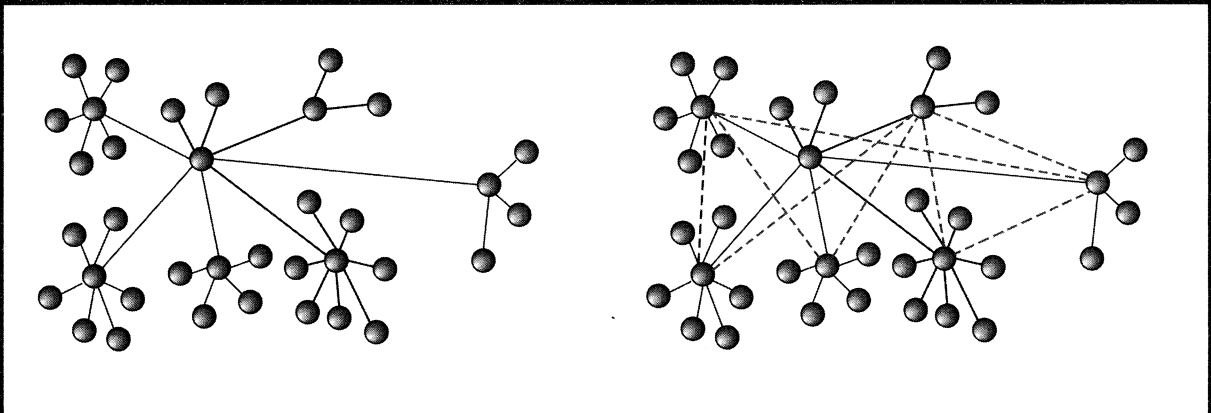


# for the learning of mathematics



# The purpose of having mathematics in schools tells what school mathematics should be

ROMULO LINS

The core of Watson's argument is, I think, that the purpose of school mathematics is quite different from that of disciplinary mathematics. All the other differences somehow derive from this. For instance, it *could* be the case that the purpose of school mathematics is to teach (or induce) pupils (all) to act as mathematicians; even in this case, there would be a crucial missing component, namely that in disciplinary mathematics one is operating on the boundaries of the known, while in (such) school mathematics pupils would be only *acting as if* they were there. This is the reason why a Lakatosian (fallibilist) 'foundation' for mathematics education does not make sense.

On the other hand, is it a fair (or even interesting) goal for mathematics education in schools that all pupils come to act as mathematicians? Perhaps it would be fair to aim at enabling all pupils to act as mathematicians whenever they wanted to. But that does not seem reasonable, and the reason for this is in the huge difficulty in getting mathematicians not to act as mathematicians when talking about mathematics (for instance, when discussing school mathematics and the learning of mathematics). It seems the drive is too strong for them to keep acting as mathematicians. In other words, maybe as one truly crosses the border and begins acting as a mathematician, it is too late to come back, even if eventually.

Watson correctly states that the "discipline of mathematics has different warrants for truth, different forms of reasoning, different core activities, different purposes" in relation to school mathematics, and it seems wise to extend this observation to everything 'mathematical' normal people also do outside school. And in doing so we are naturally led to the question 'why is mathematics in school?' While Watson spends quite a while on the question "what is 'mathematics' in school?" it is less visible a concern with "why is 'mathematics' in school?" If mathematics as a discipline disappeared altogether at the disciplinary (research) level (production of new mathematics) would school mathematics also disappear? Not necessarily. The other way around? Yes, possibly in a couple of generations.

Watson also says that, in her experience, "those who have the opportunity to do this [act like mathematicians] become better mathematical learners than those drilled in more traditional methods" – but that could well be because the traditional approach is (with respect to any subject) boring to *most* (but not all) people, not because of any peculiarity of mathematics. In school I loved to read and write, but hated formal grammar; I loved to play (real) football, but hated drilling passes or even tactics. Maybe normal people only like to (drill-like) practice the things they enjoy enough as to want to become a pro in them. And that choice sounds perfectly

healthy. That points to a fundamental and irreconcilable difference between school and disciplinary mathematics: people who do the latter do it *voluntarily*. And I sense that fits quite well with the fact, mentioned above, that these people also do it *for real*.

Let me push the analogy further. In Brazil, youngsters who go to football clubs to be trained act exactly like the pros: they drill passes, shooting, tactics, carrying the ball and so on. And not only they do not complain of this traditional drilling, they will actually tell their peers who only play for fun that these are not doing it the right way (if they ever bother to comment, much as the mathematician does not usually comment with non-mathematicians on what he does). And, quite naturally in this case, *in the discipline the ways of acting are transparent, but in school mathematics they are a teaching goal*, as Watson and others correctly point out.

It could be that "the institutionalization of mathematical knowledge for novices ... is not, and perhaps never can be, a subset of the recognised discipline of mathematics" not just because of different warrants for truth but, ultimately, because we are looking at an institutionalization *for all* and that means that school mathematics should *not* be an incubator of future mathematicians, as much as physical education in school should not be (although it similarly could) be an incubator of Olympic athletes.

Of course, I agree that the public image of mathematics is, in too many countries, quite negative, and there is plenty of room for improvement in that area. But surely that is not going to change simply by making people eat all their maths.

Watson's argument sufficiently supports the point she wants to make. If anything, I would just add that perhaps *as it stands* the effort to understand the relationship between school and disciplinary mathematics is better framed as a struggle between mathematics educators and mathematicians, possibly representing professional interests ideologically dressed as 'truths'.

And maybe, paradoxically, that struggle means that the relationship will not be best understood by remaining only within our specialist fields.

## What's so great about doing mathematics like a mathematician?

HEATHER MENDICK

Watson argues that school mathematics should try to produce people who act like mathematicians. *And* that this is not possible because of the different conditions in which the practices of school and disciplinary mathematics are embedded. I agree with the second part but not the first part of her argument. I start with the part where we agree.

Watson mentions several reasons why there will always be a mismatch between school and disciplinary mathematics:

- schoolteachers do not have the experience of doing mathematics over time;