s.20.a A (Cybernetic) Musing: Some Examples of Cybernetically Informed Educational Practice

Abstract

In this column I follow up my earlier column, "A Cybernetic Musing: Cybernetics and Human Knowing". Whereas that column was concerned with arguments about education, this column is concerned with examples and courses of action.

Three learning approaches and environments (the studio, problem based learning and computer aided learning) are introduced as frameworks embodying the qualities argued in that earlier column. The relative roles of teacher and learner are discussed and hints are given to help teachers work with learners within these frameworks: and it is suggested that radical changes are needed in how we view both, and value education.

A (Cybernetic) Musing: Some Examples of Cybernetically Informed Educational Practice

Introduction

When I submitted my last column, the editor commented that while the arguments I presented concerning Froebel, education and cybernetics were interesting, he would like to know how to use these ideas in the normal university situation he (and most of us) work in. I told him I would address this matter, which I do here. Not that I have produced a set of practices that might help teaching in a normal university life. Rather, I have shown some existing approaches either demonstrate, or have the potential to demonstrate, what I was writing about. In particular, I present examples in which the approach to education is truly student centred and learning based, i.e. ones where the control has passed from the hands of a conventional control system (e.g. teacher) to being more with the controlled, or between both teacher and learner, thus demonstrating that they are true second-order cybernetic systems.

My response is personal: I give my suggestions—mainly concerned with how we approach education and the roles of teacher and learner, directed generally at the teacher. In essence, I imply that truism of therapy: we may not be able to change the situation, but we can change how we approach it. While we may not be able to change the world, we can change how we deal with it. Rather than change the system (and the power devices giving the system its authority) we can alter our attitudes, changing how we approach, think about and interact with the educational system as we find it.

Recent publication in this journal of so much education and learning material has encouraged me to show that much of what I proposed is practised, albeit partially and perhaps not in every field.

I shall proceed as follows. After this introduction, there follows a prelude in which I reprise some points from my last column, and then two main sections separated by an interlude discussing teacher and learner.

In the first of the main sections I introduce three areas in which at least some of the techniques and educational insights I argued in the last column are implemented: the Design Studio, Problem Based Learning, and Computer Aided Learning. After a brief characterisation, I discuss the implementation in each area, albeit simplistically. While this may not directly answer the editor's request, it does show that the ideas I presented are practised in education.

Then, I introduce some imperatives the teacher may use. These are small scale approaches, individually implementable. They derive from both my earlier column, and the examples I have given. This section perhaps most answers the editor's challenge, for a teacher may try to work with any of these within the framework (s)he finds her/himself in. I believe that, if the reader

takes these on board, the remaining sections will appear very straightforward!

Finally, in the Postlude I discuss whether it is appropriate to try to modify what we do at present, or start again afresh. This type of discussion can apply in many different areas. It characterises the difference I see between constructionism and constructivism. Essentially it constrasts the conservative and the radical-revolutionary.

Prelude: Reprise

To focus us, let me summarise the relevant features of my last column.

> Cybernetic Themes:
> Error; autonomy; responsibility; generosity
> Learning is designing is constructing.
>
> The learner:
> Error and ignorance; difference (in what's known, what's wanted and how to learn)
> Teachback.
>
> The teacher:
> Waiting; listening; concern for the other
> Conversation—listening; drama (theatre).

Part 1: Current Examples

1) The Studio

I am told ever more of the effectiveness of "studio education." Studio education has a long and successful history in design, being the principle and more-or-less only means by which designers and architects are educated. Artists also study in a similar manner.

This approach is so powerfully in place in all areas of design that it is very hard to conceive another means of design education. Donald Schön (1985) (recently commemorated in this Journal) followed by Broadbent et al (1997) have shown it is an extremely effective means of education, although both concentrated largely on different features than I refer to here.

Generally, a studio works like this.

A project is set, often not specially related to professional reality (its purpose is, after all, educational rather than a rehearsal. It may be vital the student is not in a professional reality: the point is to allow him/her to study without risk to him/her or anyone else). Students are invited to design a "solution" within a specified timeframe. Traditionally, students work together in a large space, visiting, discussing, stealing ideas (the studio denies ownership of ideas). The studio is also a place: usually a nice place to be, featuring a lot of intense concentration and fun. Students share work, helping each . They have tutorials in which each student's ideas are tested and developed. Thus designs develop, usually across a drawing board, at several levels. Since every student generates his/her own response to the project, there are two types of discussion: how well does the student achieve what (s)he sets out to, and how good is what (s)he sets out to do. There

are also conversations concerning current conceptualisations, precedent, practice, production and context, etc.

At various stages, work is critically examined by a panel of (often distinguished) visitors and teachers in the presence of fellow students (who may join in). Each student presents virtual realisations in drawings, models etc. (now enhanced by electronic realisations) to this panel.

The process is conversational, a based in students undertaking self-directed study as their own responsibility, within a framework set by staff. There are various types of conversation. It is assumed that, although teachers have experience and authority, they use these benignly to support students developing their own ideas, rather than in the older training style of the apprentice in the atelier, instructing students in what they should do. Whether it knows it or not,studio teaching is substantially Froebellian in inspiration, model and practice.

Aspects of studio education work quite well at a distance. There has been interesting work in which students form teams either in their locale, or virtually via the Internet. Shared whiteboards allow designing together. Video allows criticism sessions a wider base. (See, for instance, pioneering work reported in Wojtowicz 1995.) New possibilities appear, facilitated by computing media.

A variant on the studio is the Unit, introduced in the UK about 35 years ago. In this variant, students choose between a selection of smaller units clustered around areas of interest of various teaching staff. Another difference is that units usually have a cross-year (vertical) component while studios are generally a common experience for all in a study year.

You may think this approach is applicable only in design. Yet, again and again I hear teachers in other disciplines envious of this way of educating, coveting it. The reason they don't try it, they say, is because it is deemed expensive in teaching hours, and would involve a radical rethinking—with all that that implies.

However, as I have argued for some time, all research and all knowing/knowledge is a matter of design (Glanville 1981, 1998). We collect together the understandings we form and connect them into structures we can add to/modify. For this reason alone, a design education would seem appropriate for all!

2) Problem Based Learning

About 30 years ago, McMaster University, in Hamilton, Canada, developed a new way of teaching and learning, " Problem Based Learning" (PBL). Those who work in PBL express gently chiding irritation when the similarity between it and design education is pointed out.

But there are differences. The most notable is the subjects covered: PBL was introduced in subjects that appear "fact" based in a way design is not. McMaster's starting point was Medicine. Nowadays there are many Universities and courses. For a review of PBL (including a newsletter and list of some universities using the approach), the reader may go to www.samford.edu/pbl which provides a gateway.

To characterise PBL, I quote from Samford University's introduction to this website.

Definition—What is PBL?

Problem Based Learning is an instructional strategy that promotes active learning. PBL can be used as a framework for modules, courses, programs, or curricula.

Characteristics of PBL

- Learning is student centred.
- Learning occurs in small student groups.
- Teachers are facilitators or guides.
- Problems form the organizing focus and stimulus for learning.
- Problems are vehicles for the development of clinical problem-solving skills.
- New information is acquired through self directed learning.

In PBL, there are several critical factors. These include trusting the students; to get on, to cover the ground: and trusting the outcome. The students have to trust themselves and their colleagues. I have argued trust (like generosity) is a quality at the heart of cybernetic systems: Glanville 2001b.)

The teachers need to restrain themselves. As indicated above, teachers have learnt to parade their knowledge. In PBL, they become facilitators instead. Their job is to help in the background. And, of course, they have to design the problem in the solution of which the learning is based.

Some educators weaken these arrangements. It is hard for teachers to give up control (Robinson 1979) and the right to be right and to know best. It can be hard, too, for students to believe that this is what is intended, and to take the initiative in this manner. However, weakening the arrangements only undermines the fragility of the situation and betrays the trust required for PBL to work. It is hard to regenerate trust after it has been betrayed, and we live in societies that find trust harder and harder to credit.

Nevertheless, PBL works. Students from PBL based courses acquire a thorough understanding, often in a wider than usual context. Typically, they will deal with, for instance, ethical considerations. In comparative analyses, those who teach in PBL courses claim better results than those who don't, in both depth and breadth of knowledge. I have not fully experienced a PBL course, but I did attend a series of workshops and found myself surprised and sympathetic (that's where the effectiveness claim was made). You might think that's because of my Froebel and studio background. However, my surprise was at how close teaching a conventional subject area, taught by conventional professionals, could come to the ideals I hold—and this is what, I believe, the editor was hoping for when he demanded this column.

3) Computer Aided Learning

Earlier (before PBL), it was realised that computers might offer much to education, in at least two ways (through at least two approaches).

One way involves the computer as collator: to store vast amounts of (so-called) data. The notion of the computer as data store persists, although it has no connection with the etymology of the word “compute” (Latin com + putare, to put together).

The other embodies the cybernetic notion of self-correction through feedback. Cybernetic systems may be characterized as “learning” as a consequence of corrections to self-correction applied via feedback—as indicated early on by, for instance, Wiener (at the Macy Conferences), Grey Walter and Ross Ashby. An explicit, although not early, statement of this is in the title of Pask’s 1967 paper.

These two approaches merge in the development of Computer Aided Learning (CAL) (and its bastard offspring, Computer Aided Teaching and Computer Aided Instruction). The computer in education is now endemically visible in University attempts to place their material on the web, encouraging distance learning.

I will not pursue a critique of web realisations here. In my strongly held opinion, those I have seen are, at best, poor. They may be superficially seductive, but they are pedagogically vapid.

However, there are general points that should be made. A vast store of knowledge, such as an encylopaedia, is a resource from which we may learn, but only if we can somehow connect to and find our way through it. The notion of the computer as a datastore is similar to that of the encyclopaedia: of questionable relevance as a good form for the learnable, in our current understandings. Human learners do not simply memorise content from datastores. We use wonder, connect, ask why—and so on. That is, we exercise involvement, imagination, and learning. We understand.

This is where computers should be able to help. Each of us knows different things in different ways. Each makes personal understandings. Computers can facilitate the arrangement of material to be learnt so that we can chose to start our involvement from a topic we know, and progress to a topic we would like to know.

Contrast this with the common practice of making lecture notes available on the web. Instead of a teacher generated sequence, the sequence is created by the student. This is achieved by the creation of a vast mesh of interconnections between topics supporting and sustaining such variety. There are rules about how topics-to-be-learnt in such a mesh might be connected. Although critical, I will not pursue this either. Much was covered in Bernard Scott’s recent excellent piece (Scott 2001) and I have discussed this in previous columns.

This approach allows the student to set about learning in different ways (matching their learning styles). Again, exploration is not determined by the teacher, but by the student selecting from all legitimate possibilities, developing her/his own understandings in a “learning environment.”

There remain questions of testing. How do we test learning carried out in such an environment?

I am not convinced this is harder than testing under the “normal” conditions of standard examinations etc., partially because I’m sceptical that normal examinations test much.

Nevertheless, at least two ways of testing may emerge within such a CAL environment.

The first is teachback: the student is invited to teach back what (s)he has learnt. The second is to navigate an alternative route in the vast mesh to that they originally investigated. These ways of testing are surely better than multiple choice answer questions, presenting the world as known and limited, like a restaurant menu.

In such a learning environment, a student may use understandings and ways of learning they choose. The contribution of the computer is to support the vast mesh and assist navigation. And, as we know from games etc., the presentations computers encourage may be wonderfully involving and seductive, while the computer remains doggedly patient!

Interlude: Teacher and Learner

Some may feel that I am dismissive of the teacher. This is not my intention. What I want to do is shift emphasis from teacher organised instruction to learner generated learning. As a teacher myself, I believe in the value of what I do. However, I also believe that second-order cybernetics, which changes our understanding of control, reminds us the difference between teacher and learner has become distorted.

The point is that teachers do not have a special and precedential relationship with knowledge. Understanding—essential to knowing—is personal. Teachers cannot accept responsibility for the learning of their students: our learning is the responsibility of each of us.

Therefore, we need to concentrate on learning, on how we learn, learning to learn, and supporting the initiative and curiosity of the learner—rather than relying on the expertise of the teacher, and his ability to "force feed" us. Our interest, and out devices, should derive from learning, not from teaching.

But there is a role for the teacher, even within these understandings. Teachers can give examples and even be examples themselves, sustaining learning by observation and even by osmosis. They can encourage and assist, correct and explain. They can divert and they can (on occasion) lead—and they can even deceive for a purpose. While we should not sing the praises of teachers in the old way for what they know, we nevertheless do appreciate what (and that) they know, their warmth and encouragement; we value the challenges they offer us, their criticisms, and that they necessarily stand outside our selves, which often means they can break binds, etc we are suffering in.. Teachers facilitate, enliven and explain.

So we should not to look for instruction by the teacher, but the initiative of learning from the student. And we should remember that, while the teacher may know a lot, what we are concerned with is the student—who does not know.

Part 2: Some Imperatives

What is needed is some hints for teachers, to allow them to work in a way that recognises that it is the learners who (must) learn. Therefore, I continue with a collection of imperatives that may facilitate a teacher's ability to work with these understandings. These are distillates of the

practices in part 1, and my last column. There is no priority in the order of presentation.

- Respect the autonomy of each student's understanding.
- Place understanding above knowledge: while a subject to be studied has its own structure and autonomy that should be respected (it is a discipline), we learn this through the understandings each of us develops.
- Recognise that how we assemble our understandings is the business of each of us. It is at once a matter of our own design, and of respecting the autonomy of each.
- Only the learner can do her/his learning and acquire her/his understanding. You cannot learn for them. When I tell another, if they make an understanding their understanding is of what they think I think. It is not what I think. So my understanding of your understanding is (precisely) not your understanding. (This is the central point of Pask's Conversation Theory.)
- Teach from behind. Follow the student's lead. You may decide whether to lend the occasional guiding hand, or let them follow their own path unimpeded. Whichever, you are enjoined in a conversation.
- If you want a learner to set the standard, you cannot do it for him/her. Therefore, you must wait. Intervention removes the responsibility from the learner. (I know it is hard to wait.) (Glanville 2001b.)
- Encourage errors so learners learn to learn from their errors: no penalty for errors, and no force-feeding!
- Treat students as you would be treated yourself: show concern for them and for their vulnerability. Thus we relearn generosity.
- Remember, if we have to present in "preaching" modes (e.g. lectures), at least to entertain. Lecturing, especially "educational" lecturing at university, is a performance art (that's why it's so hard). Tell a good story well!
- If you wish to be interesting, you must be interested.
- Learn, as a teacher, to listen, and not to determine and control, at least at first. Each learner has their own already learnt knowledge and understandings/approaches. To be able to respond, it is necessary first to listen. (Glanville 1994, 2001a)
- Education is involved in helping others learn. It is concerned with the learner, first and foremost. It is not an opportunity for a teacher to display his/her knowledge/authority. We, as teachers, are also learners. There is an endless conversation to be had between us all.
- Above all, practise learning to learn and encourage it in all your deeds. (Harri-Augstein and Thomas 1991, Pask 1967.)

Postlude: Should We Do This

The position I present concerning education is a second-order cybernetic one. I see second-order cybernetics as bringing a radically new way of looking at the world. When there's a real sea-change in approach and attitude, I believe we have to think very carefully about whether we should modify and continue to prop up the old, or reconsider and rebuild anew. Of my many colleagues, including those I value greatly and work with regularly, most are modifiers. Their approach is essentially conservative. Few are truly radical. I have learnt my inclination is towards the radical. I am prepared to seem to throw away what has gone before in order to reposition. One lesson of the history of science is that such radical repositioning usually end up incorporating what was there before. For this reason, I really question whether the editor's requests were appropriate and correct. My position is that we should not modify and prop up a (endemically) bad arrangement but should make a new one, according to our second-order cybernetic understandings.

I have been through a similar argument before in the 1980s, when the American Society for Cybernetics ran a debate concerning "utility." My position was that we should care for the subject, not make it useful. That can be done by others. The debate ran in the newsletter "Continuing the Conversation." Mary Catherine Bateson's recent piece in the ASC column of this journal seemed to me to be making a similar point to mine (Bateson 2001). There is not room to extend this piece to cover it, but maybe I should return to it.

Meanwhile, I have softened and made my gesture to the majority! However, I fear this is like offering one drink to an alcoholic: breaking habits is almost impossible when we keep any hold of the old. I don't really feel I should do this.

Bacon advises us

> "Begin again from the very foundations, unless we would revolve forever in a circle with mean and contemptible progress."

I cannot but agree.

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