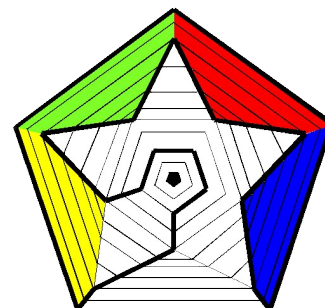


SHORT CIRCUIT

Canberra Mathematical Association Inc.

VOLUME 15 NUMBER 3

MARCH 2024



NEWS AND COMMENT

The Conference is nearly here.

Book now

[TryBooking](#) is now set up to take bookings for the CMA conference.

Saturday, March 16. (See page 2.)

At the conference, discussions around teaching and learning and the currently thorny issue of pedagogy are bound to occur. As a warm up, in this issue of Short Circuit we present an article from Valerie Barker raising some questions with relevant personal insights. This is likely to be the first of several articles from different writers addressing this important matter.

QUESTION

Someone is sure to know the answer to the following puzzle.

The sequence of numbers 3, 13, 23, 33, 43, ..., starting with 3 and increasing by 10 at each step, contains quite a few prime numbers, at least initially: 3, 13, 23, 43, 53, 73, 103, The list of primes belonging to the sequence looks as though it might continue indefinitely, but can we know this for certain?

MEMBERSHIP

Memberships run from **1 Jan** to **31 Dec**, each year. Membership forms may be downloaded from the CMA website:

<http://www.canberramaths.org.au>

The several benefits of Membership of CMA may be found on the website.

NEWSLETTER

The CMA newsletter, Short Circuit, is distributed monthly to everyone on our mailing list, free of charge and regardless of membership status.

That you are receiving Short Circuit does not imply that you are a current CMA member but we do encourage you to join.

Short Circuit welcomes all readers.

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**CANBERRA
MATHEMATICAL
ASSOCIATION**

A ROSE BY ANY OTHER NAME...?

“...What's in a name? That which we call a rose/By any other name would smell as sweet...” *Juliet*, in *'Romeo and Juliet'*, William Shakespeare

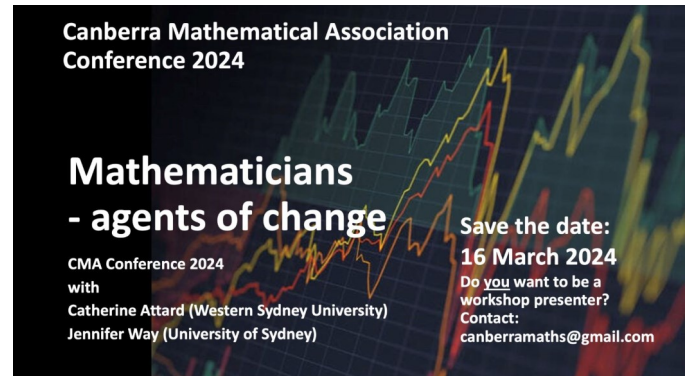
Some musings and questions on the language of 'teaching' and 'learning', from Valerie Barker.

It is difficult to be unaware of the current amount of media coverage that pertains to teachers and teaching, particularly in the context of teaching children to read, general literacy and, to a lesser extent, numeracy. It seems that many people in our society have strong views about what teachers and schools are (or are not) doing in response to societal problems and changes, as well as what more teachers should and must be doing, all within their limited few hours of a day with their students.

Indeed, the CMA has recently made a submission to the current ACT Government *Inquiry into literacy and numeracy in ACT public schools*. The terms of reference for the inquiry state that it is “focused on teaching in ACT public schools. The Expert Panel will consider the best available evidence regarding, amongst other issues: ‘...Class, whole-school and system-wide approaches and supports that have been proven to improve learning outcomes for all students at each stage of learning and development, including: ...pedagogical approaches...’”

The words *pedagogy/pedagogical* may well be the first hurdle here; when I began teaching in the early 1970s, the term was only rarely mentioned, although much would have been said about *teaching*, of course. Then *pedagogy* would have been defined as *the art and science of teaching*. These days, many may regard *pedagogy* as, simply, *teaching methods* or the *how* of teaching (as opposed to the theory of teaching). Thus a common understanding may be that “*pedagogy* refers to *the methods and practices of a teacher*. It is how they [teachers] approach their teaching style, and relates to the different theories they use, how they give feedback, and the assessments they set. When people

CMA 2024



[TryBooking](#) is now set up to take bookings for the CMA conference.

MAWA VIRTUAL

Join us for the 2024 [Virtual Maths Conference](#) on Friday, 3rd May.



ICME-15

The [International Congress on Mathematical Education](#) is the largest international conference on mathematics education in the world.

The 15th International Congress on Mathematical Education (ICME-15) will take place 7-14 July 2024 at International Convention Centre in Sydney, Australia. ICME-15 promises to be an innovative congress that builds on the well-established ICME program, showcasing established and emerging thought leaders from around the world.

refer to the pedagogy of teaching, it [may] mean how the teacher delivers the curriculum to the class”.

Importantly, *pedagogy* speaks directly to processes and relationships, including the interaction of theory and practice, and of educational philosophies, student development and learning, and curriculum design and delivery. The seminal work of Lee Shulman in the 1980s and his notion of professional knowledge, including pedagogical content knowledge, continues to guide the research, policies, programs and practices of much national and international research on pedagogy.

For all of that, it seems that these critical terms – *teaching*, *learning*, *pedagogy* – are often seen in isolation or as separate ideas, without an overt recognition that they are all transitive, perhaps transactional, involving two (or more) elements, and that they cannot exist independently of each other. Can we say that there is teaching without a learner being present? Does learning always occur as a result of teaching? What sort of learning? We are all aware that teaching does not necessarily imply learning, of course. These two sides of the same coin are inextricably linked, but is this fully recognised and understood by those not in the teaching profession? Is there confusion between the twin ideas of *teachers and learners*, and of *teaching and learning*?

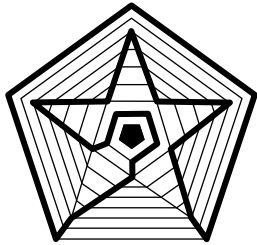
Indeed, while each of us might identify our self unequivocally as a teacher, the general public may well see us as an *instructor*, *educator*, *facilitator*, *lecturer*, *tutor*, *trainer*, or even *coach*. The context certainly matters, doesn't it? How do these terms differ? It is probably in the context in which they are used: we might have had a driving instructor when we were learning to drive, or a lecturer at university, perhaps a tutor to assist us through those difficult years in senior mathematics. My own teacher education, the post-graduate year following my undergraduate degree, was then, in the 1970s, at a teacher training college. I was being *trained* as a teacher; I was not necessarily *learning* to be a teacher, was I? And my

teachers at training college were all *lecturers*. The lines, the distinctions and the differences between these words are blurry and confusing it seems. Do they lead to misunderstanding and even misconceptions in the broader public? After all, everyone has been to school; learning is something everyone has done, is doing, or will be doing, intentionally or unintentionally. On the grounds of experience, perhaps, everyone can claim at least some degree of ability to evaluate teaching. Everyone *knows* what a teacher does, or should do? Do they...really?

My own teaching career saw me teaching both Mathematics and English in secondary schools in several different countries – that was an unusual combination, of course, and was one which allowed me the opportunity to develop a deep interest and fascination not only with the way language shapes much of our understanding of the world and of our learning and acquisition of knowledge in all its multi-faceted forms, but also of how the use of particular language, both explicitly and implicitly, might well be shaping our teaching and our choice and use of a plethora of pedagogies as well as shaping our students' learning.

Plus ça change, plus c'est la même chose

We know too that cultural, economic and political considerations and influences are also critical factors in what pedagogies and teaching practices we bring to the classroom. We might even suggest that teachers (and *learners*, *students*, *pupils*, *trainees*, *apprentices*, *beginners*...?) often find themselves working in environments which are highly charged politically, and which may seem to provide little apparent autonomy for the individual classroom '*practitioner*'. Those of us who have been teaching for many years, and even those who are early career teachers, know all too well the challenges (and yes, sometimes pleasures) of having to implement a 'new' classroom approach. These often seem cyclical; they may last only a few years, they involve change and challenges, they may be imposed, they may be necessary, they may be invigorating, and they may



ABOUT THE CMA

The Canberra Mathematical Association (Inc.) is the representative body of professional educators of mathematics in Canberra, Australia.

It was established by, among others, the late Professor Bernhard Neumann in 1963. It continues to run - as it began - purely on a volunteer basis.

Its aims include

- * the promotion of mathematical education to government through lobbying,
- * the development, application and dissemination of mathematical knowledge within Canberra through in-service opportunities, and
- * facilitating effective cooperation and collaboration between mathematics teachers and their colleagues in Canberra.

NEWSLETTER OF THE CANBERRA
MATHEMATICAL ASSOCIATION INC. INC

PO Box 3572
Weston ACT 2611
Australia

E-mail: canberramaths@gmail.com

We're on the Web!
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even seem stultifying or regressive. The one constant is that there is always change, as research suggests better ways of teaching and learning in a dynamic social and economic environment, and as education authorities respond to that research. Would we want to teach as we were taught ourselves? Probably not, I suggest – even though it may be tempting to look back with fondness and nostalgia, especially if we were successful students and learners. But what about those of our peers who struggled or even failed?

When I began teaching in New Zealand in the early 1970s, I suddenly found myself teaching ‘New Maths’ which included set theory, number bases other than ten, matrices, and abstract algebra. There seemed to be a move away from the acquisition of skills *per se*, to a focus on teaching students’ maths skills by encouraging them to use their own deductive powers to discover how to solve mathematics problems. Suddenly students could refer to the commutative law of multiplication but not necessarily recall that 7×8 was the same as 8×7 (and use the relationship effectively). Interestingly, New Math(s) was the foremost mathematics pedagogy in use in the USA in the 1960s and 1970s, and was certainly in use in the UK when I was teaching there in the mid-1970s, but by the time I returned to NZ in the late-1970s, it was far less influential and out of favour, however. When I began teaching in Australia in the early 1980s, matrices were not taught until Year 12 – that was very different to teaching matrices to (the equivalent of) Year 5 and 6 students in the UK only a few years earlier, for example.

The 1970s in NZ also brought strong social change to the country; there was a significant renaissance in *Maoritanga* (Maori customs, values, mores and cultural practices), which led to such systemic changes as the inclusion of the teaching of Maori language in schools, and subsequent societal change and recognition of the Maori people. This was a complex and challenging time for the whole of the country and across all aspects of society af-

fecting, for example, government policies, immigration, land rights, and historical understandings. Such dramatic changes necessarily had a profound educational impact and resulted in changes of practice and of focus, of government influence and, yet again, of pedagogies used in the classroom.

Similar changes have occurred, albeit later, in Australia. It is not easy, nor necessary, to compare the two countries, of course, as they are so different in many respects. However, it is reasonable to note that the one constant in both NZ and Australia over the past fifty years was, and still is, the process of change in all aspects of education. Here in Australia, these educational changes are often initiated at state or jurisdictional level: consider the New Basics of Queensland in the early 2000s, or the growth of the Quality Teaching Framework in NSW at the same time. The development of the Australian Curriculum began in 2011; this has always been contested, with several states choosing to reframe the AC in terms of their own needs and aspirations. This has led, perhaps, to the delivery of the AC through a series of filters and state government policies in states such as NSW or WA. How the national curriculum is taught (*delivered?*) in those states may well reflect several levels of intermediaries. Compare that to the situation in the ACT, where there is often a direct line from the AC to an individual classroom, with perhaps the only intermediary being the provision by the Education Directorate of learning outcomes to be assessed and reported on.

It is the delivery of the AC, or indeed of any curriculum, that is frequently charged by pedagogies: direct instruction (not direct learning?), inquiry-based learning, explicit teaching, learning styles (of students), cooperative learning, small group learning. Yet again, we must ask about the relationship between teaching and learning. How are these connected by the various pedagogies available to and used by teachers?

Other questions remain: are we teaching mathematics (or is it Mathematics?) or are we teaching children? And how do we do this teaching best? How do

we define successful teaching anyway? In terms of learning? And how might we measure that learning? Ultimately, it seems to me that it is increasingly common for the measurement of student learning to be a guiding factor in policy development at a government level, perhaps as some sort of accountability (of teachers?), and certainly to provide a basis for both national and international comparisons. And who, or what, exactly, is being compared anyway?

Is that what we as teachers really want? Where is the balance between the imposition of prescriptive systemic practices and pedagogies, and individual teacher, classroom or school autonomy? Does it matter? How does all of this affect our relationships with our students, our learners, and how are we as teachers able to be and remain (and model) being the life-time learners that we all are?

One of the most influential books I read during my time as a *student teacher* (a pre-service teacher) was “How Children Fail” by John Holt. First published in 1964, it is a record of Holt’s search for the beginnings of an answer to the question of why ‘most children in school fail’. Holt’s own answer is that they fail “because they are bored, confused and afraid”. While that was such an indictment of teaching practices in the 1960s, I wonder if it remains true today? In his summary, Holt states “... Since we can’t know what knowledge will be most needed in the future, it is senseless to try to teach it in advance. Instead we should try to turn out people who love learning so much and learn so well that they will learn whatever needs to be learned.”

Is that still a valid challenge to teachers? I certainly hope so. We are teachers only because we have learners after all.

POST SCRIPT

There are a number of speakers at the annual conference who will address several of the questions I have posed in this article. [Join us and join the discussion.](#)

And John Holt later wrote “How Children Learn”

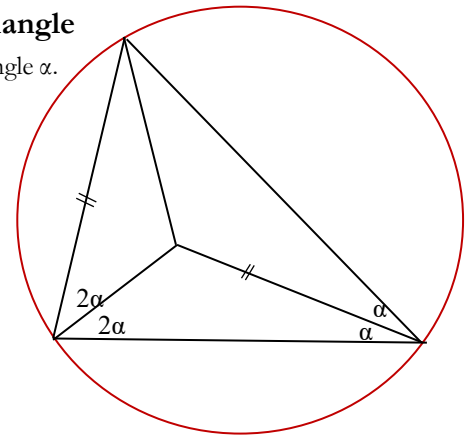
in which he “tries to describe children...using their minds well, learning boldly and effectively...” Over 50 years and perhaps two unimagined generations later, I suggest that both of Holt’s books deserve reading again.

Valerie Barker

PUZZLE SOLUTIONS from [Vol 15 No 2](#)

1. Trying triangle

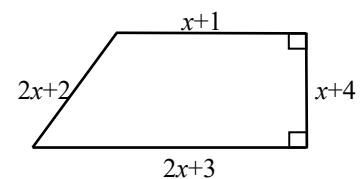
Find the value of angle α .



The angle at the top is $180^\circ - 6\alpha$. The central angle in the bottom triangle is $180^\circ - 3\alpha$. With the triangle base a and letting the pair of equal segments have unit length, we have $a/\sin 6\alpha = 1/\sin 2\alpha$ and also, $a/\sin 3\alpha = 1/\sin 2\alpha$. Thus, $\sin 6\alpha = \sin 3\alpha$, leading to $\cos 3\alpha = 1/2$ and $\alpha = 20^\circ$.

2. Enough information

Find the precise area of the following trapezium.

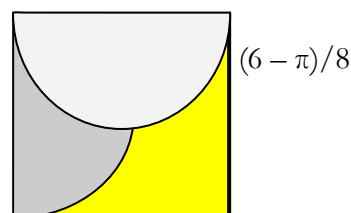


By Pythagoras, $(2x+2)^2 = (x+2)^2 + (x+4)^2$.

So, $x = 4$. The area is then $8 \times 8 = 64$ square units.

3. Overlaps

What proportion of the square’s area is coloured yellow?



4. Amazing number

In what order should we put the digits 1 to 9 so that by taking the first n of them, making an n -digit number D , we will always find D divisible by n as n ranges from 1 to 9?

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