

## **Slow Maths: Challenging the metaphor of education as a race**

STEVE THORNTON

*Centre for Higher Education, Learning and Teaching, Australian National University*

### **Abstract**

*Metaphors shape the way we think and act. They are not mere words, but rather they are concepts that deeply affect how we view the world and the ways we interact with the world. In this paper I will briefly discuss some metaphors for education that have become prominent in educational discourse and focus on one—education as a race ('to the top', 'to be in the top 5')—that I argue has become dominant in the current political rhetoric. I discuss how this positions the curriculum as a one-dimensional track, assessment as the generation of a single number that is valued above all else, teachers as coaches detached from the participants, and students as runners striving to reach the only end-point that matters.*

*I will describe the beginnings of the slow movement as a protest to the one-size-fits-all approach of fast food, and suggest the generative metaphor of education as slow food. This has the potential to reposition curriculum, assessment, teachers and students as constituents and actors in a process and product steeped in history and culture, and in which diversity is an attribute to be valued rather than minimised. I apply this metaphor to the specific activity of school mathematics and show how it might generate an approach that positions school mathematics as an activity intimately connected to life, culture and the discipline of mathematics itself.*

**Keywords:** education; mathematics; culture; slow; curriculum

### **Metaphors of Education**

Metaphors shape the way we think and act (Lakoff & Johnson, 1980). They are not mere words, but rather they are concepts that deeply affect how we view the world and the ways we interact with the world. They have both a reflective and generative quality; they hide certain aspects of a concept and highlight others, in the process creating roles and realities that shape the way we act.

How we think metaphorically matters. It can determine questions of war and peace, economic policy, and legal decisions, as well as the mundane choices of everyday life...Because we reason in terms of metaphor, the metaphors we use determine a great deal about how we live our lives. (Lakoff & Johnson, 1980, pp. 216-217)

Yet the role of metaphor is largely unexamined in educational discourse. In the school environment metaphor is most often studied within poetry or literature studies as a language device that is largely decorative or ornamental (Postman, 2011). Rarely are metaphors viewed as interactive, shaping the way that we see the world and structure reality. It is equally rare to see the role of metaphor examined in the discourse about education where its role in shaping teachers' and, more generally, society's views of the goals of education is seldom examined. Yet metaphors profoundly affect aspects of education such as policy, pedagogy, the role of the teacher and student, the nature and purpose of curriculum and the nature of the school as an educational institution (Botha, 2009).

Arguably the two dominant root metaphors of education since the advent of compulsory schooling have been the metaphors of education as production and education as a cure (Cook-Sather, 2003). To these I add the relatively recent metaphor of education as a race. Each of these metaphors generates a set of associated metaphors that together ascribe particular roles to teachers and students, purposes to the curriculum and overarching goals for schooling. As I argue below, despite their apparent differences, each of these root

metaphors is underpinned by a common set of values and assumptions that dehumanises students and teachers, relegating them to receivers and implementers of an external agenda.

The education as production metaphor casts schools as factories, a conception that has dominated much educational discourse since the mid nineteenth century, and remains prevalent today (Darling-Hammond & Friedlaender, 2008). Within the school as factory students are conveyed from one site of production to another, in the primary school setting at the end of each year, and in the secondary school setting often at the end of each 50-minute period. In the secondary setting the school timetable is, by and large, sacrosanct, with the efficient operation of the school relying on strict adherence to times. Within the school as factory teachers are workers or managers, students are products and the curriculum is the common production line along which students are progressed. Efficiency, compliance and quality control, exercised in the form of standardised tests of achievement, are valued, while diversity, critique and initiative are marginalised.

The education as a cure metaphor casts schools as clinics that cure not only the ills of children, but through that the ills of society. Its initial conception was in the very first religious schools that aimed to cure the innately sinful and depraved nature of humanity (Cook-Sather, 2003), particularly among children from the lower classes of colonial society. The school as clinic focuses on identifying the individual needs of each child as she moves towards a state of health captured by an idealised image of the educated person. The curriculum becomes a prescription, differentiated for each patient on the basis of diagnostic testing by the teacher, who is both diagnostician and therapist. Contemporary educational research is dominated by evaluation of the effectiveness of various interventions as measured by their effect-size (Hattie, 2008), a construct borrowed primarily from the psychological literature. In the Australian context the education as a cure metaphor is most obvious in the view of teacher education at the University of Melbourne, in which prospective teachers are taught to embrace teaching as a clinical practice profession. ‘There is growing recognition that teachers need to be able to “diagnose” individual student learning and provide appropriate “prescriptions” for improvement i.e., to be clinical, evidence-based, interventionist practitioners in the manner of health professionals’ (Dinham, 2012, p. 4).

Every metaphor has the potential to highlight or obscure aspects of the concept it seeks to illuminate. The education as production metaphor highlights efficiency, while the education as a cure metaphor highlights effectiveness. Both efficiency and effectiveness are worthy characteristics, but they offer no space to question philosophical bases of education, nor to ask why or whether rather than how. Furthermore, as Cook-Sather (2003) argues, both obscure the individual subjectivity of the people that matter most in education—students. While the education as a cure metaphor appears, at face value, to add a human dimension to the education as production metaphor, ‘their underlying premises—that students are quantifiable products to be packaged or diseased beings in need of remedy—...disable and control those within their constructs’ (Cook-Sather, 2003, p. 947). Hence students are dependent on the factory worker or clinician in their journey towards a common standard or state of health, rather than creating their own destiny within a culture where diversity is valued not feared.

Yet another metaphor for education has, of course, appeared in the above sentence—that of education as a journey. Indeed, it is hard to write about education without using a journey metaphor. Students *progress* through levels of schooling where they may be assigned to different *tracks* according to whether they are *ahead* or *behind* their peers. Indeed, the very terms *curriculum* and *course* have their origins in the Latin verb *currere*, meaning ‘to run’. Like the production and race metaphors of education, the journey metaphor highlights worthwhile aspects of education, but it offers equally little space to question the value or goals of the journey itself.

Taken to its extreme the journey metaphor becomes a metaphor of education as a race, which I suggest has become dominant in the political rhetoric in the Western world. In this metaphor what matters above all else is where a student or an entire education system is placed relative to others and being left behind is to be avoided at all costs. In the United States the Bush administration’s *No Child Left Behind* legislation (Bush, 2001) was replaced by the Obama administration’s *Race to the Top* agenda (Shear & Anderson 2009). Although one focuses on students and the other on the system, they are flip sides of the same root metaphor of education as a

race. Similarly in Australia former Prime Minister Kevin Rudd's apology to Australia's Indigenous Peoples undertook to 'halve the *widening gap* in literacy, numeracy and employment outcomes and opportunities for Indigenous Australians' (Australian Government, 2008, italics added), while former Minister for Education, Employment and Workplace Relations, Julia Gillard, warned that Australia was 'in danger of *losing the education race*' (Franklin, 2012, italics added) and introduced reforms that aimed to see Australia 'back in the *top five* by 2025' (Tovey & McNeilage, 2012, italics added).

Like the production and cure metaphors for education, the race metaphor effectively silences any discussion of whether or not the race is worth competing in or how winners or losers will be determined. In a race there is no time to stop and admire the scenery or to take a diversion to somewhere that might be more interesting. There is no opportunity for the runners (students) or their coaches (teachers) to question the course to be run (curriculum) or to determine an alternative destination. I argue, therefore, that we need alternative metaphors for education that reaffirm students as active participants not only in the process of learning but also in the process of deciding what to learn. These are 'life affirming metaphors that cast [teachers] but also, and more importantly, students as active creators not only of their education but also...of themselves' (Cook-Sather, 2003, p. 952). One such metaphor that directly challenges the metaphor of education as a race is that of education as 'slow food' preparation. Slowness emphasises connectedness to history, culture and traditions, strives for diversity rather than uniformity and has an ethical dimension in that qualities such as elegance and simplicity are valued more than mere correctness.

### **Slowness and education**

In 1986 a McDonald's restaurant was opened at the Piazza di Spagna in Rome. Journalist Carlo Petrini wondered why, if there was fast food, there could not also be slow food, and organized a demonstration in which he and his followers brandished bowls of penne as weapons of protest (Honoré, 2004). This was the start of an international Slow Food Movement, which has since spawned offshoots such as slow travel, slow living, slow cities, slow books, and slow parenting.

Despite its name, the Slow Movement is not, first and foremost, a movement against speed itself. Rather, it is a philosophy that rejects the one-size-fits-all approach to life that emphasises uniformity, predictability and measurability. A core philosophy of this one-size-fits-all approach is the rejection of product variability. Rather than expecting people who operate their business to reinvent the wheel, the company simply expects them to 'make it turn faster' (McDonalds, 2011). To maintain quality and uniformity, each restaurant in the chain must follow set formulas and specifications for menu items, set methods of operation, inventory control, bookkeeping, accounting and marketing, and set concepts for restaurant design and layout. These philosophies typify *fast*. 'Fast is busy, controlling, aggressive, hurried, analytical, stressed, superficial, impatient, active, quantity-over-quality' (Honoré, 2004, p. 14).

Contrast this with the philosophy of Quay, a well-known and highly regarded Sydney restaurant:

This philosophy and passion for the rare and unusual has taken [the chef] all over Australia sourcing unique and exquisite ingredients...The result is a spectacularly innovative cuisine which celebrates the diversity of nature, and which describes and explores the contrasts and harmonies in textures and flavours one finds there. (Quay Restaurant, n.d.).

Although not advertising itself as a slow restaurant, Quay epitomises a *slow* philosophy. 'Slow is... calm, careful, receptive, still, intuitive, unhurried, patient, reflective, quality-over-quantity. It is about making real and meaningful connections—with people, culture, work, food, everything' (Honoré, 2004, p. 14).

To elaborate further upon the concept of slowness it is helpful to look at the key principles that underpin the slow food movement.

First, it expresses a definite *philosophical position*—that life is about more than rushed meals. Second, it draws upon tradition and character—eating well means respecting culinary knowledge and recognizing that eating is a social activity that brings its own benefits. A respect for tradition

also *honours complexity*—most sauces have familiar ingredients, but how they are combined and cooked vitally influences the result. And third, slow food is about *moral choices*—it is better to have laws that allow rare varieties of cheese to be produced, it is better to take time to judge, to digest, and to reflect upon the nature of ‘quiet material pleasure’ and how everyone can pursue it. (Holt, 2002, p. 267, emphases in original)

I would add to these two further principles: that uncertainty is inherent in the process of creation; and that variability is a quality to be treasured rather than feared.

One could substitute the word ‘education’ for each of the words pertaining to food in the above description, and the paragraph would make almost perfect sense. A slow education, then, has a clearly articulated philosophical basis; it values culture and tradition; it blends established techniques and fresh ideas in an environment where uncertainty is encouraged; it values variability rather than uniformity; and it has an ethical dimension with which to judge what is good and worthwhile. It is first and foremost about connections—to people, to culture, to history, to knowledge, to learning, to the world, and to self (Slow Movement, 2013).

In the remainder of this paper I use the concept of slowness to briefly review the formal school mathematics curriculum, and suggest an alternative that puts connection to history, culture and context at the centre of the school mathematics experience.

### Slow Maths

Mathematics curriculum documents around the world typically contain three distinct sections. The first is normally a preamble, stating why the study of mathematics is important and listing a small number of specific goals for school mathematics. The second is a statement of the attributes that students are expected to develop through their study of mathematics. While there are relatively minor differences between the ways various curriculum documents describe the goals of school mathematics and the processes of thinking mathematically, the intent is clearly the same. All explicitly emphasise the development of mathematical thinking, problem solving and reasoning as a central goal, all refer to the importance of mathematics in understanding the world, and all, perhaps implicitly, make reference to the value of mathematics in one’s personal and social life. These are undoubtedly worthy goals that resonate with the sentiments of slowness described above, yet they are all too often subverted by the third and most detailed section of the document, a list of content laid out as a developmental sequence of learning.

Despite its avowed intent to focus on a limited number of big ideas at each year level the *Australian Curriculum: Mathematics* (Australian Curriculum Assessment and Reporting Authority, 2009), actually contains 220 content descriptions organised into 11 distinct year levels. It is little wonder that teachers’ comments in online discussions relating to the new curriculum document focus almost exclusively on issues related to the placement of content rather than passionately debating the purpose or teaching of mathematics in the era of the *Australian Curriculum: Mathematics* (Atweh, Miller and Thornton, 2012). Clearly there is a strong argument for a dramatic reduction in the number of content descriptions in the school mathematics curriculum.

Yet *Slow Maths* is not simply about taking longer to learn the same set of skills and concepts for the same purposes, although there is ample evidence that students do learn traditional content better by learning it more slowly and deeply (Boaler, 1997). Rather it is about a fundamentally different approach to, and mindset about, school mathematics—one that emphasises connections between the student, the mathematics and the world. In a *Slow Maths* curriculum what matters most is not the description of a set of skills and concepts that might be able to be applied to solve problems, but rather the articulation of a bank of mathematically, personally and contextually connected situations through which skills and concepts are developed. Such a bank might come from several sources:

- Sources in contemporary mathematics such as the ‘living and connected view of mathematics’ described in the Klein Project (Barton, 2008), or applications of mathematics in computer science

transformed into classroom use described in *Computer Science Unplugged* (Bell, Alexander, Freeman, & Grimley, 2009);

- Sources in the history and culture of mathematics such as the Fibonacci sequence and the Golden Ratio<sup>33</sup>, or those described in the 10th ICMI Study in mathematics education (Fauvel, & van Maanen, 2000) that have the potential to humanise mathematics, make it more interesting, understandable, and approachable, and that give insight into concepts, problems, and problem solving (Povey, 2013); or
- Sources from the world that require mathematics in order for people to become informed and act critically, such as those described in the critical mathematics literature (Gutstein, 2003) and discussions of contemporary applications of mathematics in society (Garfunkel & Malkevitch, 1994).

Such examples are not new. However they typically form an add-on to the curriculum, to be explored after the acquisition of skills and concepts. The premise of *Slow Maths* is that these and similar examples should form the core of the curriculum, and that skills and concepts are taught as needed to enable students to engage effectively in contexts that immerse them in the culture, traditions and contexts of mathematics.

Enacting a curriculum such as this clearly requires time and serious engagement with deep mathematics. Yet the slow, creative problem solving process of mathematicians is hardly ever reflected in school mathematics classrooms. In his seminal reflective paper written just after the turn of the 20<sup>th</sup> century Poincaré (2000) describes how much of the work of creative problem solving is unconscious, taking place over time. Studies by mathematicians consistently highlight the need for periods of thoughtful orientation and exploration, relaxation to allow the creative mind to work, and rigorous reflection and verification of the solution (Hadamard, 1945; Pólya, 1945). The message is clear—it takes time to think creatively and to solve higher order problems. Such an approach values complexity rather than simplicity, it necessarily involves periods of frustration and confusion, and variability rather than uniformity is an outcome to be valued. It is in stark contract to the one-size-fits-all approach of education as a race embodied in the current content-driven approach to school mathematics.

## **Conclusion**

The factory, clinic and race metaphors of education leave little room for students to develop imaginative and creative ways of thinking and to engage with the world. The careful planning and performance targets presupposed by these metaphors leave little room for uncertainty or the development of a sense of the aesthetic. On the other hand the principles of slowness, which include taking time to think creatively, valuing tradition and culture, embracing variability, and including an aesthetic dimension that allows one to make judgements about what counts, allow creative problem solving to thrive and enable students to come into the world as participants rather than recipients.

The principles of slowness challenge existing views of curriculum and pedagogy in school mathematics. Rather than focusing on a list of content to be covered, a slow mathematics curriculum puts history, culture, and the creative and critical application of mathematics to important problems at the centre. Engaging with such problems takes time—like mathematicians engaged in creative problem solving, students need time to explore, allow ideas to take shape and reflect on the elegance of their solutions. It's time to bring on the Slow Maths Movement!

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<sup>33</sup> □ The lack of connection to history or culture in the Australian Curriculum: Mathematics is apparent in that there is no mention of either Fibonacci or Pascal's triangle anywhere in the document, and the only mathematician named is Pythagoras.

## References

- Atweh, B., Miller, D., & Thornton, S. (2012). The Australian Curriculum: Mathematics, World Class or Déjà vu. In B. Atweh, M. Goos, R. Zevenbergen, D. Siemon (Eds) *Engaging the Australian National Curriculum: Mathematics – Perspectives from the field* (pp. 1-18) Online publication: MERGA.
- Australian Curriculum Assessment and Reporting Authority. (2009). *Shape of the Australian Curriculum: Mathematics*. Retrieved 14 April, 2010, from [http://www.acara.edu.au/verve/\\_resources/Australian\\_Curriculum\\_Maths.pdf](http://www.acara.edu.au/verve/_resources/Australian_Curriculum_Maths.pdf)
- Barton, B. (2008). The Klein Project: A Living & Connected View of Mathematics for Teachers: An IMU/ICMI Collaboration: A Short Description. *MSOR connections*, 8(4), 16-17.
- Bell, T., Alexander, J., Freeman, I., & Grimley, M. (2009). Computer science unplugged: School students doing real computing without computers. *The New Zealand Journal of Applied Computing and Information Technology*, 13(1), 20-29.
- Boaler, J. (1997). *Experiencing school mathematics: teaching styles, sex and setting*. Buckingham: Open University Press.
- Botha, E. (2009). Why metaphor matters in education. *South African Journal of Education*, 29(4), 431-444.
- Bush, G. W. (2001). *No child left behind*. US Department of Education: Washington, DC.
- Cook-Sather, A. (2003). Movements of mind: The Matrix, metaphors, and re-imagining education. *The Teachers College Record*, 105(6), 946-977.
- Darling-Hammond, L., & Friedlaender, D. (2008). Creating excellent and equitable schools. *Educational Leadership*, 65(8), 14.
- Dinham, S. (2012). *Walking the walk: The need for school leaders to embrace teaching as a clinical practice profession*. Paper presented at the Australian Council for Educational Research Conference 2012. School Improvement: What does research tell us about effective practice?
- Franklin, M. (2012, January 24). We risk losing education race, Julia Gillard warns, *The Australian*. Retrieved from <http://www.theaustralian.com.au/national-affairs/policy/we-risk-losing-education-race-julia-gillard-warns/story-fn59nlz9-1226251791091#>
- Garfunkel, S. A., & Malkevitch, J. (1994). *For all practical purposes: Introduction to contemporary mathematics*. New York: WH Freeman and Company.
- Gutstein, E. (2003). Teaching and learning mathematics for social justice in an urban, Latino school. *Journal for Research in Mathematics Education*, 34(1), 37-73.
- Hadamard, J. (1945). *The Mathematician's Mind: The Psychology of Invention in the Mathematical Field*. Princeton: Princeton University Press.

- Hattie, J. (2008). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Abingdon: Routledge.
- Holt, M. (2002). It's time to start the slow school movement. *Phi Delta Kappan*, 84(4), 264-271.
- Honoré, C. (2004). *In praise of slow: how a worldwide movement is challenging the cult of speed*. London: Orion Books.
- Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago: University of Chicago Press.
- Fauvel, J., & van Maanen, J. (2000). *History in mathematics education: The ICMI study*. Dordrecht: Kluwer.
- Mansell, W. (2007). *Education by numbers: the tyranny of testing*. London: Politico's Publishing.
- McDonalds. (2011). *McDonald's Corporate Responsibility = Values in Practice*. Retrieved 30 November, 2011, from <http://www.aboutmcdonalds.com/mcd/csr/about/values.html>
- Poincaré, H. (2000). Mathematical creation. *Resonance*, 5(2), 85-94.
- Pólya, G. (1945). *How to Solve It: A new aspect of mathematical methods*. Princeton, NJ: Princeton University Press.
- Postman, N. (2011). *The end of education: Redefining the value of school*. New York: Knopf Doubleday Publishing Group
- Povey, H. (2013). Walking in a Foreign and Unknown Landscape: Studying the History of Mathematics in Initial Teacher Education. *Science & Education*. DOI 10.1007/s11191-013-9617-2
- Quay Restaurant. (n.d.). *Quay*. Retrieved 1 August, 2013, from <http://www.quay.com.au>
- Australian Government (2008). *Speech by Prime Minister Kevin Rudd to the Parliament Department of Prime Minister and Cabinet*. Retrieved 4 October, 2013 from [http://www.dfat.gov.au/indigenous/apology-to-stolen-generations/rudd\\_speech.html](http://www.dfat.gov.au/indigenous/apology-to-stolen-generations/rudd_speech.html)
- Shear, M. & Anderson, D. (2009, July 23). President Obama Discusses New 'Race to the Top' Program. *Washington Post*
- Slow Movement. (2013). *Slow Movement*. Retrieved 1 August, 2013, from <http://www.slowmovement.com>
- Tovey, J., & McNeilage, A. (2012, December 15). The great race to the top of the class, *Sydney Morning Herald*. Retrieved from <http://www.smh.com.au/national/education/the-great-race-to-the-top-of-the-class-20121214-2bexo.html>