AN EVALUATION OF AN ALTERNATIVE DELIVERY SYSTEM IN THE SCHOOL OF TEACHER EDUCATION AT CHARLES STURT UNIVERSITY

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ABSTRACT

A growing number of universities are making course content available to students on the WWW. There is, however, a dichotomy between the call for constructivist approaches in traditional education settings and the fact that education delivered on the WWW seems to be employing instructivist pedagogies. The present study employs a constructivist pedagogy consisting of multiple traversals of subject matter and extensive use of communication amongst students and between students and lecturers.

In Spring 1998, a compulsory subject in the Graduate Diploma of Education (Secondary) in both internal and external modes, is being offered in an entirely novel way. The curriculum materials are all available on the Internet as a set of navigable documents interconnected by links that are determined by the questions that the documents raise. This allows students to follow links within the body of knowledge according to the questions that they may wish to have answered about the material they are reading.

The approach employed in this research is based on two pedagogic theories: Cognitive Flexibility Theory and Question Based Navigation. The first of these simply states that in order to know a body of knowledge in a deep fashion it is necessary to traverse the material a number of times with different issue questions to the forefront of the reader's mind. The second states that when reading any material the reader typically has questions raised that need to be answered. Combining these provides a mechanism to navigate a new body of knowledge in a fashion that should lead the student to a deeper understanding of the material. This paper describes the theoretical perspectives underpinning the delivery system and the methodology being employed to evaluate it.

KEY WORDS

Distance education, flexible delivery, computer mediated communication, pedagogy, assessment.

1.   INTRODUCTION

Distance Education is being transformed by the Internet. In the last decade of the 20th Century, many Australian universities are facing the challenges posed by telecommunications technologies to deliver to their distance education students relevant curriculum employing pedagogies that exploit the interactive and communicative facilities that the technology offers. Universities in Australia do this at a time when they face challenges from consortia in other

countries, most notably in the United States and the United Kingdom, who are seeking to expand their markets worldwide. The most notable of these include the California Consortium of Universities and Colleges, the Virtual University of the thirteen western states in the USA, and the Open University in the United Kingdom.

At Charles Sturt University, over 800 distance education subjects are online supported. A small number of internally delivered subjects also have online support. Online support means that students studying by distance education can use email and the Internet to contact their lecturers, engage with the administration, perform searches of library resources and order material, including textbooks, and communicate with their peers and lecturers through the use of discussion forums and/or listservs. A small number of courses are offered wholly online with some having been delivered this way since 1982. The subjects in these courses have no printed material at all. Students access curriculum materials and submit assignments electronically, and they retrieve the marked versions in the same way.

This paper reports one attempt being undertaken in the Faculty of Education at Charles Sturt University to transform the three message systems of education, curriculum, pedagogy and evaluation, as we explore the versatility of the communications media to deliver education both to our distance education and internal students. The paper is divided into four parts. The first section following this introduction covers the theoretical perspectives that underpin the delivery system. The second contrasts the methods employed in the traditional and transformed curriculum delivery systems, and the pedagogic, and the evaluative systems. The third describes the methodology being employed to evaluate the outcomes of the project. The fourth is a brief discussion of the findings so far. At the presentation of this paper, outcomes of some preliminary analysis of the available data will be available.

2. THEORETICAL PERSPECTIVES

Figure 1 is an attempt to differentiate fields of knowledge with respect to their cognitive demand and their structure. It attempts to illustrate, that the field of education is rich in material but somewhat lacking in structure. There is also an attempt in this figure to show how students may navigate through differentially structured bodies of knowledge.
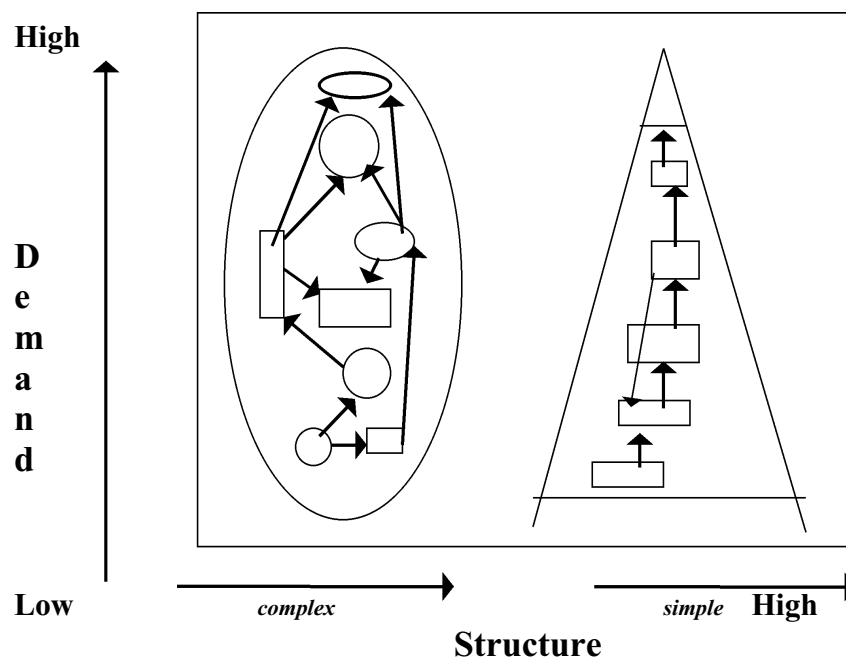

**Figure 1: Differentiating between bodies of knowledge
according to their structure**

Education, for example, is a field of knowledge that is perhaps *low in Structure* while the *Cognitive Demand* of its content can range from low to high. In contrast, Mathematics is *high in Structure* while its *Cognitive Demand* also ranges from low to high.

In mathematics, it is necessary to know how to add, subtract etc., before trying to understand equations, before differentiation, before tensor calculus. In education, there is less of a hierarchy of knowledge structure, if indeed one exists. Bodies of knowledge low in structure, such as Education, are interesting from a number of perspectives, including how we, as lecturers or teachers, can structure the material in the subjects that we teach.

In mathematics we can make assumptions about the depth of knowledge that the student has achieved if they know about tensor calculus and can undertake computations involving such esoteric things as tensors. In Education, we are in somewhat more of a quandary when we ask students to demonstrate their understandings because the deep structure of the field is hidden by the complexity of the relations that exist within the field. So, while the structure of Education as a field of knowledge is perhaps low, the relations within that structure are complex. Navigating through such complex bodies of knowledge is not a simple task. The first issue to be addressed is navigation in these complex fields of knowledge.

2.1   QUESTION-BASED NAVIGATION

The Department of Cognitive Sciences at Northwestern University in Chicago has developed a method where individuals can navigate through complex bodies of knowledge according to questions that one might reasonably ask of the information or research being presented (Schank, 1994). These are described as *Questions Raised* and they can provide the means by which individuals can navigate to places in the literature where answers might be found. Schank and others have defined eight categories of questions. Descriptions of the question classes are summarised in Table 1. The system of using questions raised to navigate to where answers can be found is called *Question-Based Navigation.*

Table 1

Question Classes

Question Class	Description
Context:	are questions that address the bigger picture.
Details:	are questions that address definitions or specific sorts of information in relation to this sub-topic.
Causes	are questions that are of a causal nature...what sorts of things can cause the phenomenon in question.
Results:	are questions that relate to what happens as a result of the issue in question.
Analogies	are questions that raise analogous situations in the society to the topic in question.
Alternatives:	are questions that ask for alternative explanations to the ones given.
Opportunities:	are questions that ask for opportunities that arise as a result of the situation.
Warnings:	are questions that ask for the things we need to be aware of if we are to try to implement something raised.

A major issue surfaces in relation to the way individuals choose to navigate through a body of knowledge using the *questions raised*. One hypothesis might be that such navigations will be quite idiosyncratic and will depend on the prior experience of the individual and the concerns they have which have created their need to navigate through the literature. This issue is taken up later in this paper in relation to pedagogy.

2.2 COGNITIVE FLEXIBILITY THEORY AND MULTIPLE TRAVERSAL OF CONTENT

Cognitive Flexibility Theory was developed in the early 1980s by Jacobson and Spiro (1995). The central tenet of the theory is that unless the learner navigates the content multiple times with different issue questions to the forefront of their mind on each occasion, then no deep or lasting learning occurs. It is through these multiple traversals in ill structured cognitive domains that an individual comes to understand the deep structure of a body of knowledge.

Until now, enacting the theory in the message systems of education has been difficult. In their original paper on teaching the art and science of film criticism, Jacobson and Spiro used a video disc of the film 'Citizen Kane' as the subject matter. They coded every 15 second segment of the film according to the themes that were evident, eg, character development, plot development etc. In this way, the content segments of the film were coded in a fashion familiar to those employed in the NUDIST program for analysis of non-numerical data. In this case, the multiple traversals of the subject matter were driven by issue questions that related to the coded themes.

Jacobson and Spiro's theory was that when a neophyte critic looks at a film they may see only character development if that is what concerns them or, if that is the topic they are asked to examine. A second viewing of the film, however, may be driven by plot development. To view the film in its entirety each time would therefore consume many hours. Using their navigation system, it became possible for the neophyte to only view those segments that related to the development of the Kane character and so on. In this fashion the neophyte critic can traverse the content of the film in relation to specific issue questions of interest. Thus, viewers traverse the material multiple times with different issue questions to the forefront of their brain and these questions determine their tracks through the film content. The substantive argument is that in order to understand the film in a deep fashion, and also acquire the analytical skills of a film critic, it is necessary for the individual to traverse the material many times with different issue questions in the forefront of their minds.

An interesting question worthy of exploration is whether this approach is worth considering in the field of education. That is to say, is a pedagogy based on multiple traversal of subject matter and driven by different issue questions, embedded in a system of question based navigation worth considering?

3. THE OLD AND NEW DELIVERY METHODS

Bernstein (1977) argued that there were three educational "message systems", curriculum, pedagogy and evaluation. The three message systems of education are difficult to examine separately. Inevitably, changes to one of the message systems has repercussions for the other two. This section describes briefly both the traditional delivery method and the one being employed in this project.

3.1 TRADITIONAL DELIVERY METHOD AT CSU

The model of distance education curriculum delivery at Charles Sturt University typically employs print-based materials. These may be supplemented by audio and video tapes, computer programs and in some cases the use of electronic mail, list servers and the Internet. Study materials contain a week by week study guide setting out the readings and activities that students are expected to complete.

Within this traditional distance education model, it is well known that assessment drives the student's coverage of the content. That is to say, the assignment items contained in the subject outline drive the students' navigations through the curriculum content and dictate the extent and depth to which students engage with the material.
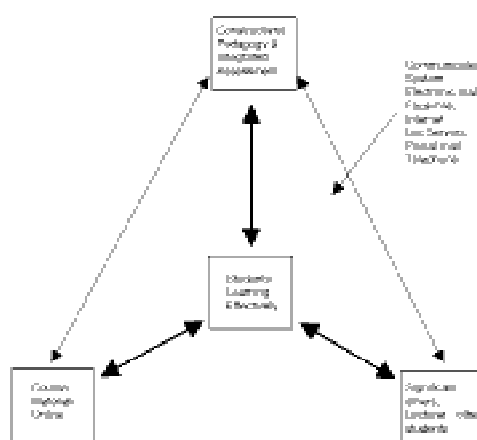
In this model, communication between the lecturer and student is mediated by the structure of the curriculum materials, the assessment items and the feedback given to the student in response to the assignments. Students communicate with the lecturer through their written attempts at assignments and perhaps also by telephone or email.

Communication amongst students is normally minimal unless there is a residential school scheduled some time during the semester. Attempts are now being made to promote communication in the online supported subjects with the provision of both Listservers and Forums. Early indications are that the communication amongst students continues to be sporadic and rare (McFadden et al., 1998). There are, however, some exceptions that are beyond the scope of this paper.

The dominant pedagogy in distance education at this institution tends to be instructivist. The instructivist pedagogy and the evaluation system drive the student's traversal of the curriculum content which they typically undertake in the most parsimonious fashion (McFadden et al., 1998).

3.2   THE NEW DELIVERY SYSTEM

An Interactive Design Model has been developed to illustrate the interactions amongst the design elements of the new delivery system. The model is presented in Figure 2. It comprises three key design elements: a curriculum delivery system accessible on the Internet and navigable using question-based navigation, a constuctivist pedagogy with integrated assessment and significant others, and a communication system for linking the students with the elements and with each other. Significant others include the students themselves, the lecturer who provides students with the support and guidance they may require, and access to others on the Internet who may provide additional support and information.

**Figure 2: Model of the Mixed-mode Delivery System
(after McKinnon & Nolan, 1998)**

In the Model, the communication system connects the students in varying ways with each of the three design elements located at the vertices of the triangle. Specific means of communication range from traditional mail and telephone to the more modern tools of facsimile, electronic mail, threaded list-servers and the Internet.

The location of students at the center of the Model and also at the center of the communication system represented by the shaded circle signifies the student-centred nature of the subject. Interaction between the design elements creates the environment for students to learn effectively throughout the course. The thin double-headed arrows signify inter-dependency among the design elements as well as the dynamic and mutually supportive interaction. The thicker arrows indicate that the students interact with each of these elements but that the locus of control rests with them, i.e., when they are studying the course materials, communicating with others, initiating and conducting navigations in response to issue questions, and completing assignments.

3.3   INTERACTION BETWEEN THE DESIGN ELEMENTS AND THE COMMUNICATION SYSTEM

The communication system in action mediates all student interactions with the three design elements of the Model. It provides them with the means to not only study the contents of the course but also to access a wider range of research information and ideas, and significant other individuals with whom to explore and discuss ideas.

Electronic mail and other communication methods such as the electronic Forum, Newsgroups or list-servers can allow students not only to interact with their lecturers but also with each other. These media present the lecturer with opportunities to create electronic learning environments that emulate the face-to-face ones in which constructivist pedagogy can operate. The major difference between these two is that the electronic learning environment can be accessed at the participant's convenience and not the timetabler's.

3.4   THE PROJECT AT CHARLES STURT UNIVERSITY

The project at CSU is being conducted in a compulsory subject of the Graduate Diploma of Education. The curriculum materials have been loaded into a relational database and are navigable using the Question-Based Navigation system described earlier.

The screen dumps at the end of this paper show what the student sees in the question-based navigation environment and in the Forum. The first three screen dumps illustrate the hierarchical organisation of the material. This organisation is purely for the sake of convenience and relates to how the material is organised in the relational database. The student first enters the research room where the topic is split into three sections (Figure 3). Each section is further split into 'chapters' (Figure 4) and each chapter into a number of research segments (Figure 5). When a student clicks on a Topic, the research segment is loaded (Figure 6). At this stage the outside frames change to show the eight classes of questions. When a question class is clicked, the questions associated with this are loaded into the central frame together where the answers can be found (Figure 7). The student can then click on the segment where the answer to the question raised can be found (Figure 8). Students can also view the titles and short abstracts of all of the research segments by pressing the 'Headlines' button. They can also do a free text search of any or all of the fields of the database using the 'Search' button.

Both relational database and the electronic Forum are accessed from the Subject Online Support web page (Figure 9). Each week, an issue question, derived from the formal assessment items, is posted to the group Forum for the subject together with a first point of contact link to the relational database. The Forum is a threaded listserver (Figure 10) to which the students have to go to read the contributions of their peers and to post material. Using the first point of contact link, students navigate through the content using the *questions raised* by each research segment. They have to make decisions about which question link to follow in relation to the posted issue question and what interests or concerns them. At present, students are asked to record where they have been in the literature and to write a short summary of what they have found out in relation to the issue question. The summary is posted to the public Forum where others can read and react to it.

Students are encouraged to re-enter the research database to follow other students' navigations in attempts to reconcile any differences in perspective that might have arisen as a result of their idiosyncratic paths through the research literature. In this way, students have access to the findings and interpretations of others. Soon, an additional feature of the software will keep track of what buttons students have clicked and make this available to the navigator as another web browser window that can be saved, printed, added to or included with postings to the forum.

The issue questions are derived from the lecturer's attempt to deconstruct the assignment question. For any assignment question, different issues can be identified. The issue questions thus serve the purpose of driving students' initial traversals of the subject matter. Additional traversals may be driven by the students having access to each other's summaries in the Forum where they may choose to re-enter the relational database in an attempt to understand how a perspective has been developed. Thus the issue questions serve to initiate debate amongst the

students. It is evident now that students do engage in debates with their peers through the Forum and in some cases the discussion can be heated as the following extracts demonstrate.

> "You said that you found that people with disabilities want access to the public schooling system but feel that they can not because of a lack of funding and resources. What people with disabilities said this(?), or was it just bureaucrats speaking and saying what they feel people with disabilities would like to say? Is it all people with disabilities that want access to public schooling? What about severely intellectually handicapped people? Is it really in their best interest to subject them to a system where even the pupils discriminate against those that are different? Are ALL disabled people saying that special schools have no place in society? Or is it just that their existence needs to be modified? It is these questions I feel that we should be asking each other and the text throughout this subject." (Student, Forum for ESS410, 11 August, 1998)

and,

> "Don't you think that it is about time that people started to view students with special needs as valuable human beings first before they label them as being different? Where do we draw the line and say who is different and who is not? So a student is 3/4 of a year behind the rest of the class, does this mean that she is not learning any valuable social skills? She may actually be extending her own potential as she may be well ahead of what she would have been if she was in another setting. Isn't this important? Whose welfare are you really concerned with? Parents of these kids are well aware of any differences but they choose not to focus on these differences to give their child a chance. It's about time people like you start to do the same." (Student, Forum for ESS410, 31 August, 1998)

At the end of the series of issue questions and discussions, students construct a response to the assignment question. They now have access to the postings of others as well as to their own readings of the literature. The assignments are tendered to the lecturer in both hard and digital copy. The best attempts at the assignment question are then posted to the Forum for all to see and perhaps to which they may react.

4.   METHOD OF EVALUATION

Students enrolled in both the internal and external compulsory special education subject of the Graduate Diploma of Education were invited to participate in the on-line delivery of the subject during Spring Semester 1998. Of the 160 external and 42 internal students, 47 and 15 respectively, elected to participate.

All students were asked to complete pre-treatment questionnaires. The questionnaires used are: the Study Process Questionnaire (Biggs, 1987), Locus of Control (Lefcourt, 1981), and Self-Efficacy Toward Future Interactions with People with Disabilities (Hickson & Smith, 1996). The three questionnaires were supplemented by a number of demographic questions designed to elicit information about students' computer skills, study and home commitments, and the type of computer hardware they had. A response rate of 100% for internal students and 90% for distance students was achieved. The same questionnaires will be distributed at the end of semester.

The research design is, therefore, a quasi-experimental (Cook & Campbell, 1979) non-equivalent dependent variables design with pre- and post-measures. Specifically, the Study Process Questionnaire attempts to measure students approaches to study in three areas: Achieving Approach, Deep Approach and Surface Approach. Each approach has two dimensions – motive and strategy. The Locus of Control questionnaire measures the extent to which students feel to be in control of their learning. Two major factors measure external and internal locus of control. The Self-Efficacy Toward Future Interactions with People with Disabilities instrument measures how confident students feel about interacting with disabled students.

Both internal and external students who elected to participate in the online delivery of the subject received the treatment described above. External students who did not wish to participate, either because they did not have regular access to the Internet (92 of the external students) or because work conditions precluded a regular contact with the Forum and the Question-Based Navigation system (5 external students), received the traditional print-based distance education package. Internal students who did not wish to participate attended lectures and tutorials in the normal fashion. All groups of students completed the same assignment questions. All students, both internal and external, had access to the Online Support web pages for the subject and to one of the Forums accessible from the Online Support Overview page.

Since students elected to participate in the Internet delivery of the subject, there are serious threats to the validity of the quasi-experiment. Attempts have been made to address these threats. First, by employing a non-equivalent dependent variables design with both pre- and post-tests, it will be possible to ascertain if there are any differences in the pre-test measures and to control for these in order to determine if there is any main effect in students' performance, their approaches to learning and in the self-efficacy towards future interactions with students with disabilities. Second, by using additional sources of data in the form of interviews, we hope to ascertain if there are any personal characteristics that may predispose students towards participating in this form of distance education study.

If multiple traversal of the curriculum content in relation to the issue questions is to engender deeper approaches to learning about people with disabilities and how to cater for them in regular school settings, then specific hypotheses can be made. The dependent variables that are hypothesised to be influenced by the treatment would be the Deep Motive, Deep Strategy and Self-efficacy scales. In addition, it may also be hypothesised that students undertaking this form of distance learning may perceive themselves to be more in control of the form and direction that their learning takes through the question-based navigation system compared with their peers undertaking the traditional delivery modes. The non-equivalent dependent variables that are hypothesised not to show significant differences are: Surface and Achieving motives and strategies; and, the external locus of control scale.

The questionnaire data are being supplemented with student interviews, analysis of the Forum navigations and responses, and comparison of the attempts at the assignment questions. The latter are being distributed to external markers on a double-blind basis. That is to say, the external markers do not know who is in the treatment or control groups, nor does the person who distributes the assignments to the markers. A post-facto analysis of the assignments will also be undertaken by an independent researcher using the Structure of the Observed Learning Outcome Taxonomy (Biggs & Collis, 1982; Boulton-Lewis, 1995).

5.   SOME FINDINGS AND DISCUSSION

Approximately 30% of the distance education students already had access to the Internet or were prepared to get a connection so that they could take part in the project. With access to the relational database, it quickly became evident that students did navigate through the research literature in idiosyncratic ways. This has been demonstrated in their navigations and postings to the web-based Forum. The summaries also indicate that differences in perspective are engendered by these idiosyncratic navigations but that collectively, students manage to identify most, if not all, of the factors related to particular issue questions. As a consequence of these postings, students engage in debates about aspects and interpretations of their navigations, sometimes heatedly as the two extracts in an earlier section demonstrated.

The tracking systems at CSU provides extensive statistics on the number of hits made on pages associated with the online supported subjects. The statistics for the pages associated with the Adolescents with Special Needs subject show that the pedagogy enacted in this subject is perhaps responsible for a very high hit rate. Table 2 presents some of the statistics available in week 8 of the semester.

Table 2

Hit rate statistics for various pages by different groups of students

Page Area of the Subject	Number of hits by External students (12/10/98)	Number of hits by Internal students (12/10/98)
Online Support Overview Page	1260	429
Assessment	48	38
Resources	47	32
Study Schedule	36	21
Read me	35	21
Forum Visits	2793	920
Forum visits by other students	177	0

Table 2 shows that there is a very high hit rate for the Forums by the external and internal students taking part in the Internet delivery. When compared with the 523 other subjects that are online supported, this subject ranks fifth highest in its hit rate for the forums. The other four subjects have enrolments ranging from 250 to 400 students.

Further analyses of the data will be presented at the conference in December. The early indications of this project are positive. Students have made many positive comments about the flexible nature of the navigation system. They enjoy using the Forum. The tyranny of distance is, to some extent, being overcome by the use of a communication tool that makes them feel less isolated. In week three of the semester, the forum for the distance education students showed a cumulative total of 51 postings and the internal students 50 postings. It now stands (October 12) at 142 and 114 respectively. This includes a three week break for residential schools where no postings occurred.

Comments from the distance education students indicate that the Forum is welcomed as a way of overcoming the sense of isolation in this mode of study, e.g., "Hello everyone, it's good to feel that I am not alone here in D.E. land." (Student, ESS410 Forum, 20 August). The personal dimension is also communicated as well as information related to the content, e.g.,

> "Dear all, sorry about the delay in getting to this forum but Australia Post misplaced my study guides, a skiing accident, and a sick father have all conspired to keep me from my duties. I've been to a number of spots using both the "contents", "alternatives" "details", etc navigation approach and also the "Fischer skim through everything, just in case you missed something technique". I know I visited more sites than necessary but it was also a bit of a catch up for me and a lot of information is embedded implicitly." (Student ESS410 Forum, 18 August).

One student, Jane, replied to this student's personal story as well as the summary of where she had been with the following:

> "Dear Louise
>
> This is just to say hi! I've been skimming around and came across your piece. I'm half way thru q2, but when I catch up I'll have a chat re your ideas. It's nice to see someone's thoughts included - mind you it might be useful if I got anything other than conversation down on the forum. cheers for now.
>
> cya
>
> Jane" (Student ESS410 Forum, 19 August)

A great deal remains to be done with this project but the early indications are that the multiple traversal of the subject matter in idiosyncratic ways is happening, and that the postings of the group complements the sets of findings of any individual student in relation to the issue questions. Students react to the postings of their peers and engage in debates that are related to the issue questions put up by the lecturer. They explore further the issues by asking questions of their own and by passing comment on the findings of others. By the time this paper is presented at the conference the post-test data will have been acquired and preliminary analyses undertaken. These will be presented at the conference as an addendum to this paper. It will be interesting to see how it all turns out.

6.   ACKNOWLEDGEMENTS

7.   REFERENCES

Bernstein, B. (1977). *Class codes and control, vol 3: Towards a theory of educational transmissions*. London: Routledge and Keegan Paul.

Biggs, J. B. & Collis, K. F. (1982). Evaluating the quality of learning: The SOLO Taxonomy. New York: Academic Press.

Biggs, J. (1987). *Study Process Questionnaire Manual*. Melbourne: ACER.

Boulton-Lewis, G. M.(1995). The SOLO Taxonomy as a Means of Shaping and Assessing Learning in Higher Education. *Higher Education Research & Development*. 14, 2 143-54,

Cook, T. D., & Campbell, D. T. (1979*). Quasi-experimentation: Design analysis issues for field settings*. Boston: Houghton Mifflin Company.

Hickson, F. & Smith, I. (1996). Outcomes of mandatory disability studies on nurse and teacher education students' attitudes towards people with disabilities. Paper presented at the ERA-AARE Joint Conference, Singapore,25th-29th November

Jacobson, M. J., & Spiro, R, J. (1995) Hypertext Learning Environments, Cognitive Flexibility, and the Transfer of Complex Knowledge: An Empirical Investigation. *Journal of Educational Computing Research.* 12, 4, 301-333.

Lefcourt, H. (1981). *Research with the locus of control construct: Assessment methods*. New York: Academic Press.

McFadden, M., Lord, B., Parnell, S., Sequeira, D., Taylor, G., Williams, G., & Wood, S. (1998). An Evaluation of the Spring 1997 Online Trial. A report to the ILSG. Center for the Enhancement of Learning and Teaching. http://www.csu.edu.au/division/oli/celt/pubs/springtrial/. (14 June).

McKinnon, D.H & Nolan, C.J.P. (1998). Distance education for the gifted and talented: An interactive design model. *The Roeper Review.(in press, 1998)*

Schank, R. C. (1994). *What we learn when we learn by doing*. The Institute for the Learning Sciences: Northwestern University.

8.   FIGURES

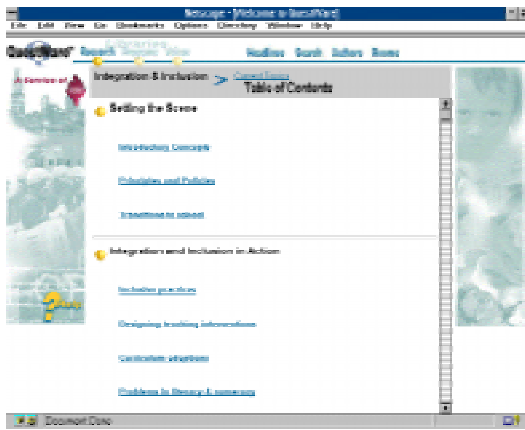**Figure 3: Within the Integration and Inclusion 'Room': The sections**

Figure 4:
The 'chapters' within 'sections'

Figure 5:
The 'segments' within 'chapters'

Figure 6:
A segment showing the question-based
navigation 'buttons' in the outside frames
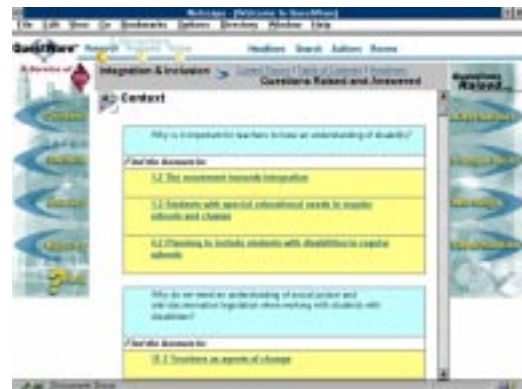

Figure 7:
The questions leading to other segments

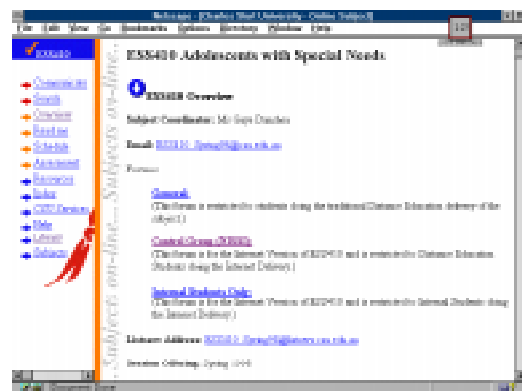**Figure 8: Another research segment to**
the Forum and to the relational database.

Figure 9: The Subject home page with links

Figure 10: The Forum: A threaded listserve