INTRODUCTION

Computer Studies in Tasmania falls under the broad learning area of Technology within the subject areas of Information Technology and Computer Graphics and Design. Under these subject areas there are syllabuses at pre-tertiary non-pre-tertiary levels as well as vocational education courses accredited under the National Training Framework.

The Technology learning area was reviewed in 1998. In the process some broad principles were established, in particular that syllabuses reflect links with the key competencies and that, wherever possible, a staged approach rather than separate syllabuses be adopted to increase opportunities for students. The biggest growth has been in Computer Graphics and Design particularly in the areas of animation, games and interactive multimedia.

A positive outcome of the review has been the empowerment of moderators (the teachers who convene and report on moderation meetings) where their role has been acknowledged through PD conducted by the Tasmanian Secondary Assessment Board (TASSAB) in all regions and across sectors.

It should be noted that with the advent of Computer Graphics and Design as well as the Vocational Education offerings there are now many options for students interested in computing which has broadened their choices and attracted some students who previously might not have studied in the area, and equally it has diminished the numbers studying in the traditional computing subjects at pre-tertiary level.

HISTORICAL DEVELOPMENT OF YEAR 11/12 COMPUTING COURSES

Computer Studies was introduced to the year 11/12 syllabus in 1972, mainly at the instigation of Scott Brownell, as a subject to study and to a certain extent, control, an emerging technology. Computer Studies therefore focused on the technology as an entity as well as programming as a structured activity. Pascal was adopted as the language though structured BASIC was included at a later stage. Practical work was originally carried out on terminals linked to the Elizabeth Computer Centre an arrangement which developed to produce a Statewide network TASNET, linking all state senior secondary colleges, high schools and primary schools.

By 1982 there was a growing concern that Computer Studies had too narrow a focus. With the arrival of microcomputers there was a general support for exposing students to an informed use of computer applications rather than subjecting them to the rigours and discipline of programming. It was argued that statistically only a small percentage of the population would be engaged in programming, but that most would need to use the technology. As a result, Computer Studies was split into the two subjects, Computer Science and Information Systems.

Computer Science took on the traditional area of software engineering but with Proposition and Boolean logic, Language Theory, Data Representation, Machine Language and Combinatorial Circuits added.

Information Systems, mainly instigated by Roger McShane, was aimed at providing the professional with an informed understanding of the capabilities of Information Technology. It combined practical hands on skills with an appreciation of the economic, social and legal implications of using Information Technology.

Both subjects were reviewed in 1998/99 and the resultant courses introduced in 2000. One of the strong
rationales for changing the Computer Science subject was to attract more females. Computer Science has retained its emphasis on Software Engineering but has lost a lot of the more esoteric theoretical components. There has been a switch from Pascal to the object oriented language, Java and an introduction to networking theory has been added. The course has been written so that another object oriented language could be easily slotted in without losing the essence of the course. Some colleges deliver Computer Science combined with a vendor course such as provided by the CISCO Academy or 3Com NetPrep. This goes part way to closing the gap between academic and vocational education courses.

Information Systems now has its emphasis on the study of systems used to perform a particular job or solve a problem. It builds on the student’s knowledge of computer systems by going from the particular to the general in contextual settings.

As well as the two pre-tertiary subjects, Computer Science and Information Systems, there are a number of practical, half year and full year courses that cover a basic computer literacy component and then a specialised one such as Business, Publishing, Multi-media or Programming.

All Senior Secondary Colleges are also Registered Training Organisation and deliver Australian Quality Framework Vocational Education Training courses including Certificate 2 Information Technology. This certificate is often accompanied by a CISCO Academy or 3Com Netprep course.

At years 9 and 10 the subject Computers and Information is offered at three levels of difficulty.

DEMOGRAPHICS

The following table gives a breakdown of enrolments in the various Tasmanian Secondary Assessment Board (TASSAB) accredited courses. The lower numbers in a series indicate a less demanding syllabus.

<table>
<thead>
<tr>
<th>Syllabus</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/10 B Syllabuses (100 Hours)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF246 Computers &amp; Information</td>
<td>15</td>
<td>28</td>
<td>43</td>
</tr>
<tr>
<td>IF247 Computers and Information</td>
<td>123</td>
<td>159</td>
<td>282</td>
</tr>
<tr>
<td>IF248 Computers and Information</td>
<td>108</td>
<td>103</td>
<td>211</td>
</tr>
<tr>
<td>IF447 Computers and Information</td>
<td>274</td>
<td>379</td>
<td>653</td>
</tr>
<tr>
<td>IF448 Computers and Information</td>
<td>287</td>
<td>363</td>
<td>650</td>
</tr>
<tr>
<td>Subtotal</td>
<td>807</td>
<td>1032</td>
<td>1839</td>
</tr>
<tr>
<td>11/12 B Syllabuses (100 Hours)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF749 Applied Computing</td>
<td>32</td>
<td>69</td>
<td>101</td>
</tr>
<tr>
<td>IF750 Applied Computing</td>
<td>154</td>
<td>248</td>
<td>402</td>
</tr>
<tr>
<td>IF751 Applied Computing</td>
<td>114</td>
<td>128</td>
<td>242</td>
</tr>
<tr>
<td>BS760 Business Computing</td>
<td>28</td>
<td>50</td>
<td>78</td>
</tr>
<tr>
<td>BS761 Business Computing</td>
<td>142</td>
<td>114</td>
<td>256</td>
</tr>
<tr>
<td>Subtotal</td>
<td>470</td>
<td>609</td>
<td>1079</td>
</tr>
<tr>
<td>11/12 C Syllabuses (150 Hours)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF861 Computer Science</td>
<td>2</td>
<td>49</td>
<td>51</td>
</tr>
<tr>
<td>IF862 Computer Science</td>
<td>18</td>
<td>177</td>
<td>195</td>
</tr>
<tr>
<td>IF871 Information Systems</td>
<td>49</td>
<td>150</td>
<td>199</td>
</tr>
<tr>
<td>IF872 Information Systems</td>
<td>326</td>
<td>513</td>
<td>839</td>
</tr>
<tr>
<td>MD875 Computer Graphics &amp; Design</td>
<td>4</td>
<td>62</td>
<td>66</td>
</tr>
<tr>
<td>MD876 Computer Graphics &amp; Design</td>
<td>20</td>
<td>208</td>
<td>228</td>
</tr>
<tr>
<td>0Subtotal</td>
<td>419</td>
<td>1159</td>
<td>1478</td>
</tr>
</tbody>
</table>

DESCRIPTIONS OF ACTIVITY

Full syllabus details are available as PDF files from the TASSAB website at http://www.tassab.tased.edu.au

**Computer Science - available at pre-tertiary and non pre-tertiary level**

Computer Science was completely rewritten for the year 2000. The aim was to make the course more relevant to the experiences of the student (eg programming for the WWW, introduction of animation and some multimedia aspects as well as networking) as well as providing those skills required in the workforce and for further study. Guidelines from the Australian Computer Society (“Skills required by computing professionals”) were used for determining the content of the syllabus.

Types of activities/content include:

- Programming Java applets
- Using/modifying Java network programs
- Setting up and configuring a network
- Working with TCP/IP
- Computer security

This syllabus describes how computers work and interconnect. An appreciation of modeling the real world is gained by the acquisition of knowledge and skills in computer programming. A strong emphasis is placed on practical tasks to investigate the theoretical concepts. Students have the opportunity to explore graphical environments, virtual worlds and networking.

The topics in the course include:

- Computer basics (20 hours)
- Network communications (30 hours)
- Programming and program structures (100 hours)

Assessment includes individual and group based programming assignments, class presentations, practical involving setting up networks, tests and a three hour open book examination.

**Information Systems - available at pre-tertiary and non pre-tertiary level**

This syllabus is a study of the skills and concepts relating to the use of information and its associated technology,
for the purpose of problem solving and decision making. This involves an understanding of the hardware, software, personnel, data and procedures involved with information systems. This understanding is developed through the study of a collection of prescribed generic contemporary issues.

**Course content:**

**Fundamental issues:**
- an appreciation of the past, present and future development of modern computers and information systems
- functional understanding of computers as input/output, processing, storage and communications systems
- an understanding of the importance of appropriate strategies in the analysis, design and implementation of an Information System
- an understanding that Information Systems operate within a social context and therefore there is a need to take account of the social and legal implications

**Contemporary Issues**

Each year after consultation the list of issues is made known. The issues for 2000 are:

- **WWW** - intelligent agent, intellectual property, search strategies, equality issues, censorship
- **E-commerce** - social changes, unemployment, economic feasibility, object and personal identity, security
- **Database** - data capture, validation and storage/retrieval, user interface, reporting, privacy
- **Document processing** - role of the skilled person in matching content and presentation to audience, layout and style, medium and bitmapped graphics
- **Image processing** - bitmapped and vector graphics, image capture and manipulation, animation
- **Information Systems graphic models** and the role of the creative person in image processing. Office automation - facsimile, video conferencing, email, voice mail, scheduling, groupware, occupational health and safety

**Computing**

The subject is designed to enhance students’ understanding of computer concepts and practical skills, enabling them to evaluate and use information technology. Through practical experience students should develop confidence in dealing with existing and emerging information technologies and understand their application and implication in work, leisure and communication. Through project work students will be encouraged to develop problem solving, time management and planning skills.

**Course Content:**
- Introductory computing skills
- Application module
- Project module

**Computer graphics and design**

The above courses may be studied through one or more of the following topics. If more than one topic is studied, then it is suggested that 00 Computer Graphics and Design be chosen. These codes may be added to the course code (for example) TE162/06 for the 11/12 Computer Graphics and Design A course, Computer Graphics and Design stage 2 (Interactive Multimedia).

1. Computer Graphics
2. 2D animation
3. Computer Graphics - 3D
4. 3D Animation
5. Industrial Design
6. Interactive Multimedia
7. Creative Computer Graphics
8. Graphics for Film and Television
9. Game Development and Design
10. Web Design

**Early secondary computing**

There are a variety of approaches adopted in the early secondary years. Some schools have compulsory introductory computing courses, others have developed an integrated approach to the first two years offering a range of problem solving activities as well as activities designed to upskill students.

**Professional development opportunities**

Professional development remains one of the biggest challenges for the subject area in Tasmania. Moderation meetings held twice per year give the opportunity for meetings with one teacher from each school attending. As well as the moderation business of the day, these occasions are also often used for informal sharing of resources.

As an example, to support the new Computer Science syllabus, a range of strategies have been adopted:

- The moderator organised three days of Java programming during 1999, conducted by the University of Tasmania (a single day, and a follow up two day seminar). Schools/College had to fund this.  
- A one day seminar on networking was undertaken by teachers of the subject this year. Central funding was available for catering and facility hire.  
- Don College set up a Web based system where Computer Science teachers have placed resources developed throughout the year.  
- An email discussion list of all Computer Science teachers from each school attending. As well as the moderation business of the day, these options are also often used for informal sharing of resources.  
- There have been some informal meetings of Computer Science teachers in regional areas.  
- TASITE's operation as a Special Interest Group of the Australian Computer Society provides ongoing close contact between industry, university and Senior Secondary teachers.
ISSUES ABOUT COMPUTER STUDIES IN THE STATE

Low participation of females

This has been an ongoing concern. It had been hoped that the new Computer Science course would attract more females and this is certainly the case in one school where one class has grown to two but it is too early to know whether or not this represents a state wide trend.

Professional development

The Professional development dollar is stretched too thin and a priority on cross curriculum integration of ICT leaves insufficient funds to address the needs of the subject specific areas.

The subject area has a greater need than other subjects for ongoing PD support due to rapid obsolescence of equipment and software as well as the rapidly changing nature of the world of work and the imperative to be responsive to this. Professional development depends largely on the goodwill of moderators and colleagues.

Pre service education of teachers

There are concerns that there may not be sufficient competent teachers specifically trained with dedicated experience in the subject area.

CONCLUSION

Tasmania has two policy documents informing its direction at present - the Labor government’s Tasmania Together strategy promises an intelligent island with an information economy and in tandem the Department of Education’s policy Learning Together calls for a responsive education system to prepare students for the jobs of the future and indeed to create their own jobs. Maintaining a contemporary suite of syllabus offerings is an essential aspect of this vision and with this by implication is the imperative to maintain professional development for teachers in the area.

Contact information for the ACS

To contact the ACS, phone the Branch in your state or territory, or the national office on (02) 9299 3666, visit the ACS Web site, or e-mail: info@acs.org.au

(Continued from page 19)

ISSUES AND CHALLENGES IN INFORMATION TECHNOLOGY EDUCATION IN AUSTRALIAN SCHOOLS

Our State Governments, and in fact anyone with an interest in our economic future, need to be lobbying the Federal Government to provide more funding for our tertiary institutions, particularly direct funding to tertiary IT Departments to assist them in retaining and developing quality staff and maintaining up-to-date curricula.

(Ridge, 2000)

The need for funding to tertiary education institutions is also relevant for Faculties of Education, as these undertake the initial training of teachers, teacher professional development through postgraduate study, and research into curriculum issues and roles for information technology in supporting learning.

The ACS can provide more specific support for Information Technology teachers in several ways. The Society has a mentor scheme, through which teachers might arrange for information technology professionals to contribute to aspects of their work. Through the ACS teachers might make connections with the industry, providing "real world" experiences or advice for the teachers and their students.

The importance of including social issues topics in Information Technology courses was mentioned earlier in the paper. Many Information Technology teachers, most of whom have scientific backgrounds and training, find teaching these topics more difficult than the more technical aspects of the courses. The ACS has developed statements and position papers on various of these issues, for example on ethical considerations in the uses of information technology. These are readily available for members, and some may be available more widely. As well the ACS runs meetings and seminars on issues relevant to information technology professionals; one example is intellectual property matters raised in information technology contexts. The subjects of many of these would also be relevant to senior Information Technology teachers and students.

The ACS is aware of the need for support by the profession for all levels of education in information technology, and the senior secondary school area is highly significant in this context. Contact information for the ACS is included at the end of this paper.

REFERENCES


CONTACT INFORMATION FOR THE ACS

To contact the ACS, phone the Branch in your state or territory, or the national office on (02) 9299 3666, visit the ACS Web site, or e-mail: info@acs.org.au