AN EDUCATIONAL TECHNOLOGY - CAN IT INCLUDE DISCIPLINE AND MAINTAIN DIVERSITY?

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Introduction

In Sunrise at RMIT we are working on a process of disciplining personal experience with computers in order to develop a shared educational technology. Given that computers will be ubiquitous soon, how can sense be made of their presence? Our 'discipline to awaken awarenesses' is based on the Discipline of Noticing of Professor John Mason (Open University) and developed with his assistance. Our development of ways of articulating what is done with, by and in the presence of computers aims to support a discourse which will empower those involved to make informed and appropriate decisions and evaluations of their interactions with computers.

Technology as a discourse

The shift from regarding technology as an object or collection of objects to
using the word as a label for a discourse for working on ideas about 'technological' objects opens the way for thinking about the development of a technology by a community. At RMIT we, like so many of our colleagues at fellow institutions, are faced by the problems which seem to be associated with the presence of computers: incredible ranges of computing skills and expertise among both staff and students, terrifying questions about new forms of knowledge and practices, pressure to solve the problems of inequity in a new domain, and so on. We find it hard to know where to start.

> "I am no longer interested in the question of what the computer will do for the teaching of mathematics," I said to someone the other day. She looked askance and after a few minutes felt compelled to interrupt the current conversation to assert that she was "very interested" in that question.

What did I mean? what did she think I meant? what did she mean? It soon became clear that she was assuming the question was not of interest to me, quite reasonably. In fact, I was alluding to the idea that the question had
changed for me - instead of asking what the computer would do, I was asking what could I do with a computer1 or more accurately, what I could do and who I am, in a world in which there are computers (and tigers).

It is not now for me so much only a question of what it is that is of concern
to my colleagues, or even what they choose to be concerned about, as it is how we can help people acquire the tools for working on their concerns - the how rather than the what. It becomes easier daily to find information

about the relationship between people and computers, computers and forms of knowledge, computers and people as social constructs2, and so on, but it seems that gaining access to the means for engaging with the 'what' is not always the concern of those assembling it3.

John Mason (1992) in a keynote presentation at the Australian Conference on Computers in Education raised some questions about this. He suggested that more on the computer screen, even if it is the result of multiple-media
production, too often resulted in a product which supported zero or uni-dimension thinking at best. The same is true off the screen: accumulating wise words (articles written by others, for instance), does not necessarily result in a powerful personal technology. Even given the motivation to want to know, there is still a need for skills and tools which make it possible
to find out.

> "I am interested in how people learn" was another statement I offered naively in conversation recently. "We've moved past that" was the reply I got from my social constructivist colleague.

Again, what was I talking about, what was he talking about? He thought that I was dwelling in the psychological question but I thought I was dealing with an epistemological question. He thought that I was going to 'teach' something if only I could find the answer; I was thinking about how I keep finding harder questions, having constantly to even more finely tune the ideas I have. He was telling me about how society shapes our understanding; I was telling him about what I feel inside when I 'learn' something or want to learn something. We were poles apart.

On both occasions reported, I was talking to esteemed colleagues and on both occasions they were saying what I felt I might have been saying if they were taking my role in the conversation. There was a third incident recently.

> A colleague assured me he would not participate in an activity if I continued to hold so tightly to an enunciated principle which was, it seemed, the basis for much of what was being planned. I chose to abandon the principle and see what happened. Immediately the activity could take a different form and I was far more satisfied by this than the original one. My colleague could be satisfied as well.

The three incidents I have reported might trigger memories of similar experiences in others.

In this paper I want to work on these experiences in several ways: how do

we talk about experiences so that others can engage with us effectively; how do we use thinking strategems (Pimm, 1987) to arrive at more effective ways of thinking and talking about experience. I also briefly consider adopting these as the basic questions for an educational institution. In all three cases, the use of discipline to provide opportunities for diversity is emphasised and the context is the development of an educational technology.

Collaborative Discipline of Experience

In offering my accounts of what happened in the three incidents described above, I tried to do more than recount the events.

I carefully crafted the description so that it would contain only enough information to enable my reader to identify with it, with the intention that the reader would find my account evocative of a personal experience. I wanted to use a class of experiences to make a point but I was not sure that I would achieve that aim if I offered a general class description. Instead, I worked to evoke in the reader another similar experience to which the reader could relate as I spoke of my experience. Then generality could come from plurality, but still be connected with the particular.

I have taught myself to aim for a concise description to achieve this purpose. I use the minimal description instead of one which depends upon the reader's entry in to it, and so, often requires embellishment, exaggeration, etc. My purpose is to find common ground on which to work with colleagues and I find I need to have shared experiences for that: while both parties may have had different 'primary' experiences, they can now be sharing 'secondary' experiences; they are re-minded of experiences they have had at other times.

This process provides the base for collaborative reflection. It immediately anchors the reflective work in a community which can then support the work that is done. Many action research practices depend upon writing as the support structure for reflection but we have found that writing requires even more discipline, does not provide the opportunity for the researcher to learn from or with others, and leaves the researcher in isolation when it comes to the adoption of new practices based on the reflection. The development of discipline within and by a community makes it more likely that the discipline will be sustained (Baird, 1992).

This approach to dealing with experience contrasts with many in another way. Working from experience has many advantages but it is not easy to describe experience: what about all the factors which are unique to the experience? Unless they are all related alongside the experience, there is a fear that generalisation from the experience will be invalid. We agree. But adopting the minimalist approach described does not lead to impoverishment if the reason for the reviewing of the past is the future. (I might not want to claim that this is also true when one is interpreting the past.) In my case I am trying to find ways of using experience to inform action in the future and while re-entering the past is often easy, it is not often that what happens in the future is informed by what happened in the past. It is often the case that the past is allowed to pro-form the future (as happens when past actions are repeated without being either informed or reformed as a consequence of past experience).

Using Thinking Stratagems

> I sat in a meeting with colleagues trying to design the benches for a new computer laboratory which would house the department's 200 desktop computers. I suggested we replace the computers with notebooks4 and make the new room an attractive study space. I was told that was not the question. I sensed that past experience was in the way of the future.

One of the contributions that we can make to our colleagues when we are discussing experience, is the provision of a different perspective. When we detect a mis-match of thinking we might be able to identify that it has, as its source, a perspective other than our own.

When we find we have 'just seen the light' it often feels as if we have moved to a different place with respect to whatever we were thinking about. In the example above, I was an outsider at the meeting and felt I was standing outside their problem-space. My view of the problem was different and my solution followed. The problem could have been seen by them as more diverse than they had made it if there had been room for other perspectives from which to confront it. They seemed likely to miss some opportunities for the future.

If we know that we have this feeling of being spatially in different places when we 'see' something, how can we make sure that in our own context we give ourselves the opportunity to 'shift attention'? We have found that people often think about computers, for instance, in terms of the metaphors they choose (or use) to decribe them. There is ever so much being written currently about what can be learned from the metaphors

that people use. We have used this idea to create strategies for helping ourselves shift our attention in cases when we want to learn more about something.

> If the computer was full of little people, what would they all be doing now? Can you use the metaphor of little people to describe how the computational system works?

This particular example is in one sense a no-fail. It always evokes a heated
response from someone in a group of participants. We usually use it to alert people to the models they are using when they are trying to make sense of unfamiliar computer software but it invariably raises another issue. Why people in the computer? and that leads to revealing discussion of feelings about computers, people, and so on..

> If you consider what you have in the way of software, and
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> what you want the students to do, can you find an activity you
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> like? (Usually the answer is yes.)
> Now, if you consider what you would like the students to do, can you find a bit of software which supports that? (Usually the answer is no.)

Just as deliberately shifting attention to another perspective provides an opportunity for fresh thinking, so can reversing the question.

> We have sixty computers, sixty children, two printers, a plotter, a modem and a scanner. How can two of us teach all those children to use all those things when we don't even know ourselves?

Who needs to learn? How many teachers are there? Whose learning problem is it? Sixty children can become a very powerful workforce for their own learning (Commission for the Future).

These four examples are offered to provide a basis for the place of thinking
strategems. In Sunrise meetings we 'step out of' the immediate discussion to adopt strategems with which to develop a fresh approach to our concerns. We use our thinking strategems as tools for thinking, explicitly.
We participate in our own conversations at two levels: the participant level
and what Pimm (1991) has identified (in the context of a teacher working with students) as the meta-conversational level. The four strategems

described above are initiated by a call for

a shift of attention;
a metaphor which will help us think about this;
let's look at,, through and back at, the software, or
how can we be enterprising?

Awakening Awarenesses5

Just as mere reflection does not make a difference, nor does merely sharing experiences (primary or secondary). Even if we do succeed and become aware of missed opportunities, new ways we might have acted, we are not necessarily ready to take advantage of those lessons.

In order to be awake to the opportunities when they arise again, we need to be sensitized to something that will trigger 'reflection-in-action' in the future moment. One way to do this is to rehearse the future, to enter it now,
to pre-form it.

> I had imagined they would laugh, I had imagined they would not respond at all, but I had not imagined that anyone's eyes would fill with tears. I did not know what to do.

How often have we done 'thought experiments' to prepare for the future? What we need is a way of manipulating the variables in the future event to be able to try a few possibilities. We need also to be able to predict a range
of possible consequences of any action we choose to take. The teaching of science is often advanced if students work through the POE6 approach, taking risks intellectually in what are really safe thought experiments. But no thought experiment can work unless there are the tools and materials for the experiment.

To prepare past experience for use in the future, it is necessary to have worked the experience into some manipulable form - to recognise it, then to label it so as to make it 'concrete' enough to manipulate it. It is helpful
to have talked to others about what they might do in the circumstances (by discussing what would have been possible in similar circumstances in the past) and it is essential to be alert in the moment in which a decision can be
made - to not be merely performing in the circumstances (working through the circumstances (timewise) without regard for how they are shaping the activity).

I have used a number of words based on ‘forms’ in the last few paragraphs7. They are words which cannot be used now by those in the Sunrise Laboratory without alerting someone to their presence. They remind us of the form of what is being talked/written about and act as triggers to other aspects, or alert us to the possibility of other perspectives,
which may have been disregarded. They act to shift our attention just enough to make us free to reflect-in-the-moment.

This process of working on experience does not happen without hard work. The discipline required to gain access to and then control of the processes is demanding. We find that with the support of colleagues who understand what we are trying to do, and who are interested in doing it themselves, we can improve our performance and the practice does help to make the process less burdensome. Baird (1992) has called this combination of personal challenge and collaboration ‘shared adventure’ and claims that in the many PEEL8 projects, it has often been credited with both the instigation and sustenance of changes in teaching practices.

Similarly, practice with the process makes it easier to use. If it is burdensome to stop and think about the past and work on it for the future at the beginning, building a discourse which is shared with colleagues, and in which the process is understood by all and triggered frequently, makes the process one which will be triggered frequently. At first it is a self-conscious and difficult task but soon it becomes automated. I have observed
communities which worked hard to establish the process but who are
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