Adding (negotiated) learning management to models of teaching and learning

Version of 11 April 1997

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Preface

This paper, written for the email discussion list "itforum", is also on the WWW at: http://www.psy.gla.ac.uk/~steve/TLP.management.html both for direct reading, and to fetch a postscript version for printing.

(It is about 4,000 words long, 25kbytes, 4 printed pages (Times 12 point, single spaced).)

Introduction

During a project ("TILT": see references) in which we had to develop a method for evaluating applications of CAL (using the term VERY loosely to refer to all uses of computers in learning and teaching), we found that the most important results of many of our evaluation studies turned out to be not measurements but discoveries of the importance (in that situation) of factors we had failed to anticipate. Consequently I believe that we have a great need for an adequate theory of the Learning and Teaching Process that could at least describe which factors are important and so structure observation, evaluation, design, and other research.

The literature does not provide us with the answer: there are a number of landmark theories (I am working on my list of them!), but they are limited by the failure even of the best of them to discuss their relationships with the other landmarks. Hence we are some way from a workable synthesis. However in my view the best single one to point to currently, particularly for the domain of Higher Education, is Laurillard's 12 activity model (Laurillard, 1993 p.103). At least as presented in that reference, it has a number of failings such as its failure to address peer interaction. This paper concerns another such issue that I feel should be addressed explicitly in any useful model of learning and teaching; and because of my interest in the Laurillard model, I will also discuss how it relates to that and might be integrated with it.

I will call that issue "learning management".

Learning management

Learning, particularly in higher education, depends on the time and effort the learner puts in, and whether they invest that time and effort in more or less productive activities. (This is worth stating since in contrast many psychological theories view learning as something that happens automatically, independently of the learner's intentions and motivation. And of course some learning, such as occurs when you burn your hand on a stove or are stung by a bee, is involuntary. Furthermore, rightly or wrongly, most of us do expect that we will remember people's faces without special effort or action.)

Given that (in education) learning depends so heavily on the direction of the learner's effort, results will depend on the management of that effort. Laurillard's model, for instance, revolves around classifying into 12 categories the relevant activities, which she calls "mathemagenic", following Rothkopf (1970). "Mathemagenic" is simply used to mean "likely to engender learning". Laurillard's model, like other theories of learning and teaching, focusses on what the important activies are for promoting learning. However in observing actual learning and teaching I have come to realise that the control or management or administration of these activities is itself a crucial issue. If it goes wrong (e.g. if students do not know where a lecture is to take place, or if they do not take a deadline seriously, and so do not submit work in time to get feedback before an exam), learning outcomes suffer. This applies, and in fact applies particularly strongly, to uses of IT in learning and teaching. Many CAL applications have foundered because the package is delivered and applied with ONLY "learning" i.e. conceptual issues addressed. All the "management" issues about when to use it, how much to expect to do at a time, where to get help, how it will be assessed, how to turn the computer on, how to get into the package, etc.etc.etc. are almost always omitted, and often teachers do not grasp this until they have a large disaster on their hands. The fact that this is only obvious in hindsight to many people shows that we have a significant gap in our theories, whether they are conscious or not, of the learning and teaching process. We need to include the activity of learning management as a major process within the learning and teaching process.

When we consider how to address the management issues around some piece of CAL software, there are two basic practical approaches. One is to get the human teacher to do it i.e introduce the software personally to the class, and be there to support the learners. This is easy, works for any software, but means there is little reduction in human work ("contact hours") to offset the cost of the software, and it can't work for distance learning. The other is to try to incorporate the management activity in the software or other media. Clearly an explicit model of it would then be a great help in the design process.

As in many other areas, introducing a new technology exposes with a new clarity issues that have really always been there. When someone naively replaces a human activity by a machine one, then we see by the way it breaks down some of the less obvious things that were in fact being done by the human. This has proved true in office automation, and I have seen it in education.

Lectures

In passing, Laurillard (1993) made some scathing comments on lectures as a teaching method. Since I take money for lecturing, this naturally makes me defensive and since reading her book I have collected other views on this. Certainly against lectures is the fact that they go at one pace which it is almost impossible can be optimal for everyone in the audience, while textbooks and CAL have the immediate advantage of being self-paced. On the other hand, lectures are not merely expository mechanisms, but perform other functions. One of these is their role as social occasions, and as mechanisms for creating social cohesion in the class. But the role relevant to this paper is that in practice they are used as the main means for "management": for announcing learning objectives, learning activities such as exercises, but also for the teacher to get immediate feedback from learners about agreement or resistance over those activities and objectives, and for learners to gauge their progress, efforts, and understanding relative to others in the class. As a management mechanism they are not one-way, but to an important extent, interactive.

It is of little benefit if lectures are replaced by CAL (or videotapes, multimedia CDs, etc.), only for the teacher-manager to have to schedule class meetings to deal with these other issues. The name of the meeting might change from "lecture" to something else, but the need for a room to meet in, a time that everyone concerned can meet (a synchronisation constraint), and the resource to pay for the teacher's time remain the same. Replacement of lectures may be desirable, although many disagree, but successful replacement requires attention to their learning-management functions as well as their expository function.

Student peer interaction

Research on peer interaction has almost all been studies of whether conceptual advances take place, and what the preconditions for this are. One of the real lessons between the lines in these studies, however, is that such conceptual discussion seldom takes place without careful manipulation by the experimenters. (For instance, it may be necessary not only to create groups where the individuals have different starting conceptions, but to make each individual state their views in public e.g. by having them write them down before they hear others' views, then read them out. Only this makes them publicly committed to defending their true opinions.) Thus what they are studying may have no ecological validity in the sense of being a phenomenon that occurs naturally. Furthermore we know very little about the amount or content of student-student interaction in higher education.

However there have been some studies of student email, which begins to lift the lid on this. A lot of the exchanges are "social" i.e. nothing to do with education, and much of the remainder is not about conceptual content, but about what I am calling "management" e.g. "when is that assignment due?", "what do they want for a 'critical review'?". If I am right in this sketch, this may seem depressing to researchers on peer interaction who have presupposed that conceptual gains are all there is to the learning and teaching process. However I suggest that actually learning management is crucial, though neglected by theorists, and peer interaction is probably a crucial support for it.

Student email

Although still far from universal, providing students with email facilities is now quite widespread, and a number of studies have been done of this. They suggest that email exchanges with teaching staff often show a similar pattern: that is, novel conceptual content is rare, checking up on definitions a bit more common, but administrative and management content is the main use e.g. students verifying deadlines and other requirements, and asking for clarification on the content of assignment instructions.

My department got a rather clear lesson in this recently. Our first year numbers hve approached 900. Two years ago, the whole class had email, but the following year this was not available. The class tutor (i.e. manager in the sense of this paper) found the number of queries she had to handle was greatly increased, even though it was rather more effort for students to make in inquiry. This was because with email, every query she received and recognised as of wider interest, she could post to the whole class. Students who for various reasons missed announcements were referred by their peers to the electronic bulletin board. I think this experience is telling us about the interacting importance of IT, of scaling up in numbers, and of the learning managment component of the learning and teaching process. Any announcement (e.g. of an assignment) made with typical competence by a teacher may perhaps draw clarification questions from 5% of students the first year it is used, and 1% in later years (if the teacher uses the experience to edit the announcement). In a class of 30 that would be one or two students in the first year, and quite likely none in later years. In a class of 1000, that is 50 queries the first year, 10 in later years. A typical human teacher might be happy to answer one query (it reassures them the message went across at all, lets them reconsider whether they expressed what they wanted), find it quicker to answer 2 or 3 personally, but after that starts to long for a broadcast mechanism such as making another announcement, (preferably not in a lecture which some students will miss). These simple numbers show how just having email or electronic bulletin boards may be one of the most important applications of IT to education for large class sizes, just because even though lectures scale up cheaply, management interactions (just like marking and tutorials) do not. They also show how management is an interactive, not one-way, issue: when a student asks a question this tells the teacher something. But again, this does not scale up: the teacher does not learn 10 things from 10 repeats of a question.

Tutorials

The same points I made about lectures should apply to tutorials. Though "tutorial" means very different things to different people and institutions, it is basically some sort of meeting between a teacher and some learners. Most discussion of tutorials, and how they might be replaced by some kind of software, only analyses the conceptual aspects of the exchanges that occur. In practice however tutorials are the occasion for even more management and administrative exchanges than lectures are, and replacing most physical tutorial meetings with the kind of software usually described as tutorial software will leave this function unaddressed.

I am currently part of a project looking at ways to provide and supply over the network materials that would constitute "tutorial" material. (The project is MANTCHI: see reference list.) The project is based on Terry Mayes' ideas, that students get value from overhearing discussions or at least questions and answers involving other students i.e. "lurking" in net parlance as third parties to a learning exchange; and that it should be possible to develop computer assisted versions of this (using the Answer Garden idea: Ackerman & Malone, 1990). For instance, last year's discussions would be available to next year's class. The idealised version of this is that the resources would be like Plato's "The Symposium": a reported discussion that conveys hugely valuable conceptual content. (Lurkers on this list may like to comment here about whether silently overhearing discussions can indeed be a learning experience, or whether that is just a fantasy indulged by the garrulous and verbose.) The opposite version is that such things are and will be largely FAQ (Frequently Asked Questions) collections: replacements for hearing clarification question and answers in lectures or tutorials. Even if this latter view is correct, should we regard this as disappointing? It surely shows the importance of the "management" component of real learning and teaching processes, and suggests one kind of IT support for this.

However working on these issues has for me brought out another important question: are student questions a good or a bad symptom? On the "bad" hand (to garble a cliche), if I have to answer 10 separate versions of one question asking for clarification on what I meant in a handout, then I feel I expressed myself badly, that I must and will rephrase it better next year, and that the badness is proportional to the number of questions I got about it. On the "good" hand, if I get no questions after a talk, I do not feel good. One of my formative (though "gratuitous" i.e. third party) experiences as a teacher was discussing with another lecturer her performance in a course. She had had repeated bad course feedback about going too fast, and the year I observed her she had decided to respond drastically. Her whole manner showed (at least to me) how bored she was to be going so slowly through this elementary material. But, she remarked, she knew it must be working because now the students asked questions. This brought home to me the importance of questions as positive feedback to a teacher, at least to a speaker or lecturer. I am therefore caught between two views: that capturing FAQs can only be a measure of the failings of the original exposition, and should only be a stopgap before revising the material; and that receiving questions is crucial to the teacher managing the course, and that mechanisms that do away with that will undermine the whole process, just as my colleague had to get 2 years' worth of bad course feedback questionnaire returns to get the message about her delivery pace.

The learning management process

Such indications show us that the learning management process must be interactive in nature, even though a naive model might show it as a one-way process from teacher to learner (as in "setting homework"). This would make it fit with one of the three main generating principles of Laurillard's model: that of interaction or "conversation" between teacher and learner. It also shows why the basic Laurillard model cannot be complete.

The Laurillard model by itself (unlike Pask's model from which it derives) tacitly implies that the mathemagenic activities are agreed without discussion, as if dictated by the teacher. In practice, at least in campus universities as opposed to distance learning courses, they in general are negotiated. When students decide not to come to my lectures they are consulting a higher level goal (learning outcomes) and deciding that that activity is not necessary or not as important as another. Students have alternative resources and decide between them. In fact student selection between resources is one of the questions we have found important in evaluation of both CAL and non-CAL teaching (Brown et al.; 1996), but is not discussed as a factor by most theoretical models. Furthermore, students can and do decide to form peer groups for study, to do extra exercises, to do teachback i.e. to institute learning activities not suggested by teacher. Currently in my institution it is very noticeable that this is done far more by "mature" students i.e. not fresh out of school: these students take a more active role in managing their own learning, a skill that we should perhaps be doing more to teach.

Thus "over" the 12 Laurillard activities, is the management activity of deciding what the mathemagenic activities will be, together with the coordination necessary to make such activities actually work i.e. organise teacher, learners, materials, and rooms together. This activity is in general an interactive one of negotiation and iteration. Hence interactive media like email can support it, but textbooks and fixed software may have trouble.

But interactive management of learning is not just about administrative matters: students also need and should receive information on how well they have learned the material, how well they now understand it (after the extra feedback). So do teachers: they learn how well material has got across, which material has not got across, which activities have failed. Any technology that failed to support this management information flow would endanger the course it was used on. Hence (as noted above) feedback that teachers get about how the course is going and what activities are failing and succeeding is as much part of this layer as administrative announcements to students about assignment deadlines. Furthermore, time round the feedback loop is important. Once a year feedback (never mind once per textbook/CD redesign) is thousands of times worse than the once an hour or minute to minute feedback obtained by lecturers successful at eliciting questions.

Hindsight: Is it all old hat?

I've said what I mean by "learning management", why I believe it is important because it has a marked effect on learning outcomes, and that I feel it should be a component of any adequate theory of the learning and teaching process. Is it all obvious, something we all know anyway, and not worth stating? It is certainly true that any practicing teacher actually does spend a lot of time attending to such practical management issues, so in a sense we do know it all already. However the common cases where CAL is introduced and doesn't work well exactly because these issues are not attended to I believe shows how we need to express our practical know-how in our theories. In this respect I think it is like the issue of meeting costs and delivery deadlines in instructional design (which was discussed here not long ago). Every practitioner "knows" these things are important, but most design methods do not mention cost, and still no-one likes to say that cost and timeliness are more important than learning quality: yet that is what designers' behaviour shows, and what customers need (better something adequate on time and budget, than something a bit better but too late to be used). I think that our theories should say what is the case, and so be able to predict what skilled practitioners actually do and what everyone needs to do to make learning happen when we perturb old practices by introducing new technology.

Foresight: can we predict future problems?

New technology often causes design disasters because factors that were hitherto unimportant may become important before they are identified (Petroski 1982). One of the more famous bridge collapses of this century was the bridge over the Tacoma Narrows, which oscillated itself to destruction in a side wind. Romans building bridges in stone did not have to worry about side winds: even with hindsight we know they were right to ignore that, because by the time they had met the vertical forces, then the side forces were automatically dealt with. Modern steel changed that. In higher education IT, expanded numbers, and distance learning are all changes that may make old design approximations invalid. With face to face teaching and a class size of 30 or 50, then unplanned interactions such as questions in lectures typically take care of the management function without any specially resourced and timetabled mechanism. This robustness is a virtue of the best designs, even if we didn't realise it at the time (as with stone bridges). But take away face to face (distance learning), or lectures (replace by CAL), or increase class sizes to 1000, and suddenly explicit provision will probably be needed.

But this doesn't tell us what to choose: whether to argue that traditional approaches are best with an inherent stability that we didn't appreciate until we tried to replace them, or whether that to make any of those changes while maintaining quality will just require more careful design than enthusiasts realise. When we understand better what all the functions of traditional practices really are, we will probably see how to replace them in other ways. And then we may be able to abolish all campus learning, replacing it by a single world wide course in each subject delivered by wire, mail, and ether, and yet raise learning quality. If so, then perhaps we may look back on all those "social" interactions in classrooms and student accommodation and realise they were just fallbacks to compensate poor presentation and communciation by teachers, and peer interaction can in future be exclusively about recreation. You'll have a brave new world, but I'll be out of a job -- unless of course this paper turns out to be really really important and makes my fortune as a consultant putting the rest of you out of a job. So you better start pointing out just how wrong it is ...

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