Learning Dialogues Using the World Wide Web

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Background

The use of interactive techniques such as asynchronous discussion groups, and synchronous chatrooms is beginning to fill an important part of online learning strategies in University courses. The potential of online methods in the teaching of advanced science concepts has been realised, and is most effective when the strategies employed to involve students are well designed[1]. In this paper I describe an implementation of the "learning dialogues" concept as part of a teaching strategy in a second year physics for engineers subject.

Web Based Teaching System

Although the main emphasis of this paper is the use of a web based system for enhancing flexibility and student learning, the generic aspects of the system used for this work need describing. A hybrid web based teaching system[2] was purpose built from freely available software running under the Linux (a unix-like operating system for personal computers)[3]. The main components of each website fall broadly into four categories:

digital *resources* (notes/multimedia/solutions/hints);
interaction facilities (email/virtual tutors/newsgroup/chat);
administration functions (scores/student profiles/assessment tasks); and
other *virtual* spaces (links out/web gallery/diagnostic test centre).

Students and staff need to be registered and each subject/group website is protected by server *htaccess* control. In so doing, it is intended that a web space is created that is equivalent to a face to face class, in so far as opinions and misconceptions expressed by individuals would remain within the group. The UTS student identification number, though somewhat impersonal, provides a unique 8-character username. Passwords must be http compliant.

The newsgroup software (*HyperNews*) supports multiple threading and indentation of responses and a variety of modes for the addition of messages including a simple to use "smart text" as well as hypertext markup language. Newsgroup discussions can be established in one of three categories:

Staff owned (assessible discussion groups started by the teacher);
Staff and students Zone (discussions on any topic, started by anyone); and
Staff free zone (discussions between students in absence of staff).

Proprietary systems such as *WebCT*, *TopClass*, *WCB* can now provide many of these features with increasing flexibility and reliability.

Students' profile and virtual Physics Learning Centre

As part of the registration for the web site students were asked to complete an online survey. The survey was aimed at gauging their confidence and experience with using web based technologies, as well as the nature of their access to it and any concerns they might have about web based teaching.

The profile of the students has been an ever-changing one. The data collected represents a snapshot in autumn 1998 from a sample of N>175 students:

On campus full time (ie. greater than half load)	84 %
Have remote access (work or home)	57 %
Engineering students studying physics	81 %
Fraction of part-time students *with* remote access	78 %

Students' perception of their experience with internet technologies was measured using a 3 point Likert scale. As can be seen in Figure 1, nearly all respondents claimed some experience in the core technologies of WWW, email and search engines. The majority of students however were not so experienced with email listservers and computer mediated discussion. (Care was taken to explain the meaning of these terms in the survey form). Students' confidence with these technologies was also probed. The student responses however showed that in excess of 50% of respondents claimed to be very confident in the use of the core internet technologies. Approximately 20% described themselves as not confident, but few described themselves as being worried about using the web.

Open feedback was also sought about any concerns they had at outset:

It's going to make the course &/or assignments more difficult than usual.
I've only used the internet for fun so far, & I'm a bit hesitant about using it for coursework.
I attend uni on ... only & I find using the web etc very time consuming.
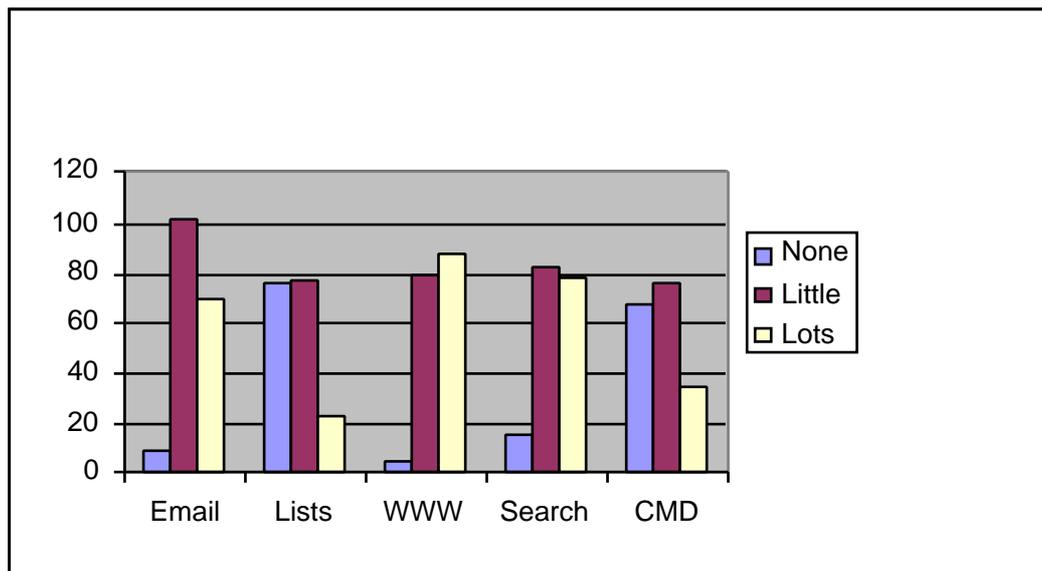*Call me old fashioned, however I prefer to learn from a human being.*

Figure 1. Students' ratings of their experience with Internet technologies.
Lists=Listservers, Search=Search Engines, CMD=Computer mediated discussion

The majority of the students surveyed are registrants for the Virtual Physics Learning Centre (vPLC). Involvement in the vPLC is completely voluntary for students and staff. Greater than half the eligible students and a quarter of staff are registered. The website has the same generic structure as that described above, however the main emphases of it are:
  to provide equity across different strands of the same, new first year subject;
  to provide an avenue for timely updates, help (v-tutoring) and advice; and
  to facilitate some self-help online diagnostics & provide interaction with staff and fellow students.

Learning Dialogues

The use of web based computer mediated discussion has been trialled and developed over several years. This work has its origins in the many emails to and from students that were often on administrative and time management (a polite term for begging for extensions on assignments) issues, and which not surprisingly increased in frequency near to the final examination period. Amongst this correspondence were genuine attempts on the part of students to formulate mature questions, and to provide reasoned "self-answers" inviting comment. The benefit of this *semi-formalised* "thinking aloud" has been recognised as an important attribute of computer mediated discussion.[4] A strategy has been developed as a way of trying to engage students in dialogues with each other, with the teacher and importantly internally with themselves. A teaching and assessment strategy has been developed that engages students in "thinking aloud". The asynchronous discussion format provides a flexible and interactive vehicle for this thinking to take place. A small number of key concepts in the subject are dealt with in this way.

    The important features of the strategy are:
      open questions as the stimulus (room for interpretation in question & answer);
      exploration of the question can usually take place at several levels;
      each question(module) starts a fresh newsgroup;
      questions are set as as prework for next class (often revision of earlier studies);
      virtual tuition (comments/arguments) from peers or teacher; and
      self review later in semester.

   Figure 2 shows schematically the timeline. A module will remain "active" for upto 4 weeks to allow stragglers to complete (commence) the modules. The input from the teacher is shown on the left, feeding in where necessary to ensure discussion proceeds productively. Critical stages have been found to be just after the module stimulus is posted, and at the end, when contributions from students are synthesised into a summary record. To encourage student involvement, the students' participation in modules is assessed. The weekly activity, amounts to 5% of the subject assessment, and is assessed primarily on participation. To ensure that all students had the opportunity to consider the prework modules prior to class, a computer lab is made available immediately prior to class.

Module Posted

Students' Attempts

Serious Problems Corrected

Peers' Comments

Some Clarifications/Probing

Stragglers

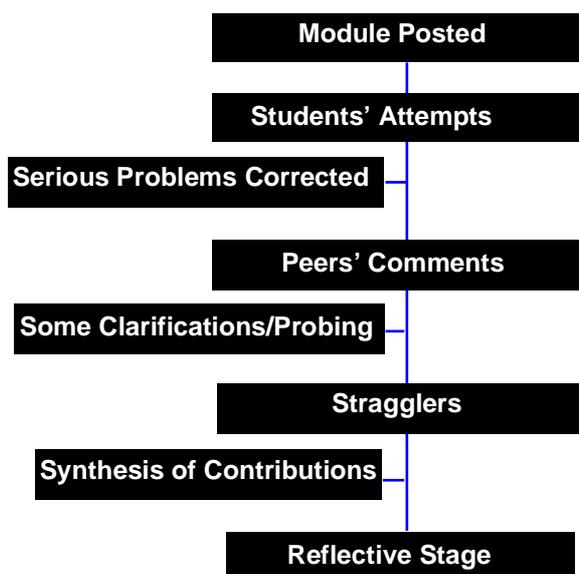**Synthesis of Contributions**

Reflective Stage

Figure 2. Schematic diagram showing the timeline of a learning dialogues module. The involvement of the teacher at key points in the process is shown as inputs from the left.

A number of implementation issues arose ("Not bugs, ... features"). Although the newsgroup format encourages interaction, a good answer, early in the thread of responses, tends to kill discussion. The role of the online teacher here is to work hard to draw out some broader issues to keep the discussion fuelled. For instance, by seeking clarification from individuals who seem eager to agree with the previous person. In the prototype system, students were not aware of other students responses prior to submitting their own answer. Instead, new responses were incorporated into the newsgroup database using purpose written CGI scripts that returned to the student's browser, a sample of the previous responses and the invitation to comment. The pros and cons of the two approaches are under review.

The learning dialogues project is still being evaluated and on two levels.

At the technical level, there are questions and issues like:
Was the newsgroup software easy to use?
Does the newsgroup and email technology help or hinder?
Why not just have old-fashioned tutorials?
Was prework posted early enough to be useful to students?
Did I underestimate how long students would spend doing the modules?
Was (remote) access to the internet still an issue for some?
Is the necessity to express physics in english a barrier to use of technique?
Analysis of web server statistics is providing a profile of usage.

At another level, there are the intended learning outcomes:
Do the students feel that the modules helped them understand better?
Can this understanding be demonstrated using targetted exam questions?
Were (deliberately vague) comments from the Virtual Tutor helpful?
Does reflection improve understanding?
Are learning dialogues really happening?

Endnote

The main emphasis of this paper has been the description of a strategy for incorporation of online discussion for enhancing flexibility and student learning. A snapshot of the everchanging profile of my students involved in web based teaching has been given together with a description of the virtual learning environment that the majority of them are involved in this semester. A specific strategy to engage students in learning dialogues using newsgroup software has been described. Details of evaluation of effectiveness of the latter will take place in a forthcoming publication.

References

[1] Taylor, Ed. (1995). *A Different Kind of Mateship*, OzCUPE2 Conference Melbourne.

[2] http://www.flex.uts.edu.au

[3] UTS VCDF Funded Project 1997*An Integrated Approach to Electronic Mode Flexible Learning*

[4] Laurillard, Diana. (1993) *Rethinking University Teaching: A framework for the effective Use of Educational Technology*, Routledge London (p104)