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Superhighway or Superhypeway?**

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A community of online learners: A longitudinal study of post-graduate students within a virtual community

[Margaret Lloyd](#), RITE,
School of Mathematics,
Science and
Technology Education,
QUT.








 [TOP](#)

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Note: (by Bill Russell AARE WWW Master). I have taken the liberty of changing the name of this page from AARE to I1099521. As well as changing the links to it, I have also taken the liberty of changing many of the links to local links for consistency and compatibility with the CDrom. In spite of my best efforts two of the sound files did not load correctly due to corrupted disks.

By the way - Congratulations Margaret for a paper that uses the medium.

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This presentation is non-linear and makes use of emergent technologies in the form of audio files embedded in a web page. While the contents are traditional in the form of a discussion of methodology and so on, the presentation of the data is not. Subjects' own voices are used (with their full permission) to illustrate the points raised or conclusions drawn.

This presentation is thus an experiment in the presentation of research from the horizontal to the vertical and away from a sequential and textual environment. The reader has the choice of interacting with the presented text as they choose. This form was chosen in light of the knowledge that the publication of the conference proceedings was to be electronic (CD-ROM) and this format made good use of that. As the content was also concerned with online communication, it seemed a good opportunity to have the context reflect the content, to have the medium reflect the message.

Abstract

The RITE Group (Research in Information Technology in Education) has, since 1993, been involved in the management of a cohort of students sponsored by Education Queensland and enrolled in post-graduate studies in computer education. Programs offered to these students combine academic and professional studies which have been conducted in open learning mode primarily using telecommunications and a philosophy of participation.

A longitudinal study was begun in 1995 and concluded in 1999 tracking the perceptions, attitudes and belief structures of twelve individuals. The study has shown that active membership in the program led initially to manifest changes in behaviours without comparable, parallel changes in core beliefs. Continuing membership of online professional communities consolidated changes in belief structures, affecting quite fundamental views of the role of the teacher and the role of telecommunications and information technologies in the curriculum.

The study is qualitative and is drawn from participant-observation methods. The prime instrument has been interviews conducted in various mediums - from face-to-face, to telephone, to email interaction. The workshop will present excerpts from the interviews as audio streaming from a web site to elaborate and illustrate the study's findings. The main innovation emerging from this study was the development of a dual-level categorisation of participants as the dichotomy between manifest behaviours and fundamental beliefs emerged from the data. The study perhaps goes some way to explaining the hesitancy some teachers experience in introducing telecommunications and information technologies into the curriculum even when the necessary and pre-requisite skills are in place.

Outline of Research Project

Background to the Project

The RITE Group within the School of Maths, Science and Technology Education at QUT has, since 1994, been contracted to Education Queensland to provide postgraduate academic studies in computer education and complementary professional development for a selected cohort of teachers. Communications between the institution and the student retain some of their traditional form namely, print materials such as course notes but increasing use of email has made it the main vehicle for professional development activities. Email is the medium for student student interaction, and for communication between the student and the broader professional community.

In the first two years of this project, students "connected" to QUT through Owl and subsidised ISP accounts. "Owl" was the name of the server commissioned through the Online Open Learning Project (Lloyd, 1996) made possible through a QUT Large Teaching and Learning Grant. The work RITE has done in establishing online professional development communities has been recognised in a 1999 APEC commissioned study into "best practice" in the area of flexible delivery.

Aim of the Study

The study described in this paper sought to review the activities of the Professional Development program conducted in Computer Education by QUT and Education

Queensland for practising teachers and which paralleled postgraduate academic studies in the field. The premises to be tested were qualitative in that they were designed to measure changing patterns of behaviour within the individuals involved in the program. The hypothesis was that individuals would shift from an egocentric focus to active membership of a professional community. In doing this, individuals would become more aware of their own professional needs; a metacognitive broadening of their own knowledge domain to include previously hidden directions, concepts, strategies and ideas to know what they do not know. The individual, furthermore, would be expected to hold the required strategies in information literacy and the confidence to act on this realisation, to rectify the situation for themselves and others.

It has been noted that there is little research on "how students learn online or the impact of participating in online communities on learners' ideas and attitudes" (Williams, 1995, p. 5). The study reported in this paper aimed to add to the knowledge domain in this area by focussing on affective concerns, most particularly the shift from belief into action. It was also hoped that the study would assist in the maintenance and development of the program under review.

Profile of the Learner

The learner in the Education Queensland cohort is typically a practising primary or secondary teacher in a rural centre employed by the Queensland Department of Education. There are exceptions to this stereotype in that some students both work and reside in or close to Brisbane or other cities in the state. This fact would seem to challenge old understandings of "distance education" referring instead to newer notions of "flexible education". This notion does not alter the operational strategies of the programs, but it changes the perception that such courses are solely designed to counter "distance" (location). The other factors in a practising teacher's life need also to be considered, and greater flexibility needs to be structured into any such program.

The learners in the QUT program are, as with many of their counterparts in Australia, coming to terms with the increased (and now mandated) requirements to be computer literate and to make effective use of computers and computer mediated technologies in the classroom. Since the commencement of the study reported in this paper, there have been large scale government initiatives, particularly through the Connect Ed and Schooling 2001 projects to make computing a necessary tool in a teacher's life in this state.

Methodology

The study was qualitative in that it replicated the reflective collaboration it encourages in its students. Its hermeneutic practice of presenting participants with previous views is a familiar recursion in a course whose medium (telecommunications) is its content (computer education) and whose students are its teachers in an on line community of learners. In an attempt to meet this aim, the study tracked individuals beginning the program and culminating in interviews after the formal links with the university had ceased. The subjects in the study were chosen as a representative sample to reflect the composition of the group that is, [geographic location](#), [gender](#), [computer experience](#), chosen computer architecture, postgraduate course being undertaken and current employment. [Table 1](#) presents the subject details in full.

The study was diachronic in that it tracked changes in its subjects over time. The 'beginning' participants were asked to identify their professional needs and to predict what their role would be. They were asked to document their experiences and to reflect on the qualitative aspects of the professional development program. Data was collected through interviews at critical stages of the program and through the experiences recorded by the

participants in a diary. The frequency of online participation was considered as well as its nature (active dialogue or impersonal response). The factors which may inhibit the interaction of individuals and conversely, the processes which lead to learner autonomy were sought from the initial experiences related by these individuals.

Because of staggered graduation times and the logistics of travel to the subjects' homes across the state, final interviews were held between 1 and 2 years after formal association with the university had ended. In most cases, these interviews were held in the subjects' workplace (school) to more clearly identify the links between belief and practice. These multiple sources of data helped to provide an answer to the over arching concern that QUT's professional development program achieves its stated goal of creating effective on line communities which facilitate learning and foster professional growth; and which, more idealistically, creates an autonomous cultural shift in its graduates so that they retain their community membership and move to positions of leadership within a broader environment.

Summary of data collection events:

- **Interview 1** was held at a QUT study school at the beginning of the program (four weeks from the beginning of the academic year).
- **Interview 2** was a telephone conversation at the end of the academic year with questions sent in advance to students by email.
- **Interview 3** was held in person at the subject's school at least a semester after the individual's completion of their course of study. (The timing of the final interviews have been opportunistic and have coincided with other travel commitments within the state).

Table 1: Subject naming and characteristics

Identifier	Gender	School Location	Type	Computer Skill
Alpha	Female	Metropolitan	Primary	3
Beta	Male	Provincial	Primary	3
Gamma	Male	Remote	Primary	3
Delta	Male	Coastal	Primary	2
Epsilon	Male	Rural	Primary	4
Zeta	Female	Remote	Secondary	3
Eta	Female	Rural	Secondary	4
Iota	Female	Metropolitan	Secondary	3
Kappa	Female	Coastal	Secondary	3

Please note that computer skill was a self-efficacy rating of 1 (as expert) through 3 (as competent) to 5 (as beginner). This proved to be an inaccurate measure of actual competence and was interesting as an affective measure of belief and attitude.

- It should also be noted that the data concerning computer architecture that is, IBM or Mac proved to be of no significance to the study and has not been included in this table.
- The numbers of males:females and primary:secondary teachers included was a reflection of the numbers in the total cohort of students. The subjects were then seen as a representative sample of the larger population.
- The descriptors for location are metropolitan (here meaning Brisbane), provincial

(here meaning a city outside of Brisbane), rural (meaning a country town) as distinct from remote (which was distinguished by its distance from any town or city and its location in a smaller community) and coastal (which here refers to either the Sunshine or Gold Coast which are rapidly becoming conurbations of Brisbane and defy other categorisation).

- The underlined identifiers are hyperlinked to more detailed case studies of these subjects.

Data Analysis

The data collected in this study came mostly from interviews which were taped and transcribed. Supporting data came from written artefacts such as diaries and email conversations and the field notes taken during the visits to the subjects' workplaces. Contextual data came from a group survey. The analysis of the data at the outset appeared to be a fairly simple and formal matter.

However, on consideration of the collection, different strata appeared and remained consistent throughout the study period and across all data collection incidents. Put simplistically, there was a disparity between beliefs and actions, of emotion and reason, of hearts and minds. What individuals said in rational discourse about the role of computers and information technology in education, in their own lives and in society in general was very different to what they seemed to believe. The interview transcripts are seemingly full of contradictions.

What was required to make sense of this was a similarly stratified mode of analysis. We looked firstly to the [Stages of Concern](#) (Hall & Hord, 1987) to provide us with the means to plot the rational and behavioural aspects our subjects were exhibiting. We then looked to the [Genres of technics](#) (Ihde, 1979, 1990) to schematize the more subjective or emotive relationships which were being described. The former enabled us to track action, in terms of the use made of the computer in the classroom while the latter tracked beliefs, in terms of positioning an individual in a relationship with technology, and in integrating it into their lives. The plotting was necessarily subjective, but when complete provided a tracking which we believed was wholly consistent with the phenomenon under review.

Discussion of Findings

The focus of this presentation is on the processes of analysis in this study. To this end, the following table is presented with embedded links to individual case studies of the participants and exemplars of the classifications of behaviour.

◆ [Change in Participant's Behaviours](#)

Tabular presentation and discussion of the changes (as measured by both the Stages of Concern and the Genres of Technics) throughout the period of the study. Some [critical assumptions](#) have been drawn from the data.

◆ [Coding of Data and Patterns of Change](#)

Presentation of case studies in terms of behaviours and links to audio files.

◆ **"Success" Stories**

Details of those participants whose responses indicated significant change to both beliefs and practice.

Change in Participants' Behaviours

Table 1 provides a summary of the schema and indicates the changes which occurred to individuals (identified through the letters of the Greek alphabet) over the period of the study. The data is in tabular form with the rows displaying both the Stage of Concern (SoC) as a bracketed number from 0 to 6 and the Genres of Technics (intentional, intentional (reflexive), embodiment, hermeneutic, hermeneutic/alterity, background) being employed.

Table 1: Summary of Schema

Identifier	Interview 1	Interview 2	Post interview
Alpha	3 Management <i>Background</i>	5 Collaboration <i>Background</i>	6 Refocussing <i>Background</i>
Beta	6 Refocussing <i>Embodiment</i>	NA	NA
<u>Gamma</u>	2 Personal <i>Hermeneutic</i>	5 Collaboration <i>Hermeneutic</i>	5 Collaboration <i>Background</i>
<u>Delta</u>	3 Management <i>Intentional</i>	5 Collaboration <i>Hermeneutic</i>	6 Refocussing <i>Background</i>
Epsilon	3 Management <i>Hermeneutic</i>	5 Collaboration <i>Intentional (Reflexive)</i>	6 Refocussing <i>Intentional (reflexive)</i>
Zeta	3 Management <i>Hermeneutic</i>	NA	5 Collaboration <i>Hermeneutic</i>
Eta	1 Informational <i>Intentional</i>	NA	NA
<u>Iota</u>	2 Personal <i>Intentional</i>	1 Informational <i>Intentional</i>	NA
Kappa	3 Management <i>Intentional</i>	5 Collaboration <i>Intentional (reflexive)</i>	5 Collaboration <i>Hermeneutic</i>

A critical study of this data reveals the following assumptions:

1. The participants in the course are most likely to enter the course at Levels 2-3 on the Stages of Concern (SoC) schema. Enrolment in the course is, of itself, an informational act (Level 1). The individuals who were classified at differing levels may be seen as outlying cases:

- Eta, classified at Level 1, withdrew from the course, unable to deal with the types of understanding required of him. Heller and Martin (1987) described how pre-service or initial computer courses fail to address task directed concerns and achieve task directed outcomes, is that the:

... teachers were simply not ready for them. Providing inputs that are not stage relevant (e.g. attempting to force high level concerns) is an assured way to increase the intensity of lower stage concerns. Whether and with

what speed higher level concerns develop will depend upon the person as well as the innovation and the environmental context. (p. 6)

- Beta, classified at Level 6, was forced to withdraw from the course after a family crisis. He entered the course with considerable professional experience within Oz TeacherNet projects and extensive personal experience using telecommunications.

2. Individuals entering the Professional Development Program are likely to display a range of personal relationships with technology. There is little global correlation between the Stages of Concern registered and the 'genre of technics' displayed; and each needs to be interpreted in the specific context of each individual's experience. All four correlations were observed within the population. While the 'genres' are not specifically hierarchical, there are progressive shifts of control within their categories. It is therefore not surprising to note the following:

- Beta, classified at Level 6 (SoC) displayed highly abstracted levels of personal control i.e. embodiment and hermeneutic/alterity.
- [Gamma](#) was initially classified at Level 2 (SoC) in that he displayed anxiety over a range of issues (typing error in postal address, bad weather, computer memory problems) which affected his ability to deal with the innovation. This was manifested as hermeneutic behaviours because of the pre eminence given to the issues themselves. He was reacting to each issue and had not developed a holistic sense of the purposes of the course. In this instance, the SoC and the genres are easily seen as interdependent.

3. There were few parallel combinations of SoC and genre, that is, Management - Background, Management-Intentional, or Management-Hermeneutic. This is to be expected given that the individuals chosen were representative of different types of people within the population, not as a homogeneous group in and of themselves. What this does indicate is that differentiation between individuals is tracked by the dual measures (SoC/Genre). A sensible interdependence can be seen between the SoC and Genre in all cases.

4. Analysis of Interview Results (Interview 2) There is an apparent paradox in the second measure, where significant changes were seen in the recorded SoC level while the genres recorded appeared to be static.

- **Stage of Concern** Five (of the remaining six) had been re-assessed as being at Level 5 (or higher). The remaining individual regressed (from Level 2 to Levels 0-1). No individual remained at the same Stage of Concern.
- **Genre of technics** The opposite appears to be the case in the classification of genres. Of the six, four remained within the same classification despite evidencing different behaviours.

This presents a paradox which may have its explanation in the Piagetian accommodation and assimilation arguments. Accommodation requires the world be changed to fit one's thinking and can be seen as nonconservative and directed towards the object to be known. Assimilation means that thinking is changed to fit the world; it can be seen as

conservative and egocentric (Pufall, 1988). "Changing the world" is, for classroom teachers, a relatively simple task a set of daily transactions which are altered to include higher use of technology.

In conducting the professional development activity, the individuals imposed a change upon their world they made their peers redefine their roles and their subsequent relationships within the school. The initial entry to a program of this nature imposes dramatic changes on the way an individual views themselves, their working environment, their professional communities, their interactions with others. The universal dramatic changes in SoC levels (usually 2-3 stages) support this notion of accommodation.

Assimilation is a slower more conservative process it is "hearts and minds", the ego (in a psychological sense) redefining the new experiences and relationships. The genres did not change because they are part of an assimilation process which would contextualise the teachers' fundamental beliefs about teaching and learning, about defining and controlling principles.

At this stage, "background" appears to be becoming the dominant genre. This is reflective of the higher levels of SoC also recorded at this time which, according to their definition, indicate an outward focus. The higher 'stages of concern' are more about purpose and context than context and vehicle. The actual technology becomes the conduit for the action, it is of little value of itself and ceases to be the centre of attention. Attaining higher SoC levels indicates a particular confidence with medium, allowing the user to focus on processes and outcomes.

5. Analysis of post course interviews

The interviews and visits were welcomed in all but one instance. The overwhelming trend here was one of a maintenance or heightened measure on the schemas. This finding reinforced the accommodation/assimilation processes at work and affirmed our assumption that turning beliefs into action is a slow process. Subjects described their practice in theoretical terms and almost unanimously described their membership of a teaching community well beyond the confines of their physical working space. The abiding sense was one of confidence, of belief in one's ability to deal with change.

Conclusion

The findings from this study are that teachers' attitudes to technology are initially different from their actions; and that it takes a period of immersion followed by a period of reflection to convert attitudes into beliefs and from then, beliefs into genuine and sustained shifts in practice. What is most interesting is that beliefs and actions did not change in tandem, indicating that changing the world (accommodation) is easier than changing thinking about the world (assimilation).

The study reported in this paper was successful in a number of ways. It permitted us to gain a clearer insight into what was happening in the lives of those we came into contact with. It also allowed us to test some of the motherhood statements of our program and to monitor whether we were, in fact, meeting our stated aims.

Perhaps, of importance to this conference is the notion that "true" professional development can be achieved through online communities and that distance is, in this

environment, a state of mind rather than a geographical reality. The changes to individuals reported in this paper happened through, and largely because of an online community. Such changes were complex and are, as stated, about both "hearts" and "minds". It is hoped that the stratified analysis tool developed in this study will be of use to others and will further our understandings of learning in online communities and in how professional development actually translates into action.

Of relevance to this conference is the notion that, in this instance, the Internet did provide a "Super Highway" (rather than a "Super Hype-Way") in its provision of a delivery system which lived up to its expectations.

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