In 1990, educators at the tertiary, regional and school levels found mutual benefit from a collaborative venture. Regional Computer Consultants of the Queensland Education Department became 'clients' for second and third year students of the Bachelors Degree in Informatics at Griffith University. This article describes the project from three perspectives—university lecturer, computer consultant and classroom teacher.

THE TERTIARY PERSPECTIVE
A bachelors degree programme in informatics has been conducted at Griffith University since 1985. The original design of the course was based on an orientation towards problem solving, and development projects conducted by the students have occupied a central position in the course structure.

The Informatics programme is structured around a common core of material studies by all students, comprising the whole of the first (or Foundation) year of the course, together with a compulsory concentration area in Information Technology spread over the second and their years of the programme. In addition to these subjects, each student completes in-depth studies in a Concentration Area. At the moment, the available concentration areas are Software Engineering, Artificial Intelligence, Information Management, and Microelectronics and Information Systems. There is scope for up to two elective units which may be taken from a wide range of available options.

There is a stream of group participative projects which continues throughout the entire degree programme, starting with the Problem Solving Workshop component in the Foundation Year. In this unit, students gain skills in group interactions, and apply these skills to the solution of problems, not necessarily of a technical nature. In the second year of the degree, a substantial group project in the construction of a significant information system is undertaken in the unit Design and Development Project. The third year project course, Information Systems Project, is not included in the 'core' of the degree programme, but is a compulsory element in all concentration areas.

The extent of formal teaching content varies between the different project courses, with reduced emphasis on formal content as the student progresses through the degree. Thus in the Foundation Year projects, there is only limited technical content, and teaching in the workshops is primarily oriented to group processes and problem solving techniques. In the second-year project, there is significant formal content, aimed at providing students with the theoretical background to undertake high-level analysis and systems design.

In the third-year project, formal teaching is reduced to a minimum. Guidance is provided through meetings with the group's technical supervisor, and ongoing contact with the members of the teaching team. The intention is that students will learn by doing, and will apply the skills and techniques imparted in other courses of the degree. Students are required to manage their projects so as to conform generally to the requirements of the Australian Standard for Software Quality Systems, AS-3563, and there is a significant overall emphasis on the quality of both intermediate and final products.

In achieving this, the formal structured walkthrough has been adopted as the primary teaching tool. As many key deliverable items and milestones as possible are reviewed by an audience comprising teaching staff and fellow students. Walkthroughs are held every three weeks through the 25-week (approximately, 'term-time') duration of the project. The walkthrough activities are interspersed with tutorial sessions (in the form of informal reviews) and guest lectures, where experts from local industry provide information on procedures and practices in the 'real world'. This mode of delivery has evolved over time: in the early days of the course, there were almost no activities which involved the entire class, but the trend has been toward more full-class activities.

Group formation and project selection has also changed significantly with the evolution of the course. At first, groups were allowed to 'self-select'. Initially with no real restrictions, later with restrictions only on group size. The groups once formed were
allowed to choose their own projects, subject to some negotiation and bidding. This process has been significantly altered and individual students now apply for the projects they wish to undertake, giving arguments for their selection. The teaching team then selects teams for the various projects on the basis of individual abilities and learning goals. This causes minor problems with arranging group timetables, but the benefits are seen to outweigh these.

Unlike several other project courses described in the literature, the practice at Griffith is to arrange different projects for each group. This has certain definite benefits: it makes any form of plagiarism between groups impossible, and it provides for a greater variety of problems to be discussed in walkthroughs. Against this, it required considerable attention by the teaching team to allow for the considerable differences in scope and complexity between the projects. So far, this has not been seen as a problem of any consequence.

**CO-OPERATION WITH THE REGIONAL LEARNING CENTRE**

Over time, the range of clients prepared to provide opportunities for projects has increased. In the beginning, most projects were for voluntary organisations or 'internal' clients academic or administrative contacts within the University. The types of project undertaken varied from small database systems to more sophisticated modelling, forecasting and graphical software. In recent years, there has been an increased emphasis on projects with an Artificial Intelligence component — expert systems, natural language interfaces and so on — as the AI concentration area in the Degree developed. Until 1990, however, there had been no projects involving what may generally be termed 'educational' software development. The Education Department, through the Mt Gravatt Regional Learning Centre, first became clients for the course in 1990. Four projects were undertaken for the Centre. Two were performed by students in the Third Year course, while the other two were allotted to the second year course.

Details of the projects are as follows:
- **Small Business Simulation (Third Year)**
  The aim of the project is to develop a simulation study, using both electronic and conventional media, of small business operations for use by Secondary business and Accounting students. Examples of similar simulations in other areas will be provided, and a panel of expert teachers in the field will be available for derivation of the user requirements.
- **Data Logger Translation (Third Year)**
  An Electronic Learning Centre has been established at Camp Hill State High School. Part of the centre is a Rain Forest establishment project. 'Data loggers' provided by CSIRO are used to collect a variety of environmental data. The aim of the project is to develop software to download the data to computer using the serial port. The downloaded data will need to be stored in a format which can be loaded into a suitable application — e.g. MS Works — for further analysis. The system will need a simple user interface suitable for use by students with no specialised computer background.
- **Periodic Table Database (Second Year)**
  A database system is to be developed for use as a teaching aid in Chemistry. The database will store information relevant to the subject, so that students can retrieve and manipulate the data under direction. A high standard of documentation is required.
- **Australian Literature Database (Second Year)**
  A database system is to be developed for use as a teaching aid in Australian Literature. The database will store information relevant to the subject, so that students can retrieve and manipulate the data under direction. A high standard of documentation is required.

**OUTCOMES**

All four of the projects undertaken in 1990 were successful, both for the students involved and the clients. The nature of the projects added to the success of the course. Because of the very general nature of the client's goals, the definition of user requirements was a complex process, and at least one of the project teams (a, above) was able to make good use of 'soft systems' methodologies and prototyping in defining and realising the final product.

From the point of view of Griffith University, the success of the exercise is emphasised by the fact that the Department is providing further projects this year. Our involvement has in fact widened, with projects coming, not only from the Regional Learning Centre, but also from one individual High School and the Queensland Distance Education Centre.

**THE REGIONAL PERSPECTIVE**

Once teachers have experienced the effects of the powerful learning environment provided by computers and related technologies on their classes, and sampled success in using computers in the classroom, they quickly adopt this medium as one of their professional strategies and resources.

It has been the longstanding view in Brisbane South Region, that the single largest impediment to the increased use of computers and related technologies as professional classroom tools for teachers, particularly in secondary schools, has been the lack of appropriate resources, directly relevant to teaching and learning.

While there are increasing numbers of software packages on the market in the educational domain, there are still large areas of the curriculum not supported. The reasons are fairly simple:
- **generic software, while a valuable and powerful tool, is often not a suitable starting point for teachers inexperienced with the technology;**
- **suitable commercial software often does not exist; and**
- **where such commercial software does exist or can not be easily adapted to suit the education environment.**

The projects developed by Griffith University students in 1990 for Brisbane and South region are intended to address these issues. Four projects were undertaken in 1990, and while all four projects were successful two have resulted in outstanding pieces of educational software suitable for widespread use.

**Sound Business Practice** is a simulation of small business developed under Hypercard on the Macintosh. In this simulation, students manage a rock band through a planning and budgeting process, and receive feedback through annual financial reports. While the project simulates the management and reporting functions, it takes no account of musical talent so that even the most tone deaf students and teachers can use it.

The third-year students involved with the project did a lot of background research into small business to familiarise themselves with the problems small businesses face, in order to make the scenarios as realistic as possible.
They also undertook extensive consultation with commerce teachers in order to make their product appropriate to the educational environment in which it will be used. One of the teachers involved also had experience in this section of the music industry, and thus provided insight into this context as well.

The Periodic Table was developed by second year students. It is an interactive database of the elements, designed to help chemistry teachers teach about the periodic table. To achieve this, the Griffith students have provided an on-screen periodic table which is the interface into the database. This allows students to retrieve data about individual elements easily. However, the most powerful features are those that allow graphing of elemental properties. The table is presented on screen, and students can select elements to use. A range of bar graphs can then be shown including ionisation energy, melting and boiling points and so on. Thus students can explore trends in these properties in rows and columns of the periodic table.

As with the third year students, the second year students had little knowledge of the domain of expertise they were modelling, since only one of them had studied chemistry in Year 12. However they also undertook the research task of gathering the data, and consulting with chemistry teachers who would eventually become the users of their system.

Both groups have produced software that is of high quality and high educational value. The user documentation produced is extensive and includes teaching notes. Once released, these items will affect the way in which teachers approach these particular topics with their classes.

This year, the Brisbane South Region has a further two projects under development with Griffith University students and it is hoped that they too will exhibit the same qualities.

Through this type of cooperative project, the University can achieve its aim to have students do 'real' project work, and the education community can benefit from the skills, determination and hard work of the students.

THE SCHOOL PERSPECTIVE

The setting up and running of a rock band — a small business program.

My concept of the program
Due to subject selection many students never gain experience in business matters whilst at high school. This can leave them at a disadvantage later in life.

The program, though accessible to all students, could be seen as an ideal way for students interested in starting their own business to gain some insight into the pitfalls and hopefully successes of starting out in the business world.

In my opinion, the theory behind the above point is fine, though from a student's point of view, probably boring. Hence the idea of using a 'rock band' as the business — something students would be actively interested in — allows the students to enjoy themselves while at the same time acquiring vital business skills.

My role

I saw my role in the development of this program purely in terms of providing necessary background information on the music industry.

Having had extensive experience in the industry, I was more than happy to 'lend' my expertise to the development of various elements in the program, thus allowing some credibility to the figures used and the directions taken by the students as they work through the program.

It was felt by all members of the group developing the program that we could not include everything relevant to the real world and much of the information used had to be scaled down to fit the students' and the program's requirements.

My background in small business studies as a subject was also useful in providing details of the sorts of records

USE OF THE PROGRAM

This program will be of greatest benefit to 'small business studies' students in the senior part of the school since it gives a practical slant to their studies.

As important, however, is the benefit to students in other subjects who may wish to see how the business world operates (e.g. accounting, legal studies, study of society).

I see the program as having a wide application in schools and with the central concept being the music industry, I'm sure it will capture the interests of all students coming into contact with it.