An Insidious Kind Of Glamour

August 7th, 2008

All I have ever written has been, one way or another, concerned with "developmental" mathematics. I have written and still write mathematics from a point of view that I like to think is the real developmental one. I have presented and discussed developmental issues with colleagues on various venues, in my own department, at joint **AMS-MAA** meetings, at meetings of the **American Mathematical Association of Two Year Colleges** (**AMATYC**), in the **AMATYC *Review***, on **Mathedcc** and **Mathspin**, etc. But, for all that and for just as long, even though I have kept musing about my own position in relation to developmental mathematics and while I have never had any doubt about said position, I have always been uneasy about formulating and stating it.

I. On this site, the closest I have come to mentioning my motivation was in the preface to Reasonable Basic Algebra in which I quoted from one of my *Notes From the Mathematical Underground* in the **AMATYC *Review***, Spring 1996 issue:

Also directly relevant to the issue is an article by **Colin McGinn**, *Homage to Education*, in the August 16, 1990 issue of the **London Review of Books** [. . .]. The article is a review of a book of, and of a book about, R. G. Collingwood. The relevant part is where McGinn "spell[s] in [his] own way what [he] thinks Collingwood is getting at here." "Democratic States are constitutively committed to ensuring and furthering the intellectual health of the citizens who compose them: indeed, they are only possible at all if people reach a certain cognitive level . . . . [. . .]. Democracy and education (in the widest sense) are thus as conceptually inseparable as individual rational action and knowledge of the world." [. . .]. But what is education? "Plainly, it involves the transmission of knowledge from teacher to taught. But what exactly is knowledge? " [...]. [It] is true justified belief that has been arrived at by rational means." [...]. Thus the norms governing political action incorporate or embed norms appropriate to rational belief formation. [...]. The educational system of schools and universities is one central element in this cognitive health service [...].

[…]

The quasi-mathematical language in which this is stated should have a special resonance for mathematicians. “It would be a mistake to suppose that the educational duties of democratic state extended only to political education, leaving other kinds to their own devices. [...]. How do we bring about the cognitive health required by democratic government? A basic requirement is to cultivate in the populace a respect for intellectual values, an intolerance of intellectual vices or shortcomings. [...]. The forces of cretinisation are, and have always been, the biggest threat to the success of democracy as a way of allocating political power: this is the fundamental conceptual truth, as well as a lamentable fact of history.

[…]

However, “people do not really like the truth; they feel coerced by reason, bullied by fact. In a certain sense, this is not irrational, since a commitment to believe only what is true implies a willingness to detach your beliefs from your desires. [...]. Truth limits your freedom, in a way, because it reduces your belief-options; it is quite capable of forcing your mind to go against its natural inclination. This, I suspect, is the root psychological cause of the relativistic view of truth, for that view gives me license to believe whatever it pleases me to believe. [...]. One of the central aims of education, as a preparation for political democracy, should be to enable people to get on better terms with reason—to learn to live with the truth.”

Indeed,

A political act “to enable people to get on better terms with reason—to learn to live with the truth.

is the phrase I used when trying to explain what this site and its contents are all about. And, in a way, that *does* say it all. However it certainly doesn’t spell it out and I have long felt the need to discuss this a bit further but, somehow, have always had trouble with it.

II. It was a recent article, again in the **London Review of Books**, 6 March 2008, *Is It Glamorous?* by **David Simpson**, a review of *Absent Minds: Intellectuals in Britain* by **Stefan Collini**, Oxford 2007, that, although it had of course nothing to do with developmental mathematics, finally gave me, for whatever reason, what I needed to discuss how I see

developmental mathematics and why.

The part of the article that resonated with my own feelings and motivations is where Simpson discusses Collini's attitude regarding **Edward Said** in general and Said's *Representations of the Intellectual* [The 1993 Reith Lectures] in particular. Following are a few excerpts of Simpson's article directly relevant to what I will say below about developmental mathematics. However, I should say immediately that the whole article is well worth reading independently of the issues that concern me here.

[I]t seems symptomatic that the figure [Collini] finds most wanting is Edward Said.

Collini finds [Representations of the Intellectual] a 'poor book' marked by 'simplistic binary alternatives', a 'kind of political free association' […]. Above all it succumbs to an 'insidious kind of glamour, that of being the champion of the wretched of the earth'.

[Said was] throughout his career […] a defender of those who couldn't speak for themselves or get a fair hearing when they did.

[Intellectuals] should call our attention to 'all those […] issues that are routinely forgotten or swept under the rug' and should universalise every crisis so as to bring it into line with as many other crises as possible, to the point of being 'embarrassing . . . even unpleasant'.

Collini does not like Said's 'existential drama' and its 'inescapable logic of choice'

and, last but not least,

If Collini is right that with a few variations and exceptions the view of intellectuals has been much the same across the West in the 20th century, that there is a 'larger international pattern' at work, what is the common influence or structure that would explain it? He says at the end of the book that there is such a structure, but somehow the matter of 'structural rather than merely local explanations' dwindles down to a matter of 'alarmist cultural pessimism' which he has 'taken issue with on other occasions'. There might be interesting reasons why capitalist economies in tandem with representative democracies are felt to have the power to impose despair or desperation on their

intellectuals. But do they do so on all of them? Are there not some who maintain an optimism of the will, and must it be 'culpably romantic' to do so?

Well, of course, I am not Said and since I have long admired Said I feel that directly invoking the above would be at least presumptuous, in fact impertinent, and certainly quite ridiculous. So, I will now proceed with my stance regarding developmental mathematics and leave any connection with the above entirely to the reader.

III. The first issue is why would anyone at all want to "learn" mathematics. I can see three possible answers which however involve three different meanings of the word "learn".

1. One can see mathematics as a chore, as something necessary to be able to do other, specific things such as being able to register for another course or being able to cut rafters for a roof. But the apprentice carpenter neither needs nor wants to go through Euclid's books in order to be able to cut rafters and the English major neither needs nor wants to factor quadratics in order to be able to discourse on Shakespeare. Developmental mathematics is therefore the prerequisite for Precalculus which, as the name indicates, is the prerequisite for Calculus which is the prerequisite for Physics and other "advanced" courses, etc. Of course, the dual of the question is why would most curriculums require mathematics in the first place. The answer is usually that curriculum designers include some mathematics so as to give weight to, or simply pad, their curriculum … and, by a fortunate coincidence, give jobs to mathematicians who are then expected to, and duly do, return the favor.
   The carpentry curriculum thus claims "geometry" to be a necessary background for learning how to use a carpenter's square and the English departments thus claims that set theory and abstract algebra are essential to understand the linguistics of Harris or Chomsky, the structures of Lévi-Strauss, the Borromean knots of Lacan, as well as Catastrophe Theory and now Chaos Theory for whatever literary theory is currently fashionable. But of course, none of these claims ever held any water. Harris didn't know any mathematics beyond the definitions of equivalence relation and semi-group and never did anything with either. Being honest, Chomsky never claimed to do anything mathematical in the first place, Lévi-Strauss didn't know what a structure was —he just liked the word, Lacan never exhibited the least interest in rational discourse, etc.
   When all else fails, as it invariably does, recourse is then made to needs like having to be able to compute unit prices, discounts and markups at the store, etc. When you point out that very few people feel these supposed needs and, anyhow, that most everybody nowadays has a calculating cell phone, your opponent, very likely to be into teaching with calculators, gets vaguer and vaguer until s/he declares her/himself outraged by something or the other and walks away in a huff and with a snort of disgust.
   What I find amazing under these conditions is how we are able to convince most everybody that they need to know a certain amount of arithmetic and a certain amount of algebra and, when we catch them in time, how we succeed in corralling them into developmental mathematics programs. The bitter irony here is that success in these programs is largely determined by those running these very programs. There might be a good reason here as when, occasionally, the success of a developmental program is

measured by the success of its graduates in ulterior courses, the results turn out to be horrendous. See, for instance, LongitudinalStudy

2. Another view is that mathematics, in some way, is somehow formative: being able to factor a few quadratics is good for you. Period. A variant is the belief that a—small—amount of mathematics is a necessary ingredient of "general knowledge", the panoply of the well-rounded, cultivated gentleman: Gauss as well as Michelangelo, Shakespeare and Einstein. See whatever "liberal arts mathematics" book you happen to have at hand. Yet, there *is* something to that view but it is impossible to delineate and, in any case, most people don't have the leisure or the financial means and that type of course is very much on the way out.
3. My own view is that mathematics is the simplest universe in which to learn how to make a case for one's conjecture, in which to distinguish what we can show is true from what we can show is false and from what we don't know to be true or false, etc. In short, mathematics is the simplest place in which to learn how to operate rationally. In that, mathematics is a lot closer to law than to what is currently peddled as mathematical proof in geometry textbooks. See The Uses of Argument by S. Toulmin.

IV. The second issue is what mathematics ought to be learned when. As pointed out above, most students are not really free to choose what mathematics they are to learn. And when it us who decide for them, as we usually do, we invariably choose developmental mathematics and/or precalculus mathematics and for the—very few—survivors, calculus. All of which according to the gospel of texts carefully packaged by an industry driven by greed bordering on the pathologically insane which, though, give us great opportunities to deploy our teaching skills, that is essentially our ability to sugarcoat the pill and grease the plank. The students be damned.

Many alternatives would of course be possible.

- One could be the arithmetic and algebra of collections-of-items and unit-prices with co-multiplication because this can quickly be generalized to "baskets" of collections-of-items and "lists" of unit-prices, that is, in other words, LinearAlgebra.
- Another could be Discrete Mathematics but it seems to lack any story line and I have nothing to suggest. All I can say is that the texts I have seen appeared to be collections of topics: a bit of sentential logic here, a bit of set theory there, some graph theory possibly somewhere in-between, etc.
- Another could be Geometry and/or Group Theory starting, say from the notion of tiling. But, while I have played a bit with the idea, I am not sure how to let it go beyond the obvious. It is a bit as with Incidence Geometry which is initially enticing since there are so few axioms but which quickly degenerates into counting arguments.
- The alternative which I have chosen to develop materials for is a strongly integrated Arithmetic-Basic Algebra-Differential Calculus three-semester sequence and this for a variety of reasons. The main one is that the *mathematics of change* is a well defined goal well within reach of a lot more students than learn it in the traditional sequence. Another one is that there is a simple, very strong story line which I will discuss later. Yet another is that this alternative can be fitted without too much upheaval in the current college framework. Last but not least is that I happen to like the subject of polynomial approximations and that I see this sequence as the ideal developmental mathematics. (Of

course, how well it will work in practice will have to be ascertained by others than myself.)

In the next installment of this blog, I will thus discuss developmental mathematics as embodied in the Arithmetic-Basic Algebra-Differential Calculus sequence and from the point of view that "mathematics is the simplest universe in which to learn how to make a case for one's conjecture, …"

As ever, any criticism, critique, feedback, etc is of course welcome, the more detailed, the more welcome.

A. Schremmer

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