

Integrated Support Systems for Curriculum Development and Management

Anthony Williams
Learning and Development Program
University of Newcastle.
asapw@cc.newcastle.edu.au

Kaye Cleary
Learning and Development Program
University of Newcastle.
Kaye.Cleary@newcastle.edu.au

Abstract

The University of Newcastle, along with many Australian Universities, is addressing the issue of student learning experiences. One of the University's planks in its raft of responses was to scrutinise the curriculum, and develop the curricula's potential for enhancing the student experience. Curricula are unique in their capacity to address quality at both the subject and course level - they are tools for conceptualising the students' learning experience.

An outcome of this scrutiny is the implementation of a multi dimensional curriculum framework to support the development and review of courses. This multi-dimensional framework supports the process through web sites, consultancy and facilitation, and manages the documentation through a database linked to the web site.

The web site utilises an electronic performance support model to facilitate the curriculum development and review process. The site exemplifies a generic process that can be contextualised by each discipline and tailored to accommodate an array of teaching, instructional and learning models used within the Faculties. A relational database is being extended from its curriculum foundation to manage both curriculum and subject review documentation. This database will articulate with existing subject sites that currently manage only part of the documentation generated by a subject review.

Introduction

Across the nation, universities are looking to enhance student and community satisfaction with their courses. Changing community expectations of universities, including those of their students, employers, professional bodies and community groups, are providing a lens through which universities engage with review and evaluation. Review and evaluation are the foundations of various "quality" initiatives. To date, the emphasis on quality is most often expressed in terms of teaching, in all its forms. A focus on student experience solely in terms of teaching, in many respects disregards the role of curriculum development, "beyond the classroom" experience of general university facilities and interaction with stakeholders external to the university.

Universities' interests in providing quality courses are founded on a variety of motivations but unite in a general aim to achieve a coherent and well-structured curriculum addressing the needs of stakeholders. A foundation for the structure and principles of the curriculum were laid down in 1992 by the Australian Vice-Chancellor's Committee with the release of their Guidelines for *Quality Assurance in University Course Development and Review*. Curriculum issues were highlighted in these Guidelines with the identification of a need to:

- demonstrate that courses are consistent with, and assist in, the achievement of institutional mission and objectives;
- make clear the purpose and objectives of each of the courses offered by each University;
- contribute to monitoring, maintenance and improvement of standards and quality;
- support and enhance student learning;
- demonstrate to interested parties the detailed procedures followed in course development.

The University of Newcastle too, has identified the need to evaluate the courses it offers with the purpose of achieving a higher quality of student learning experience. The University in documenting its five-year Strategic Plan identified a range of issues associated with the improvement of the courses it delivers. See the following objective and targets.

An Objective to Attain the University's Teaching and Learning Goals

Offer courses congruent with the University's strategic directions, with best contemporary learning theory and practice and that include core skills and abilities valued in the workplace and broader community

- review course curricula for: commitment to core skills and abilities valued in the workplace and broader community; flexibility in course content, modes of entry and exit, mode of delivery; flexible and student centred approaches to teaching and learning; and relevant assessment
- develop innovative courses with an emphasis on both generic and professional knowledge and skills
- implement and improve teaching strategies and procedures which promote deep learning and life long learning skills
- create opportunities for students to undertake comparative and inter-cultural studies
- incorporate international perspectives and tasks into core subjects and in all degrees
- conduct ongoing evaluations of subjects and courses with input from key stakeholders, and undertake full course reviews within a five year cycle, to improve quality, relevance and alignment with the Institutional Strategic Plan

Targets of the University

From January 1998 each revised or new subject or course to satisfy the Curriculum Review Committee that it has accommodated student differences, core skills and abilities valued in the workplace, and has incorporated flexibility of choice for students in their learning as appropriate

Achieve consistent improvement in the relative performance of offerings in the Annual Graduates' Course Experience Questionnaire

Simplify course structures and reduce the number of approved undergraduate subjects by semester 1, 2000 to ensure minimum enrolments exceed 15 students in all subjects except honours and highly specialised offerings

The System to Support the Attainment of the University's Plan

In the UK's Dearing Report (1997) the need to develop curricula of the highest quality with structures that are well defined and cohesive is clearly identified. The issue Dearing's report raised was that the skills to develop these curricula were not evident within universities. Australia has identified similar issues with Piper (1993, 172 & 173) recommending the application of management quality assurance strategies to curricula in order to achieve "effectiveness, efficiency and economy".

The procedures outlined by Piper are designed to produce quality curricula development or review, but the achievability of this is questioned by Laver (1992). Laver's Report identifies a lack of knowledge among

academics, relating to teaching issues. The Report identifies the need for significant professional development systems to be put in place to support staff in activities associated with teaching as:

Improvements in quality of university teaching will come not only from the efforts of individual academics, but also (perhaps more predominantly) from enlightened policies of departments/faculties and institutions as a whole (Laver, 1992, 37).

The University of Newcastle has implemented strategies to support the enhancement of curriculum development and review across the university. It has put in place a multi-various system to achieve the goal of curriculum enhancement through curriculum evaluation and management strategies at the three levels depicted in the following figure:

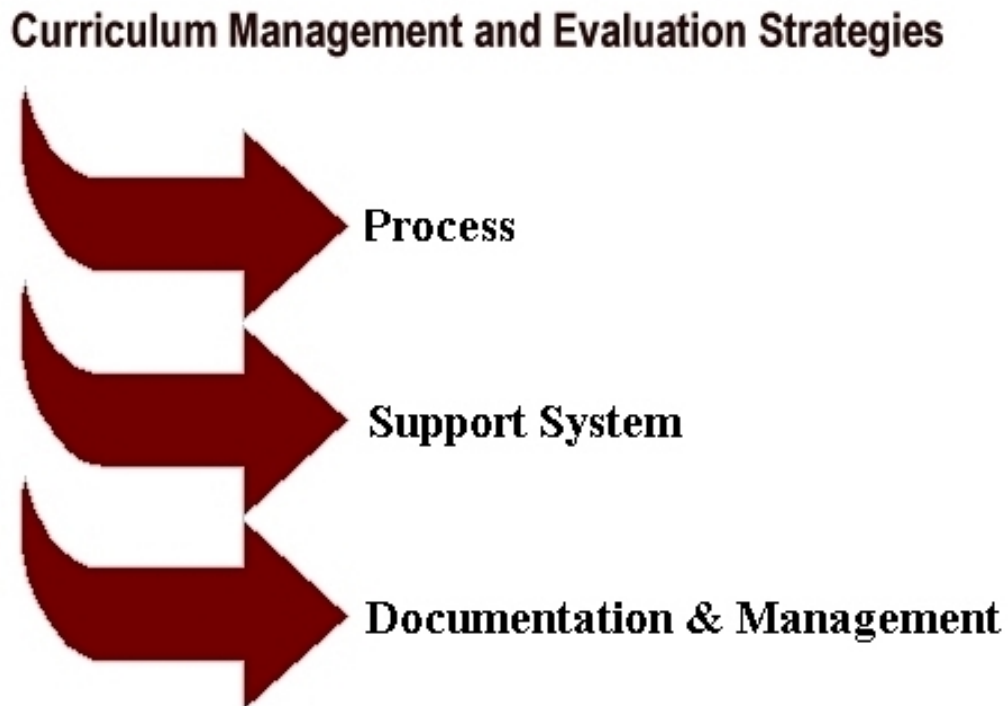


Figure 1. The three tiered support for curriculum management and evaluation strategies at the University of Newcastle

The University's system is based on the development and implementation of a process, which is to be utilised across the University for course development and review. This process is supported through web based, workshop and consultancy activities. The final stage is the management of the documentation generated as one of the outcomes of the process. This management is achieved through a centralised database. These three aspects of the curriculum support are discussed below.

The Process

The process implemented at the University of Newcastle for developing or reviewing curricula was developed to be generic so that it accommodates both professional and non professional degrees, as well as undergraduate and graduate coursework programs.

The process is summarised in the table below:

Table 1: Outline of the course review process

Action	Responsibilities
1. Form a Working Party to steer the entire development and review process.	The Working Party (WP) (including the course coordinator and representatives of teaching staff across all Faculties contributing to the course) will: <ul style="list-style-type: none"> oversee the review of each program; generate new course structure and rationale for changes; propose new course structure; coordinate the writing of the new subjects and program; inform all staff and faculty at each phase of the process.
2. Form an External Advisory Committee to provide comment at critical phases of the review process	The External Advisory Committee (EAC) including members of professional associations, student representatives and invited University staff external to the Faculty and WP: <ul style="list-style-type: none"> critiques submitted documents are considered by the WP who then plans actions in response to these.
3. Analyse current students' experience of the existing course.	Evaluators, independent of the course, address specific issues identified by the WP as their terms of reference. The evaluators use student focus groups and surveys to collect and interpret data, and report results back to the WP.
4. Course needs analysis - The aim is to develop a clear understanding of the needs for such a course.	The WP or external evaluators will collect data from: <ul style="list-style-type: none"> professional accreditation bodies; student feedback; graduate (former students) questionnaire data.
5. Development of a graduate profile	The WP, in wide consultation, develops a comprehensive graduate profile addressing: skills, knowledge and attitudes.
6. Inform servicing departments of review progress	From the initial stages of the process, the WP informs service providers of process as well as outcomes at critical stages.
7. Development of conceptual framework - the overall course outcomes & teaching and learning strategies to attain these outcomes - subject profiles to meet course outcomes - identify student specialisation requirements	The WP will: <ul style="list-style-type: none"> develop the framework taking into consideration information gained through the review process apply the framework to new degrees or name changes of current degrees
8. Consider broader University issues - equity - flexible learning opportunities - student-centred learning - University core skill requirements - assessment guidelines	The WP will also identify: <ul style="list-style-type: none"> potential for grant applications funding resource sources or limitations
9. Map the course, taking into consideration the findings of the review.	The WP will outline the course structures, focussing on content streams and teaching methodologies. Time allocations to content streams will inform the subject formation.
10. Writing of New Degree Program through Writing Teams	Writing Teams of discipline specialists will use the time allocated to the content streams to inform subject formation.

Support System

As discussed previously, university teaching staff may not necessarily have the background to undertake this curriculum process. In order to achieve the identified outcomes, the University of Newcastle has implemented a support system for academics as they confront the issues at all phases of this process. Although not conceived as a "performance support system" (PSS), Harmon's definition of a PSS

a seamless integration of information, tools, training, policies and procedures designed to situate learning in real performance contexts and enhance that performance at the moment of need (Harmon, 1999).

provides a useful framework through which to describe the University's response.

The University's academic staff development unit, the Learning and Development Program, supports the curriculum process through consultancies; workshops and the development of a web based support system. As the web site was developed by the Program, there is both consistency of information in the site as well as articulation with the other Program support activities. These support strategies are described in further detail below:

1. The Learning and Development Program's Support of Curriculum Process.

Learning and Development initiated a multifarious system of support. This support of Departments is guided by the Program's objectives in respect to curriculum:

- that the outcome of the course review is a course, which is coherent, well structured, articulated, current and longitudinal.
- to provide a forum for stakeholders' needs to be presented and considered
- instructional or methodological issues are considered equally with content issues
- providing a mechanism for all parties interested in the review with easy access to information about the review
- facilitate informed decision-making during the review or development process
- align the course with the University's strategic plan, such as streamlining "subject streams" and offerings.

The support is designed to provide the faculties' curriculum developers – especially members of the Departmental Working Parties - with access to information, expertise and guidance to facilitate the development of consistent curriculum practice. Support includes:

- stakeholder interviews and surveys.
- assistance with structuring a Course Review web site
- workshops to support Departments with discrete elements of the process
- and a facilitator to provide support for, and direct the process of, course review.

2. The Curriculum Web Site – Supporting Curriculum Development and Review

The Curriculum Development and Review web site is essentially phase / process based, supporting the novice Course Working Party through the various process that need to be undertaken, documents to be submitted, and forms to be "signed off" by various University administrators. See figure 1.

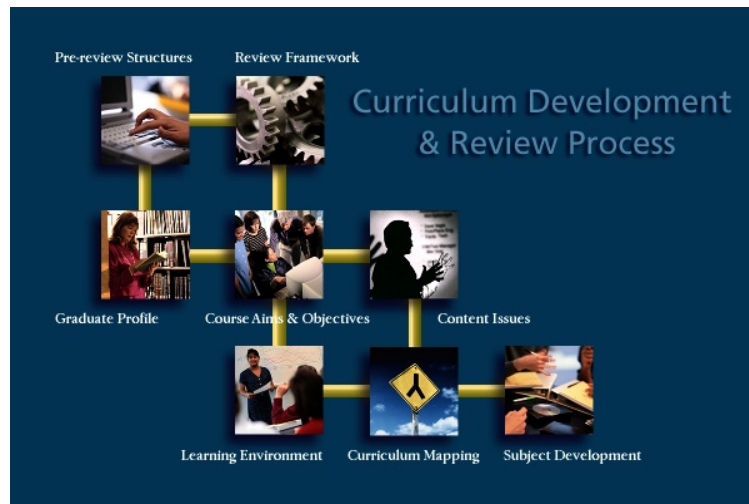


Figure 2. Opening screen for the Curriculum Development and Review site.

The structure of the World Wide Web, as a networked collection of information and resources is well suited to building "informed", multi-disciplined support systems. Web browsers integrate a range of collaboration and communication tools and the non-linear structure of the environment allows users to select the area of current interest. When combined with data management functionality, the Web becomes a powerful support and management environment.

The University of Newcastle's curriculum development web-site is essentially an electronic performance support system (EPSS) as described by Kirkley and Duffy (1997) a "toolkit, providing integrated resources to help the user meet specific needs". The site is based around the entire process of reviewing a course or developing a new course (see figure 3). Harmon (1999) highlights a fundamental difference between traditional PSSs, which tend to constrain their users in a highly structured environment, and what he coined "web-based PSSs", (a version of EPSS). Through its hypertext structure, the latter provides more flexibility in how tasks are completed, and allow users to determine what information and tools are relevant their circumstance. Kirkley and Duffy (1997) claim that the Web provides an "excellent foundation" for educational EPSS.

The model of EPPSs is becoming more common in educational web-based collaborative projects. *Interactive Newspaper for Kids* (I.N.K), is an example of a structured task-based activity - that of creating "copy" for a newspaper. Students select roles and are assigned tasks. They submit documents for review at various stages. The process is well structured, with descriptions of the roles and sequencing the phases.

In a university environment, the Web is a particularly appropriate delivery mechanism - it is ubiquitous in the workplace, as well as providing relatively easy access for off-campus staff members. The web site is under pinned by a task analysis of the processes outlined in table 1. It includes descriptions of how to develop structures that will give the course definition. These structures include the

- graduate profile
- course aims and objectives
- a matrix showing how the graduate profile will be met through the course objectives
- subject objectives are also linked to course objectives
- the subject assessment is linked to subject objectives

This process strengthens the alignment, sequence and structure of the course, building on the clear definition of what is to be achieved by the course, ie. the graduate profile.

The site also has an instructional dimension, as identified in the discussion of the EPSS, using an experiential learning framework. The benefit of connecting theory and practice, while integrating learning with workplace activities provides a powerful motivational dimension.

Case Study

The B.Sc. Aviation program undertook the review process, utilising the process outlined in the Course Review Website. The outcomes were significant in terms of the course and the directions it will take over the next four years.

The Department began the review process with a retreat to look at the directions of the industry and the role the Department had in preparing pilots for this Industry. During the retreat, the staff interacted with each other and to the process outlined in the website, relating the generic process on the site to their own context. The initial stages of the review process begun with staff members confident of being able to follow the process defined in the website.

The first stages of the process was the formation of a Course Review Working Party (CRWP) who would manage the review process. The CRWP chosen consisted of:

- The Chair – from outside the department
- The Facilitator – from the Learning and Development Program
- The Chair of the Faculty of Science’s Teaching and Learning Committee
- One member of the Department (the Head of Department was elected by department members.
- 2 external members representing the Aviation Industry (regional airlines and Airforce)
- Recent graduate

The role of this Committee was to manage the process and provide a forum for discussion. Significantly, all members of the Department had an open invitation to attend any meetings if they wanted to contribute at any of the stages.

The second stage of the process was the establishment of a website for all review documentation. This website had a dual role - to inform Departmental staff of the progress of the review (while giving them access to all Review documents), and provide external commentators with access to information relating to the review. The Department chose representatives from the broad spectrum of the aviation industry to have a wide variety of comments as the representatives felt they could contribute. This group was sent an e-mail directing them to the site when important documents (such as the profile of the course graduate) were placed on the web.

The next phases of the review process overlapped as information which informs the process takes time to gather and the Committee used information from a wide range of sources including:

- Student surveys;
- Student forums;
- Industry forums;
- Job advertisements;
- Graduate surveys;
- National and International accrediting bodies.

The outcome was the graduate profile and subsequent course objectives to achieve the requisite profile. The graduate profile was used as a focus to align the course development. What was to become apparent during the review process was that the course itself had very little structure or cohesiveness. The course was primarily a series of subjects, flying training (done off campus) and certification training and tests. It was not possible for the existing course to deliver the graduate identified in the profile. The realisation of this led to the development of a totally new course and course structure.

It was interesting to observe staff consistently relating back to the graduate profile when decisions had to be made concerning the course structure and content. The process outlined in the website and the supporting information provided on the site were used by staff to inform their process of curriculum development. The course that currently exists will be phased out over the next three years to be replaced by the fully integrated course. The process has at times been stressful for the staff as they are experiencing a change of culture. What the website has done is provide a process with explanations of the process, this has supported staff in this time of significant decision making.

Documentation and Management System

The final aspect of the EPSS system is the development of a database to support the process by requiring the submission of fields, which specifically relate to the curriculum process. The database uses a web “front end” oracle system, which provides easy submission and access to data because of the web interface. The database interface manages the expanding documentation for each course review as it is developed. The database provides the levels of security, confidentiality, and selective report generation not readily possible in a less structured Web environment.

The system enables the Departments with subjects and courses under review to upload information through a web based survey form. The system will support uploading of simple information into the database and more complex information can be uploaded in word processor formatted files. The system ensures parties are accessing only the most current information. Within this broad framework some of the specific functionality are:

- verification of input against database entries to ensure valid choices (eg. for subject and course codes).
- verification that the user has appropriate access to enter information about subjects and courses.
- ability to notify other contributors to the review process when the data is ready for their comment or input.
- routing of the information to the next person in the workflow chain.
- ability for reviewers to approve the submissions or request additional information.

Information Access

The system provides secure access to information (and system functionality) that is appropriate to the individual’s role in the review process. Some information is ‘open access’ while other information is available to members of the relevant review committees or heads of organisational units. The system will:

- publicise results of the review and make data available to authorised personnel;
- make selected data available for use by other sections in the University. For example, subject descriptions entered through this system would be available for students and others to search on the University’s main web site. This will help eliminate the duplication of data.

The database process structure, showing all the phases of the approval process, is demonstrated in the flow diagram following.

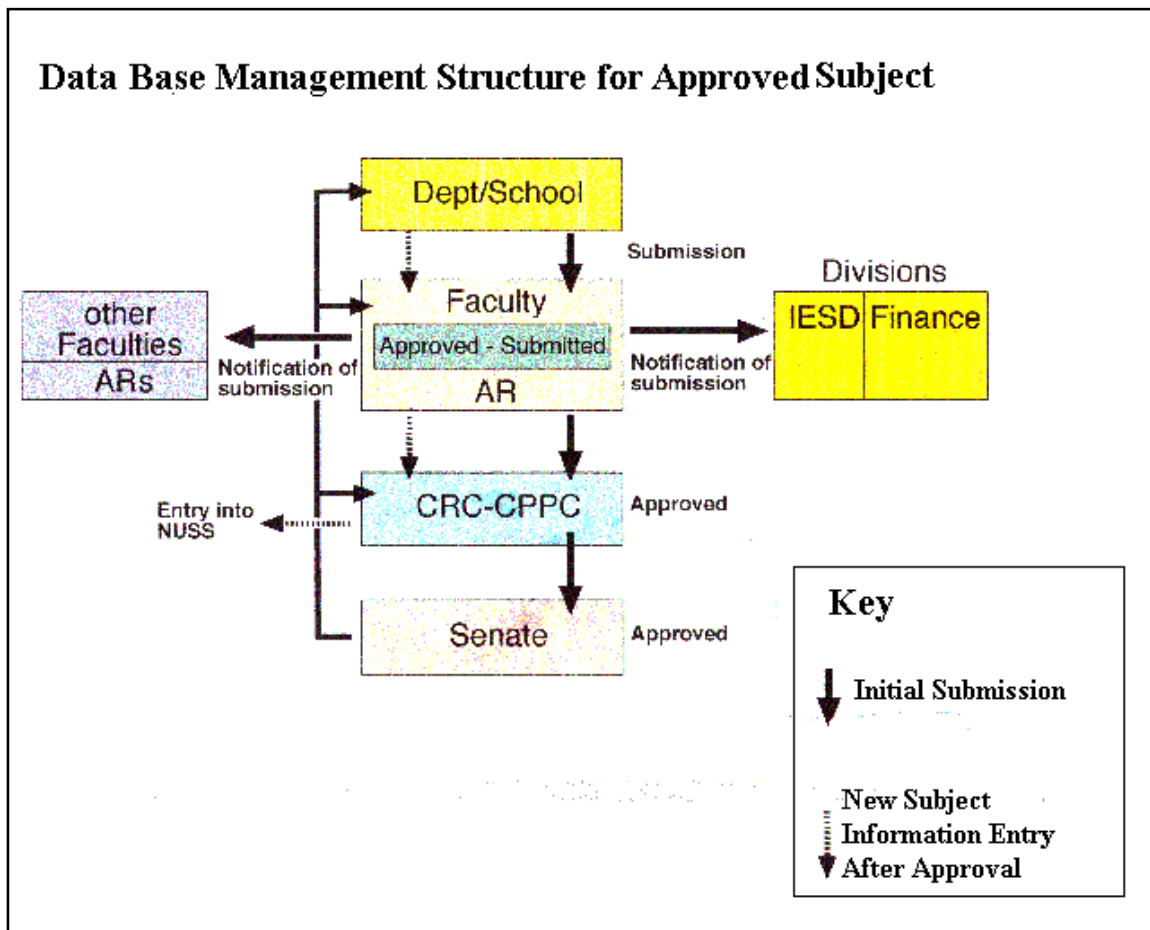


Figure 3. The information in the database is a paradigm of the process.

The Technology Used

The software was developed using mainstream web technologies and one of the industry’s leading database servers. The application was programmed in Cold Fusion, and the data stored in an Oracle database. These server side technologies ensure that access to the system will not be dependent upon a particular type or version of a web browser.

How the System is Used

During the development phase of the website, evaluations were sought concerning the functionality and effectiveness of the system. While feedback was overwhelmingly positive, the need to enrich the site with a range of contextual examples of course graduate profiles and objectives with examples of the matrixes was identified. These examples are being developed and integrated into the site.

The system has been used in the Faculties as a staff development resource to support their curricular development activities. Learning and Development facilitators have used the website as a resource in Faculty-based workshops focussing on the process which will be followed during a course or subject review. Faculty staff have found the website an effective means of engaging with the process during the workshops, and appreciate that they are able to return to the site for further details as members of the Working Party or Writing Teams. In the long term, as more courses undergo the review process, the site would be used by Departments as a resource independent of Learning and Development Program facilitators.

As we write this paper, the database component is in the final evaluation stage of testing with "live data" from two departmental reviews. Progressive evaluations during the development of the system have been very positive. Double handling, multiple versions of files and photocopying will be minimised as information is entered directly into the database for Faculty and Academic Senate approval. The system will manage the whole process including requests for further information or recommended changes made during the approval process. All University stakeholders will be informed of progress through the functionality of the system.

After approval by Academic Senate the data will be used for a diverse range of activities within the University. These activities include the development of Student Handbooks (hardcopy and online), course and subject details on Department websites, development of subject outlines for distribution to enrolled students, and quality assurance processes.

Conclusion

The phased development of the system has meant that it is entering its initial implementation phase as an integrated system. The initial website to support the review of curricula has been in use since June 1998 and has been used widely across the University by Faculties involved in curriculum evaluation and development. The database management system is in its initial implementation phase and will be evaluated in the new year.

As independent systems, both the web site and web-based database have had quite positive evaluations, both in their usefulness and suggested improvements. It is anticipated that the integration of these systems will realise the potential originally sought in the project proposal. Like the curriculum process itself, a through needs analysis, the engagement of key stakeholders from the concept stage, through design specifications, formative feedback through trialing, workshopping, presentations to key committee members and University decision-makers, and eliciting formative feedback with "live data" have been key elements in the development process.

Reference List

- Australian Vice Chancellors' Committee. (1992). *AVCC guidelines for quality assurance in university course development and review*. Retrieved March 5, 1999 from the World Wide Web:
<http://www.avcc.edu.au/avcc/pubs/glquass.htm>
- Collis, B. & Verwijfs, C. (1995). Evaluating electronic performance support systems: A methodology focused on future use-in-practice. *Innovations in Education and Training International*, 32, 23-30.
- Dearing, R. (1997). *Higher education in the learning society*. (Great Britain. National Committee of Inquiry into Higher Education). [Leeds]: The Committee.
- Harmon, S.W. (1999). *The Second "S" Putting the System Back in Performance Support*. (ITForum Paper No. 36.) Retrieved September 10, 1999 from the World Wide Web:
<http://itech1.coe.uga.edu/itforum/paper36/paper36.html>
- Interactive News for Kids*. Retrieved October 2, 1999 from the World Wide Web:
<http://ink.iim.uts.edu.au/index.cfm>
- Kirkley, J.R & Duffy, T.M. (1997). Designing a web-based electronic performance support system (EPSS): A case study of Literacy Online. In B.H. Khan (Ed), *Web-based instruction* (pp. 139-148). Englewood Cliffs: Educational Technology Publications.
- Laver, P. (1992). *Higher education: Achieving quality*. (Higher Education Council, National Board of Employment, Education and Training. Report.) Canberra: AGPS.
- Milheim, W. (1997). Instructional design issues for electronic performance support systems. *British Journal of Educational Technology*. 28, 103-110.
- Nielsen, J. (1994). Heuristic evaluation. In Nielsen, J., and Mack, R.L. (Eds.), *Usability inspection methods*. John Wiley & Sons, New York, NY.
- Piper, D. W. (1993). *Quality management in universities*. (Higher Education Division, Department of Employment, Education and Training. Evaluations and Investigations Program Report No.205.) Canberra: AGPS.