programming, to enable students to understand and adapt substantial programs; concepts taught included objects, classes, inheritance, re-use, messages and corresponding message implementations. These concepts are a significant subset of those Carleton University aims to teach in a full semester subject [2, 7]. As a consequence of using VisualWorks Smalltalk as our programming language, we taught Smalltalk specific syntax (e.g., methods such as new and constants such as self), competence and understanding of the VisualWorks tools, debugging and Graphical User Interface concepts (including "widget" properties and callbacks). We also taught students basic programming concepts that are not only part of object-oriented programming, such as booleans and flow control.

3 Where possible, the number of terms the students had to learn was minimised (e.g., we used "message implementation" instead of "method" and "statements" rather than "code").

4 Although we taught simple flow control (e.g., the method ifTrue: ifFalse:), we decided not to teach iteration, due to time restrictions, and the fact that the iteration syntax is a simple extension of simple flow control.

2.2.2 Dispelling myths

Programming is too easy/too difficult

Choosing VisualWorks Smalltalk as our language helped counter the myth that programming is too easy or too difficult:

- it was very unlikely that any of the participants would have used Smalltalk before [5, p.62]. This meant that the course was not trivial even for experienced students;
- Smalltalk has a simple syntax [4, p.564]. This meant that Smalltalk was likely to be easier to learn than other languages with more complex syntaxes;
- the VisualWorks environment allows for the quick development of visually appealing applications [4, p.564]. This meant that we could make the activities more interesting.

The worksheets catered to both the inexperienced and experienced students by including both guided and independent exercises as well as descriptions of programs and concepts. The purpose of the independent exercises was to reinforce the students' learning of the concepts that had been introduced through the guided exercises [3]. In the earlier sessions, the students were "hand-held" through the exercises. The later exercises assumed greater confidence, and more understanding and skill; accordingly less explanation and guidance was provided. The second half of the worksheets were mini-projects that were intended to consolidate the concepts that had been learned, and gave the students a chance to think for themselves.

Programming is solitary

So that their work was not solitary, students worked in groups of three with tutor assistance where necessary. Students had significant opportunity to interact with University tutors during the school and become familiar with the style of instruction that is common in the first-year subject in Smalltalk taught at The University of Queensland.

At suitable points the students listened to short verbal explanations and participated in discussions of examples. These "mini-lectures" introduced material when it was topical and gave students the opportunity to discuss questions publicly. Such discussions reinforced that programmers work in teams. The mini-lectures also provided an opportunity to introduce students to the style of tutorial instruction at universities.

Programming is repetitious and mathematical

We used a variety of applications and problems to counter the myth that programming is repetitive.
The exercises in the worksheets used several different programs:

- a predator-prey simulation, that visually simulated the actions of predators and prey which can eat, chase, run away and reproduce;
- an implementation of the popular "8 puzzle", usually represented as a three-by-three matrix of eight tiles and a blank; the tiles are repeatedly slid into the blank space to achieve a desired configuration;
- a simple graphical calculator with both unary and binary operators.

Students were required to make a variety of changes to the programs and to locate and correct both deliberately introduced errors and their own errors. The variety of examples showed that programming is not just mathematics and that rather than being repetitive, most information technology professionals engage in a wide variety of interesting and motivating activities in their work.

**Programming is boring**

In addition to our efforts to prevent repetition and provide variety, we took other specific steps to make the worksheets interesting. To introduce variety into the worksheets, to teach more and thus to prevent the exercises from being boring, each exercise in the worksheets taught several concepts at once. There was no separate session in which the VisualWorks tools were explicitly taught; instead, tools were introduced as required during the explanation of concepts. This approach ensured that our emphasis was on the more interesting conceptual issues rather than the relatively boring and repetitive process of becoming competent at using such tools.

Our approach of using examples that the students executed rather than lectures or notes has been previously shown to be successful [l]. Our observations that using examples made the students' work more fun and enjoyable, with greater learning and more student participation, were consistent with the findings of such previous research.

**2.3 Internet**

In addition to database technology, another way in which the students were exposed to information resources was using the World-Wide Web. This was presented in two forms: allowing students to access the World-Wide Web, and providing them with their own web page which would remain after the school had finished.

The first of the two Internet sessions was simply to give students experience using the World-Wide Web. A web page was set up for the school, providing links of potential interest. Each student was given a handout briefly introducing the Internet and the World-Wide Web and given a basic introduction to using Netscape. This was in the form of an information sheet rather than a step-by-step worksheet, and was designed to be useful to students who accessed the Internet on their own after the school.

At the start of the session, a 10-minute presentation was given briefly explaining the nature of the Internet, how to navigate the World-Wide Web using Netscape and the information resources (e.g., search engines) available on the Internet. Students were also briefly introduced to other Internet services: electronic mail, newsgroups, file transfer, and interactive chat.

After this presentation, students were free to explore the World-Wide Web on their own, using the school web page as a starting point. Tutors were available to answer any specific questions.

The second Internet session (during the wrap-up session) had two goals: allowing students more time for free exploration of the World-Wide-Web, and allowing students to view their own web page which had been set up for them behind the scenes by the school staff.

Web pages were generated for the students using the information entered into the Access database during the introductory session, together with the student photographs. Each web page was a standard format, including the student's photograph, name, school, favourite television program or movie, favourite sport and astrological starsign. The starsign included a link to an external web site which provides an up-to-date horoscope for that starsign, to demonstrate the hypertext nature of the World-Wide Web (and for the students’ amusement).

**2.4 On and off-campus visits**

In addition to the academic components of the school, the students had the opportunity to visit several different groups and organisations to see their use of information technology first-hand. Students visited a number of sites both on and off the university campus. These sessions were primarily to expose students to real life uses of information technology, as well as adding variety to the school curriculum.

There were three campus visits and three city visits. Each student attended all three campus visits. For the city visits, due to time constraints, students were divided into three groups and each group participated in only one city visit.

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5 Students' starsigns were used rather than their date of birth to ensure that the publicly available web pages did not disclose personal information. For this reason also, the information collected in the database was of a non-identifying nature, no addresses or telephone numbers were included.
The campus visits were to the Library Multimedia Facility where students were left to explore multimedia packages on their own, the UQ Physics department where students saw the department’s conferencing system and use of SGI Indigo workstations and The University of Queensland Electrical and Computer Engineering department where students saw demonstrations of the “micro-mouse” project, a small computer-controlled vehicle that can be programmed to traverse a maze.

For the city visits, groups of students visited the information technology divisions of the South East Queensland Electricity Board (SEQEB), the Queensland Government Centre for Information Technology and Communication (CITEC), and Telstra.

3 Feedback

At the conclusion of the school, all students were asked to complete an evaluation form, and 57 completed evaluation forms were collected. The form comprised three sections: closed questions, open questions, and survey information.

Closed questions: The students were asked to rate each session on a five-point scale ranging from very interesting (5) to very boring (1). In addition, the three laboratory sessions were rated on a very difficult (5) to very easy (1) scale. The results are shown in Figure 2.

<table>
<thead>
<tr>
<th></th>
<th>interesting</th>
<th>difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Works</td>
<td>3.3</td>
<td>3.4</td>
</tr>
<tr>
<td>Database</td>
<td>3.6</td>
<td>2.0</td>
</tr>
<tr>
<td>Internet</td>
<td>4.6</td>
<td>2.0</td>
</tr>
<tr>
<td>Campus Tours</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>City Tours</td>
<td>3.1</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: The average ratings for the five components of the school

Open questions: In this section, students were asked to name the three aspects that they liked most about the school, and to suggest three improvements.

More than half the students (34) named the Internet sessions in their favourite three aspects of the school, with five students thinking that more Internet time should be made available. The Visual Works sessions and the opportunity to “learn new things” were amongst the aspects liked about the school for a quarter of the students (15). Eight students thought there should be less Visual Works, and eleven thought that the Visual Works instructions were not adequate for complete understanding. The database project was mentioned by very few students (one positive, three negative). The campus tours received positive responses from many of the students (31); the city tours were mentioned by few students (seven positive, and one negative).

The most popular aspects of the school were the opportunity to meet other school students (16 responses) and university students (7 responses), the university experience (9), free time for other activities (23), group work (4) and the general atmosphere (5). The “hands-on” nature of the laboratory sessions was also particularly noted by three students. The students thought that there ought to be more variety in the sessions (16 responses), that evening activities ought to be organised (18), and that the organisational information ought to be clearer (6). Seven students thought the school was too short, and should be longer.

Survey Questions: The survey questions asked students about their career plans and their source of information about tertiary courses, (for the use of the department’s publicity officers). A question about the students’ prior use of computers was also included: the students were asked to indicate which of a list of software they had used before. The responses are shown in Figure 3.

3.1 Analysis of Results

3.1.1 Database

Observations: Students found the exercises quite easy, and most groups finished them well ahead of the time allocated. The ease of the exercises unfortunately resulted in many of the students finding the database sessions boring.

Survey Results: From the surveys, it was evident that most students had significant prior experience with databases. It was therefore not surprising that they found this the easiest aspect of the school. However, the students still rated this session as above average in interest on the five-point scale.

Comments: The database sessions and associated activities achieved the goal of providing an “ice breaker” session which enabled the students to become acquainted. However, the students were not challenged in these sessions, and did not appear to learn much: even those without prior exposure to databases found the concepts quite trivial to grasp. The exercises were too simple, leading to boredom for many students. The motivations of the exercise were possibly not explained well enough to students in advance, so that many were unsure of the purpose of the database and photographs in the overall context of the school.

3.1.2 Smalltalk

Observations: The programming component of the school was a success: after six hours, the majority of the students understood the basic object-oriented programming concepts that we had aimed to teach, to the extent that they could discuss and use them. They were also skilled in using VisualWorks tools.
The programming sessions were characterised by an atmosphere of relaxed hard work, enjoyment and satisfaction. Some of the students who had no programming experience struggled with the concepts at first, but most students' limits in understanding were only reached in complex exercises where a number of different implementation changes needed to be made. It appeared that they understood the individual concepts but had problems in scaling them up to larger problems. This is not unlike our experience with students in first year programming subjects, and is to be expected in a short course of this nature.

The breadth of material covered ensured that the students were exposed to an environment that was similar to real University study and that they were better able to make an informed judgement of programming as a possible career path.

Survey results: As this was the only activity in the school that required concentrated thought and hard work, and was new to all students, the higher than average rating of the interest and difficulty of the sessions was satisfying; so too was the fact that some students placed Smalltalk in the three aspects they liked most about the school.

It appeared that the students did not really appreciate the extent of what they had learnt in the Smalltalk sessions: by teaching the students "by stealth" with the use of well-designed worksheets, the course covered much of the material (and some extras!) normally taught in a first-year, one semester, 4 hours per week undergraduate subject. Also, the fact that many students went directly to the exercises in the worksheets without reading the intervening text, contributed to their thinking that the instructions were not detailed enough. We do not consider the fact that many students found the exercises difficult to be a negative response; on the contrary, we wished to challenge them, and motivate them to want to find out more about information technology.

Comments: In running this school for the first time, a flaw in the time-tabling was revealed, which we believe may have contributed to some of the students' negative opinions about the Smalltalk component. Sessions one and two were held before and after the lunch break on the first day, while sessions three and four were both held in the morning of the second day, with only a short morning tea break between them. It was obvious to us that by the middle of the fourth session, the students were tired and some of them bored. We believe that this poor time-tabling contributed to some of the students' perception that they were doing "too much" Smalltalk, when, in fact, less than half their total time was spent doing the Smalltalk exercises.

3.1.3 Internet

These sessions were undoubtedly the major success of the school: the students' high level of interest and their judgement on the ease of use were expected. By the end of the sessions, all students were proficient with navigating the World-Wide Web, but due to the hands-on nature of the sessions, some students did not fully understand the theoretical background material we provided, although they knew that they were accessing information resources from around the world. It was interesting to observe, however, that the achievement of locating a particular site appeared to be more important to the students than the content of the site itself: seldom would they actually read the material that they had discovered. Most students were excited to have their own web page, although because the pages were created for them by school staff, they did not fully appreciate the process involved.

3.1.4 General

It was obvious that the social aspect of the school was very important to the students: this is not contrary to the aims of the vacation school, which, as well as entailing hard work, intended to give students a taste of university life.6

Although the tours received mixed reviews, they were worthwhile as opportunities for the students to see information technology in use. Their inclusion in the program added variety to the school, and ensured that it was not all laboratory-based.

The expertise of the students was much higher than we had expected, and this was borne out by the

6No more than four students came from each participating school, so this was a good opportunity for the students to meet others who were also interested in information technology.
questionnaire responses and our own observations. The intention of the school was not to admit only “high flyers”, but to provide an interesting experience for all students, regardless of their ability or prior computing knowledge. While this made the design of the worksheets difficult (as they had to cater for novices as well as provide challenges for the more experienced students), we were successful in providing opportunities for all students to extend their knowledge and skills.

3.2 Problems

For a first-time trial of the school, there were few problems. Holding all the sessions in the laboratory, with the students sitting around the terminals resulted in much distraction: often students did not listen to the verbal explanatory material, because they were engrossed in unrelated activities using the computer. In general, this exploration and initiative is not necessarily a negative thing, however, in this context it meant that the students missed out on valuable information that they required for successful use of the worksheets.

We soon discovered that we needed to restrict the availability of the Internet to the scheduled Internet sessions. It did not take long for some students to connect to the Internet during the introductory database session on the first day: left to their own devices, many students would have spent all three days “net surfing”!

In general, grouping three students around each terminal was a success. However, it became evident that regular rotation was necessary, to ensure that one student was not monopolising the mouse or keyboard. This needed to be physical rotation of seating, rather than merely passing the keyboard to another student, for all students to have the opportunity of controlling the computer.

4 Conclusion

The school proved to be a very rewarding and exciting event for all organisers, tutors and participants. We achieved the broad aims as set out in Section 1: in the course of this three-day school, the students were given a taste of studying Information Technology at university as well as being exposed to different career options for computing professionals.

In a follow-up telephone survey in February 1997, of the 49 students for whom information was obtainable, 26 planned to embark on tertiary study in Information Technology. Of the 42 who were personally interviewed, 34 thought that attending the school helped them in their post-school decisions.

The second Rotary Information Technology Autumn School will run in April 1997. Two main changes have been made to the program:

- A change to the timetabling of the four Visual Works sessions: two sessions on the first day, and one session on each of the remaining days.

- Replacement of the database sessions with a “hardware” stream, where the students will use and adapt simple Smalltalk programs to control a model vehicle.

We anticipate that these changes will address weaknesses in the original program that were evident from our analysis of student feedback and from our own observations. Because the Smalltalk sessions were the most challenging of the school’s components, their timetabling was altered to ensure the students have a chance to absorb the material, and are not too tired to work effectively. The database component proved too easy for students and its replacement with a hardware session will provide more variety and challenge.

Information Technology vacation schools are a recent innovation. It is difficult to compare our experience with that of existing schools in Science or Mathematics, as teaching hands-on Information Technology poses unique challenges such as teaching behind terminals, keeping up with the rapidly changing nature of the field and changing nature of the students’ prior experience, meeting the high expectations of students and introducing students to the cognitive nature of computing. Recent programs similar to ours include the Rensselaer Polytechnic Institute’s two week school in late 1995 for 20 girls in years 11 or 12, which aimed to attract women to computer science [6]. The school included C++ programming, animation programming, an introduction to statistical reasoning, web page creation and tours. In 1996, the University of Sydney ran a five day school for 66 year 10 students [8], including web publishing, tours and guest speakers. Of these two, the activities of the Rensselaer school are most comparable with ours, although the Rensselaer school was focused on girls only, had fewer students and ran for much longer. The goals of our school were broader than those of the University of Sydney, as we hoped to give students experience in a variety of computer science areas, including programming.

We were very pleased with the outcomes of the inaugural school and have welcomed the idea of holding the event annually. This paper has set out the approach that we took to running the school, the results that we achieved, and suggestions for improving the school in its future instantiations. We hope that others will be motivated by our experiences to organise similar schools, thus encouraging more secondary school students to consider Information Technology as a career.
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References


