NATIONAL TAFE SCIENCE NETWORK MEETING

Hobart, Tasmania
September 1995

PROCEEDINGS

Edited and Compiled by
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THE ROLE OF THE NATIONAL TAFE SCIENCE NETWORK

The National TAFE Science Network (NTSN) was formed in 1994 following a successful application to the Federal Government for funding by Mr. Norm Fisher, Chief Executive Officer, Canberra Institute of Technology.

NTSN now has contact persons in most states of Australia. The National Secretary is Dr. Geoff Bell, Education Projects Officer, Canberra Institute of Technology, PO Box 826, Canberra, ACT. Telephone 06 207 3469 or E-Mail geoff_bell@cit.act.edu.au.

The role of the NTSN is to:

a) provide a national forum for discussion of issues in science education in TAFE;

b) advise NTCC on national issues relating to science education and training;

c) provide input into national and state TAFE strategic planning in relation to science education;

d) provide a national voice through which TAFE science educators can respond to professional and educational issues;

e) assist in the initiation, continuation and implementation of ACTRAC projects related to science education and training;

f) provide a national network for TAFE science educators.

NATIONAL TAFE SCIENCE AWARD

NTSN has established a National TAFE Science Award which is presented on a yearly basis the award is currently worth $2,500. Mr. Ron Burness, Head Teacher of Dental Auxiliaries was the winner of the inaugural competition held in 1994. The 1995 prize was shared between Mr. Kim Peterson, Senior Head Teacher of Chemical Technology, Granville College of TAFE, NSW, and Ms. Alison Elvin, Faculty of Applied Science, Canberra Institute of Technology.

Details of the 1996 NTSN Science Award are available from the National Secretary.

MELBOURNE CONFERENCE

The next meeting of the National TAFE Science Network will be held in Melbourne on Thursday 19 and Friday 20 September 1996. Details are available from the National Secretary.
LESSONS FROM ACTION LEARNING:
Implementing the new SCITECH Curriculum

Ivan Johnstone
SCITECH Project Manager
Canberra Institute of Technology

Michael Williams
Faculty of Applied Science
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During the first semester of 1995, TAFE institutions around Australia trialed forty SCITECH modules. To get the most from this process, the ACTRAC SCITECH Project funded ten action learning groups to support the professional development of the sixty staff involved. These groups had the opportunity to surface a lot of the issues which inevitably arise during the implementation of any new curriculum. Of equal importance, the action learning process enabled them to reflect on their day to day experiences in the classroom. The group’s experience has been consolidated into a manual which will be widely distributed very soon.

The manual describes how to interpret any SCITECH module and assessment package and suggests how teachers and industry trainers can develop a range of delivery options and assessment instruments. There are resources such as a Student Guide to Competency Based Assessment, mechanisms for recording and reporting competency, and examples of assessment policies and practice (e.g. grading, re-testing, documenting teachers’ professional judgment).

To encourage networking, there is a list of the personnel who trialed modules.
The Associate Diploma of Health Sciences (Clinical Neurophysiology) is a National Course offered by the RMIT. There are approximately 80 students enrolled in various stages of the course from every state in Australia, New Zealand and Hong Kong. There are many challenges to delivering a course via Open Learning, but a practical course in the Health area produced many more - the diversity of students with a wide range of abilities and circumstances as well as the problems on how to assess the practical area required a new approach to its delivery. The challenges are explored in this activity, how the problems have been overcome, and what benefits there have been for the department as a whole.
WORKPLACE DELIVERY IN THE CHEMICAL INDUSTRY

Raju Varanasi
Industry Specialist - Chemicals, Oil & Gas Processing
TAFE NSW

1. TAFE NSW has been involved since 1991 in the delivery of competency based national curriculum for chemical plant operators.

2. The national courses are being offered both as publicly funded courses (at TAFE site) and as fee for service programs (on site training).

3. The target group for the courses are plant operators in the chemical, oil and related industries. Usually, they are male, mature aged, experienced shift workers with no formal qualifications.

4. The South Western Sydney Institute and the Hunter Institutes in TAFE NSW have been involved in the on-site delivery of the national courses for the past 4 years. We have made incremental changes to the mode of delivery each passing year to reduce student teacher contact time (hence attendance time, for these shift workers) while maintaining or improving the quality of learning, participation rates and completion rates.

5. Over the past few years, the industry - through the concerted efforts of national and state ITABs - has been successful in gaining funding support from ACTRAC and other relevant agencies which assisted the development of print based learning resources for all modules in the courses and a CD ROM package for selected learning outcomes. These learning resources, along with a range of learner support strategies from workplaces have made it possible to introduce ways of flexible learning/delivery, which in turn resulted in reduced student teacher contact time - in some cases up to 50% of nominal module duration.
6. Flexible learning produced gains in terms of lower costs towards fee for service programs in terms of teacher contact time, assessment as and when requested by learners and faster pace of completion compared to traditional delivery. However, some learners and some teachers have raised concerns over lack of learner group interaction, excess time devoted towards assessment and its administration, and more work entrusted to the company coordinators, particularly relating to learner progress and follow ups.

7. To date, we have an estimated 200 graduates from the Operative Certificate in Chemical Plant Skills and over 45 graduates from the Advanced Certificate in Chemical Industries Technology.

8. Participants in the course have been drawn from companies such as ICI Botany, Koppers Pty. Ltd., BHP Coke Ovens (Newcastle), Castle Chemicals, Cleanway, INCITEC, and Australian Manganese Company Ltd.

9. TAFE NSW teachers involved in these courses have familiarised themselves with these companies and then plants. It assisted them in relating well with the company training coordinators and knowing the background of the participant operators. This also assisted in contextualising the training tasks and the assessment to some extent. For delivery of some elective modules, TAFE NSW teachers, with support from the Manufacturing Training Division, have taken a short return to industry (ranging from 4 hours to 2 days) for achieving familiarity with specific plant operations/equipment.

10. Learners have expressed the feeling that they get no time at work (to learn) and no learning support is available at home. Most companies and learners acknowledge that a certain minimum support from a provider such as TAFE is required to facilitate and monitor accredited training at the workplace. The role and extent of TAFE involvement depends on the availability of learning support from the workplace.

11. Learners have indicated they would like to have workplace mentors, however most mentors are either day workers or on a different shift, thus making a suitable match up of learners with mentors difficult.

12. While there are difficulties in meeting all the needs of learners, as a leading provider, TAFE NSW and its teachers are adapting to meet the needs of workplace training.
WOMEN IN SCIENCE, ENGINEERING & TECHNOLOGY

Discussion Paper prepared by The Women in Science, Engineering & Technology Advisory Group

Department of the Prime Minister & Cabinet
May 1995

Dr Brian Jones
Assistant Director
Sydney Institute of Technology

1. Background

In May 1993 the then Minister of Science established a Women in Science, Engineering & Technology Advisory Group (WISE). The major issues to be addressed by the group were:

♦ To improve the participation of women in ‘senior science’ in both the private and public sectors of secondary education;

♦ To increase participation and retention in the Higher Education and VET sectors;

♦ To increase awareness of the contribution of women in science.

♦ Of the 98 submissions received, very few were from the VET sector. One was from Dr Brian Jones, Sydney Institute of Technology and another from Ms. Jane Diplock, now Managing Director, DTEC NSW.
2. Major Theme

In the final report, the WISET Advisory Group advocates a shift away from focusing on what is wrong with girls and women to changing Science, Engineering & Technology work environments and Vocational Education and Training environments in order to make them more attractive to women.

3. Strategies

3.1 Short Term Strategies (next 12 months)

- Initiation of public awareness campaign;
- Establishment of a WISET Unit;
- Improvement on current collection of statistics.

3.2 Medium Term Strategies (1 - 3 years)

- Need for re-entry scholarships and bridging courses to provide second chance;
- Opportunities for girls and women;
- Increased use of mentoring and improved articulation pathways and selection criteria.

3.3 Long Term Strategies (3 - 5 years)

- Change in attitude and expectations of employers and employees.
- Current and future learning and teaching to be strengthened through staff development, curriculum change and the development of gender inclusive materials.

4. Recommendations from NTSN Meeting

4.1 Aidan O'Leary to consult with the Director of Canberra Institute of Technology, Norm Fisher, in order to canvass a role for NTSN.

4.2 Dr Brian Jones to contact WISET Advisory Group to again canvass a role for NTSN.
Introduction:

Since the early 1990's, the food industry has been working consistently towards upskilling operators within the industry. These workers in the past have not had access to formalised, structured training. The training available was traditionally informal and very much on an ad hoc basis.

With the advent of award restructuring, enterprise agreements and the push from governments, the food industry embarked upon the road of competency standards and nationally accredited training programs (Slide 1). This was to allow operators in the industry to have their existing skills recognised, skill gaps identified and appropriate training put into place to meet the competency standards required.

Why Workplace Delivery?

The courses developed to date in Food Processing (including Beverages) and Pharmaceutical Manufacturing have in fact been designed to be delivered in the workplace with a high emphasis on the integration of on and off-the-job delivery (Slide2). I am not talking about just on-site delivery but also actual formalised training that occurs when the participant is involved in productive work.
The operators for whom the training has been developed are obviously a very diverse group in terms of age, experience and previous education and training. The industry has a very high proportion of NESB (non-English speaking background), high proportion of women and a very high proportion of persons with language and literacy problems. Figures quoted for the industry indicate a functional illiteracy rate in excess of 60%.

Thus delivery in the workplace was seen by the industry as the most appropriate way to allow access to the training by as many of the work force as possible. Flexibility in the approach to delivery through both modes and methods is seen as essential to the ultimate success of the training (Slide 3).

**Range of Delivery Techniques**

These can be as wide and varied as one can think of. The ultimate test from the industry’s point of view is - ‘can the person perform the task at the competency level specified’? This includes not only the doing part but also the why part, particularly at higher ASF levels. Operators at ASF level 3 are expected to be able to co-ordinate and oversee processes, problem solve, trouble-shoot and communicate with all levels of personnel within the organisation.

Techniques can include:

- **face to face**;
- **mentored assisted**;
- **buddy system**;
- **self-paced**;
- **combination**.

The actual technique employed depends on a varied set of factors ranging from enterprise requirements and support through to the individual’s needs and abilities. An important consideration is also the availability of learning resources.

You will probably realise that to embrace these concepts presented quite a challenge to TAFE. However, in the light of TAFE NSW’s responsiveness to its customers’ needs, we have been able to overcome many of the perceived obstacles and we are out there doing it.

**Where it is Happening**

The Food Processing and Pharmaceutical Manufacturing Certificates are made up of a set of compulsory generic core modules which apply across the entire industry, a set of generic optional modules from which enterprises can chose those modules which best suit their operation and a set of specialised modules which cover the actual sector of the industry the enterprise is involved in.

The courses are being delivered in NSW in both metropolitan and regional areas and to participants from both individual enterprises and from groups of enterprises. The majority
of delivery is completely on-site using company facilities although in some cases the core modules are being delivered on campus at the request of the enterprises. Companies participating include Uncle Bens Australia, Edgell-Birds Eye, Sara Lee, Chickadee Chickens, Goodman Fielder Mills, Parke Davis, Pfizer, Cenovis and Johnson and Johnson.

An Innovative Approach

Overview

I would now like to take a few minutes to describe the approach that was taken at one company (Uncle Bens) to the delivery and assessment of the specialised modules, i.e. those which relate directly to a particular sector of the industry.

It should be pointed out that the approach described will not be appropriate for all situations but it is an indication of what can occur when a co-operative working partnership is set up between a company and TAFE.

It was agreed that the participants would complete the 8 modules required as an integrated block and via a research and development project. This differs from the more traditional modes of industry based delivery which allows the operator to be assessed on-the-job while performing specific tasks. In this model, it would not have been possible to identify any one specific module that was being undertaken. The project encompassed learning outcomes across the entire set of modules.

The project also raised the issues of self-directed learning and learning to learn in the workplace.

Initial Considerations for the Project

- company support must be forthcoming both financially and physically;
- company mentors need to be committed to the project (train the trainer and/or workplace assessor courses having been undertaken);
- participants need a clear set of goals with identifiable end results;
- clear communication lines established between participants, management and TAFE (meetings held weekly);
- participants agreed to allocate 8-10 hours per week to complete the task.
Project Methodology

- participants put forward suggestions as to possible new products (no prompting from company);
- market assessment undertaken (questionnaires, evaluation of market opportunities, etc.);
- presentation of findings and decision on product to be developed;
- analysis of product requirements (nutrition, quality assurance etc);
- product development trials including process and packaging;
- evaluation of product viability;
- project report and presentation to senior management and TAFE.

Project Outcomes

- the approach brings together theoretical knowledge, research skills and practical applications for the industry;
- participants have a broader perspective of their roles within the operations of the company, including an understanding of how the whole process works;
- participants are multi-skilled and have gained the confidence to transfer the skills developed to a more diverse range of company activities;
- project undertaken on a team based approach;
- company has a potential commercially viable new product;
- closer links developed between TAFE and the food processing industry;
- development of a model for other companies and TAFE.

Conclusion

I have attempted to present in a very short period of time one industry’s approach to the implementation of training to people who have previously had limited access to formal, recognised training. The emphasis is on delivery in the workplace and with a high degree of integration of on and off-the-job training.

Progress to date in New South Wales has resulted in the establishment of strong and flexible working partnerships between TAFE NSW and local enterprises highlighted by the innovative approach used to complete a number of modules as an integrated block.
Background to SCITECH Forum

SCITECH Forum was conceived as an Internet site to provide peer support for TAFE science teachers. It grew out of my own, and my colleagues' involvement in the SCITECH curriculum project and our great interest in the Internet as a communication medium. Scitech was a national, ACTRAC funded project, which developed curricula for six different groups of science technicians:

- animal technicians
- biological technicians
- chemical technicians
- food technicians
- geoscience technicians
- medical technicians

SCITECH was an extremely thorough project. Based on sound research, it developed curriculum of an excellent standard as was recognised late last year when the project was given a UNESCO award as the most successful CBT curriculum in Australia. (SCITECH was led by Dr Ivan Johnstone from CIT). The project produced very detailed curriculum for 150 modules and curriculum frameworks for a number of courses, from certificate I to diploma level, in each technician area. SCITECH modules are also being used in many courses that were not part of the original project brief. For example, in Victoria, SCITECH modules are being used in the Environmental Management and Natural Resource Management programs.
The SCITECH project has been, in many ways, a watershed for TAFE science teaching in Australia. It is bringing unprecedented change to TAFE teaching and learning practices. Science teaching was virtually untouched by many previous curriculum changes. Science teachers adapted to writing curriculum in whatever format was required by accreditation authorities, without greatly changing their teaching practices. They even learned to write the unwieldy behaviourist objectives demanded by the early proponents of CBE/T, without warmly embracing CBE/T. The teaching and learning philosophies that underpinned SCITECH gave science teachers their first insight into newer approaches to CBE/T that do offer great potential to improve the effectiveness of Science teaching in TAFE. Essentially the elements that characterised CBE/T in the SCITECH project were:

- a holistic approach to CBE/T
- problem based learning
- an emphasis on formative assessment
- the fusion of knowledge, skills and attributes reflected in learning tasks

The production of the SCITECH curriculum involved teachers from all over Australia and produced a high degree of collegiality. This gave participants a sudden and sustained influx of information about courses, teaching practices and teachers in other states. The implementation of the new curriculum was piloted through a series of nationally co-ordinated action research projects held in each state. Even within states, teachers learned more about their colleagues in other institutes and obtained valuable resources and ideas from them.

At the same time that all of this SCITECH activity was percolating, the National TAFE Science Network was formed. This group, essentially represented people managing science programs, began to meet twice a year and also brought great benefits to its participants. However the tyranny of distance has meant that participation is expensive and irregular - two states, Western Australia and the Northern Territory, have not yet sent anyone although we know of staff who would like to come. I have been a member of this group and as the SCITECH project drew to a close, like many of my colleagues, I wondered how we could sustain the energy and collegiality generated by the project. I suggested an Internet site as the ideal means of doing this. The advent of EdNA funding brought a means of actually producing the site.

With support from my colleagues in the Network I obtained funding to develop the site as a means for teachers to share information about teaching strategies, resources, assessment tasks, etc to continue impetus of SCITECH project into the ongoing implementation stage. This project has won great support from TAFE science managers around Australia. They have been actively involved in the design of the site.
The Project

I was successful in obtaining funding for two projects which are really two phases in the development of the same project.

1. Development of web site to support the implementation of SCITECH modules.

2. Staff development process to promote the web site and encourage teachers to use it. The latter project may seem like a luxury; but at this stage is extremely useful. Of our colleagues in other states, only the science teachers at CIT have internet access at this stage. Most states intend to use my workshops as a means of introducing their science teachers to the Internet and Netscape browsing.

Development of SCITEC Forum web site

The shell of the site has been constructed and is available at:


At this stage the site consists of menus with linkages and some examples of materials under each menu heading. Most of these examples come from Box Hill Institute. The site contains the following facilities:

- Introduction
- FTP Site
- Resources for Sale
- Great ideas you can use: module by module
- SCITECH contacts: writers, action learning teams
- Chat streams
- National TAFE Science Course Database
- Other TAFE Science Programs
- TAFE Science Teacher Exchange - local and overseas
- On-line manual electronic guide to SCITECH Curriculum
Introduction

This item explains the purpose of the site and also is starting to feature staff development materials relevant to the implementation of SCITECH eg information on competency based education and training.

FTP Site
A facility for presenting graphical material, photographs and diagrams, that can be used in learning materials.

Resources for Sale
A place where institutes can promote course materials that are available for sale

Great ideas you can use: module by module
A facility for sharing teachers’ ideas for learning and assessment tasks. The emphasis is on holistic, problem solving, job focussed activities

SCITECH contacts: writers, action learning teams
A facility to help teachers contact others who are working on the same modules. E-mail addresses are included where available, with automatic e-mail.

Chat streams
An interactive chat stream facility, where teachers can seeking help from others working on similar problems

National TAFE Science Course Database
The database is produced by Canberra Institute of Technology and the latest version will be maintained on this site.

Other TAFE Science Programs
A facility for posting information about TAFE science courses other than SCITECH.

TAFE Science Teacher Exchange - local and overseas
A facility where teachers can advertise their interest in exchanges, mentoring opportunities, etc.

On-line manual electronic guide to SCITECH Curriculum
A searchable guide to the SCITECH curriculum.

Many different people are contributing to the development of the site. I am responsible for the overall design and co-ordination. Nina Cox (Box Hill Institute) has been assisting with
these tasks and doing the html word processing. John Weatherly and Alan McKenzie, also of Box Hill Institute, have been responsible for the programming and for setting the site up on the Box Hill server. Georgina Racovalis of Box Hill Institute has been doing the graphic design work. Heather Symons from Canberra Institute of Technology is helping with editing and critical feedback. Many Victorian science teachers and members of the National TAFE Science Network have also provided critical feedback and useful suggestions.

The construction of the site will be completed by the 30 June 1996. This will allow the second phase of the project, the staff development workshops to be completed during the second half of the year. Training notes are being written and specifications for workshops have been distributed to TAFE Science Managers in other states to allow them to make bookings.

In developing SCITECH Forum, we have encountered some problems. The greatest difficulty arose from the nebulous nature of EdNA itself. For many months we did not know whether EdNA would sit on a server somewhere or whether we would have to find our own server. There has never actually been any official information on this topic. Eventually we decided that we would have to put the web site on the Box Hill Institute server just to put it somewhere. Whilst Box Hill is happy to host SCITECH Forum, there will eventually be concern about the cost of the maintenance. At the moment the site is not costing the Institute anything because we are using EdNA money to set it up and we are not yet receiving material from other institutes. Once teachers start to use the site, its maintenance will incur some cost. So the future maintenance of the site is an issue. One solution might be to charge users subscriptions?