

TT Series 3

Associate Professor Jill Brown

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JANE HUNTER 0:56

We are very fortunate to have Jill Brown on our podcast today. She is an Associate Professor in Mathematics Education at Deakin University and she lives and works on the lands of the Wadawurrung and the Wurundjeri peoples of the Kulin Nation in Victoria. She is a former maths teachers and current maths teacher educator and a brilliant education researcher. Jill is interested in everything related to maths and so that's very dear to our hearts. That's an area that I think for many of us has been a struggle in the past – maybe continues to be – and she's always got very innovative ideas in how to engage young people in mathematics and right from an early age. So we need much more of that. Her work in teacher education has for a long time challenged ideas around how to teach mathematics effectively in classrooms. So welcome, Jill.

DON CARTER 1:08

Welcome to the podcast. Jill. The first question is, could you talk to us about how you came to focus on maths in teacher education for the past two decades, or thereabouts?

JILL BROWN 1:19

Well, as Jane said, I was a maths teacher for over two decades and then it was the obvious thing. I mean, I love mathematics and I love teaching mathematics, and I think it's critically important. Helping others teach maths is so important. I returned to study after doing my master's and my PhD, both in maths education of course, and I'm just really interested in not just my own classroom in school, but how I can work with current and future teachers to improve the quality of or the effectiveness of teacher maths teaching.

JANE HUNTER 1:52

So what was your PhD. in maths titled?

JILL BROWN 1:55

My PhD was in upper secondary education. I was looking about the affordances of digital mathematical technology, particularly in the teaching of functions which have important art in mathematics. But you must look at the graphical numerical and algebraic representations of functions.

2:17

Jill, you've talked a bit about your thesis etc. but why is maths a subject that always creates a lot of angst in students and teachers and adults for that matter?

JILL BROWN 2:28

Yes, some people say that it's very sad and it's a really important question, so I'm glad you asked that one.

It seems that in mass of all discipline areas at one moment in a lesson where a student or a teacher does something, they can really get turned off mathematics. And beyond that time, then people

seem to hate maths, so be anxious about it. That's sad and we need to do something about it. And as maths teachers it's important that we do something about it. I think it's related to the classroom environment.

Maths is a really interesting discipline, and everyone should value mathematics. And so this relates to both the teacher and to the curriculum and certainly the current aims of the curriculum both here in Victoria but also the Australian curriculum is to ensure that students are active and critical citizens and competent, proficient, effective and adaptive users of mathematics and that they develop a positive disposition towards mathematics.

So I think this is something that as teachers and as teacher educators, it's really important that we place an increased emphasis on what happens in the classroom.

So we know that maths is challenging. It's challenging to teach and it's challenging to learn. But the environment that students are involved in, in a classroom is critically important. So I think it's really important that our pre-service teachers, but also our current teachers, really value the contributions of all students and all learners. We have different ways of thinking.

There's rarely one correct way to solve genuine mathematics problems. So language and discourse in classrooms are really important. So one of the things it's important for teachers to understand is how to manage and facilitate discussion in the classroom. And that involves not just the teacher but all the students, both as explainers and listeners.

And I think that's part of contributing to students feeling valued in the classroom, sharing our thinking, especially when we're unsure, which is often the case in mathematics because it's a complex, complicated, connected discipline can make us reluctant to voice what we our current thinking is. And of course, as learners we are unsure about things.

Otherwise the teachers aren't doing their jobs. So I think that environment of the classroom, but also why do we learn maths and what is maths in the classroom?

JANE HUNTER 4:51

Jill, I just want to take you back a little bit because I'm trying to understand, I think that that is terrific to hear you set that out for our listeners and for us interviewing you now. I just wondered, so what was it about your maths education that I guess ticked off a lot of those boxes that you were just sort of taking us through then?

JILL BROWN 5:17

I think I just liked mathematics. I was probably more interested in science when I was at school in history, maths was always something I was going to do and was reasonably good at. And so then I went to uni to become a maths and science teacher. Wasn't really till I was at university and then certainly when I started teaching, but I quickly realised that actually it was mathematics that I was much more passionate about.

And obviously I could see that students really struggled with it and my first school had a large number of students who were refugees or recent or relatively recent arrivals from countries where English was not the first language. that really helped me learn about the importance of mathematical language in everyday language in my classroom.

I think I was fortunate that I worked with a what was then called an ESL teacher, but now EAL, so English as a second language, additional language teacher. So I was in my early teaching career. I got to team teach with someone else and that really helped my teaching. I think the curriculum has

changed over time. We had a very open curriculum when I started and now we have a very often called an overcrowded curriculum.

And I think it does appear if you look at it point by point, it does look to be quite fractured into unrelated parts. And so the work of teachers to recognise that actually we need to be combining many of those parts and making teaching interesting and worthwhile.

And so I guess I realised that the important part of teaching is actually planning and if we don't plan and if we don't plan collaboratively and think about what might happen in the classroom, because after all that's what a plan is. And then teaching of course is our main work as a teacher, but also then reflecting immediately afterwards to think about what might we do differently next time.

What new ideas did students ask or contribute to the classroom ideas that we hadn't thought about beforehand? I think one of the things with my student teachers is that whether they be primary or secondary future teachers, they often come thinking that all students will like them. And that's far from the reality. And that's true at primary and secondary because we've got 25 or whatever students in that classroom, none of them think like us. And so the work of a teacher is quite challenging.

We have to think about what might students already know, what might they think, what partial understanding or misconceptions might they have that we might be able to challenge? But we also have to keep our eye on what's the main focus of each lesson and that sequence of lessons, and how might that contribute to learning? I think the part of the fracturing and the idea of overcrowded curriculum is teachers then tend to want to see learning immediately. And of course, as teachers, that's probably a natural inclination. We want to see students learn, but actually real learning is gradual and over time and in mathematics, sometimes we don't see. It doesn't mean it doesn't happen.

JANE HUNTER 8:21

That's so interesting. And so that really kind of, I guess, plays into a blog post that you wrote for the Edu Matters blog, and we'll have that in our show notes. And that goes to that question of explicit teaching and mass education. And in that post, you call for a push back and you're very clear about why that's important. So can you just talk to us about why you see that explicit teaching and that the resistance to that is critical?

JILL BROWN 8:56

I'd like to focus on effective teaching. That's what our focus should be on, not one pedagogy. and as I say in that blog, it's not even clearly defined. Different people use effective teaching to mean different things, and I think that contributes.

Since that blog post, though, in Victoria we have a new teaching and learning model for teachers in Department of Education schools that instructing them to use that and they certainly have talk about the I do we do you do model so explicit direct instruction as the sole pedagogy and as I've already said, mathematics and this is obviously not limited to mathematics, but it's complex.

We learn different things in different ways and we do not learn by one pedagogical approach. And I would argue that in mathematics, perhaps more than other areas, in fact explicit teaching should come later rather than earlier. And you can't learn things if the teacher has already told you what you're going to learn. mean, one of the sad things about the people pushing this is the lack of evidence.

We keep being told it's evidence-based, but there is very little evidence being given to teachers. And in fact, most of the evidence comes from very limited approach to thinking about research. And it's not typical classrooms with typical students, usually a single student by themselves and control experimental type situations, which is not maths, typical mass education research at all.

JANE HUNTER 10:28

That's great too. Yes, because Victoria has really amped up its explicit teaching in a range of key learning areas and I think that from my reading of the situation, teachers are struggling with that. so how does that then play into when your pre-service teachers come back from their professional experience? Do they espouse those views or are they then challenging what, say, for example, their lecturers and others might be saying in the programmes and coursework that they're doing?

JILL BROWN 11:02

Yeah, I think there's a combination of responses to what's happening in many schools, but some schools in fact for several years have been told this is the model they should be following. And that's clear from practising teachers that I'm involved in teaching out of field teachers of mathematics in a course that I've been teaching for the last four years, and I hadn't realised it was so common in schools. But of course, as I said, teachers want to do a good job. That's why we're teachers.

And so if you're told this is a good approach and it seems like it's effective in the moment. And so it's really important, of course, that as students at university in teacher education are active participants in learning at university and value what's known because of course, what we teach at universities, building on decades of mass education, research and other research.

Just for an example for listeners, a typical statement that students might hear both every day in the world but also in the classroom is the claim that multiplication makes bigger.

Sometimes this is said by teachers in a helpful way for their students. Sometimes students say it, but actually it's an incorrect statement and it needs challenging.

If we think about in the classroom situation how we challenge it, there's no point just saying to students that it's wrong. We have to put that claim to the students and ask them to discuss it, because on the surface it sounds true, but in a classroom where discussion is the norm or becoming the norm, it wouldn't take long for students and there to be in both upper primary and lower secondary.

If this view is still held to recognise that even if you multiply something by one, you're not making it bigger. If you multiply by zero, it's not bigger. If you multiply by half, the product is not bigger. And so then you can come back guided by the teacher.

Of course the teacher is critical. And this goes back to the idea about explicit direct instruction where often it's assumed that if this isn't happening, the teacher is doing nothing in the classroom. But when the teacher puts out challenges and expect students to think about quite important ideas like this claim about multiplication, students will quickly recognise, well, you have to think about what type of numbers you are making this claim for. And in fact, a little throwaway statement like multiplication makes bigger may seem like it's there to help students learners, but it's actually not. And it's making them think something that's incorrect. Despite the best intentions of the teacher.

DON CARTER 13:38

Jill, that's interesting. And you mentioned discussion, and from what you've outlined there, discussion is an important part of the maths classroom. But that stereotypical view of the maths teacher at the front, in front of a whiteboard or a chalkboard and the students sitting in rows with maths textbooks is that changing or is that still happening? What's happening in the maths classrooms around the country?

JILL BROWN 14:02

Oh, it's definitely still happening I think it's coming back to happen more and I think a lot of that does have to do with not just this big push for explicit instruction but also for what happens in the senior use of schooling, the types of exams that are written, the more predictable the maths exams are then the more teachers teach to the the test, so to speak, in year 12 because they got a pretty good idea of what's going to be on the exam. And obviously what's assessed.

And we talk about testing a lot and of course tests and exams aren't the only form of assessment, but if it's quite predictable and it's only assessing a particular type of knowledge and understanding, then teachers, of course, want their students to do well. So they tend to teach to that.

We also have a massive problem in Australia with teaching teachers who are not who are qualified teachers but not qualified to teach mathematics, teaching mathematics. And we have in primary, we have people who are perhaps less prepared and competent to teach maths as well, and we need to do better in teacher maths, teacher education to make sure that everyone is teaching maths has the knowledge, the expertise and the confidence and the capability to do a good job. And part of that includes having colleagues to work with in your school but also beyond to help you plan and reflect. And the more teachers work together in their planning, or the better effect more effective teaching will have in classrooms.

DON CARTER 15:31

Jill, you mentioned tests and I want to move on to PISA tests. Do the test results in maths really tell us a lot about our young people in their success or otherwise in maths?

JILL BROWN 15:43

The short answer would be no, because normally what we hear is just about the main results, the average student and we typically don't delve any further. It's certainly interesting to have a look at something like PISA, which I think has that had an effect on our curriculum?

Because PISA, which is obviously the assessment we're talking about, is of 15 year old students who are ready to leave school. What mathematics and numeracy should they already have the capacity to use as they move beyond schooling in their lives? I think that's one thing that's had a big impact on the new Australian curriculum, which is also coming to the other curriculums, which is including the processes, including mathematical modelling, which is a process of solving real world problems. So if we want students to be interested, engaged in the world within mathematical modelling this important part of mathematics, and previously it hasn't really been in the forefront in our curriculum yet, our students are assessed in PISA against it. I think the other thing to say about PISA is what I read last week was that in the assessment of creativity, Australian students have done really well. But I didn't see that on the headlines of the newspaper because typically what's reported is, you know, when we don't do so well. But again, it's only a single statistic. So one thing that we should be learning in school maths is that a single statistic is not a very good measure to understand. And the

other thing that's also related to PISA is the TALI report. That's the Teaching and Learning International survey that actually has that looked at what are the three most common ways or pedagogical approaches teachers use.

And one of them, of course, is described by them as explicit instruction. And that is the most common around the world are the two general categories were active learning and cognitive activation.

But when they match them to the assessment data, they actually found that the teacher directed instruction was the least effective and active learning was more effective in helping students learn mathematics. But I don't see that in the newspaper either, and I don't see that.

In contrast from what AERO's promoting and governments are promoting critical and creative thinking is one of the capabilities in the Australian curriculum And that's part of what what should be happening in mathematics classrooms. Critical and creative thinking are part of mathematics. We have to be able to discuss, describe, explain our thinking.

And so when we leave school not to go to university necessarily and do mathematics or not even to have a job that use mathematics, but to live our lives in a good way. Mathematics is really important as we make decisions, and we have to be able to learn how to make those decisions in school. And we make the decisions supported by the teachers who plan good learning activities and active discussion.

And we also recognise that as learners we can learn a little bit or a lot in a single lesson. And learning is this cumulative idea and it's okay not to know something. And in fact it's good not to know something in the classroom because there's an opportunity to learn. If we already know something, then we're not learning.

JANE HUNTER 19:03

That's so interesting. Gosh, I wish we had some of analysis tools to look at. Just it's that time of the interview when you get to have around. And we are hopefully prepared to in the sense that you have listened to previous rants on other episodes. But what is really bothering you at the moment in terms of what you're saying in maths or education more broadly?

JILL BROWN 19:32

Thank you for the opportunity to have a rant. I'll try to be impassioned, not angry in my rant. my idea.

I want to point out is that teaching does not always result in learning in class. It's the students who should be doing the mathematics. Teachers have the pleasure of doing maths in their planning. Teachers are professionals and their three main tasks should be planning to teach teaching and reflecting on the teaching and learning that occurred. And our aim should be for maths teaching to be more effective by challenging learners.

To become more active participants, the students need to engage in discussing and explaining their ideas, challenging and teaching each other, posing and solving problems, and working collaboratively to share their results and their reasoning. This will improve their mathematical understanding.

They will become more competent and effective learners, and they will value mathematics. And these are the aims of the Australian and local curriculums. And it is possible for all students to learn to value mathematics. And it's such an important discipline for that to be the case.

JANE HUNTER 20:39

Yes, it is an important discipline and oh, that was so succinctly put. It'll be great to see people's reactions to what you're suggesting there, and that would be wonderful. I think Don wants to almost wrap up our interview with you and we want to hear about some great examples of or maybe even a wish that you might have for pre-service teachers who are considering mass education and maybe something that could be changed over two years on.

DON CARTER 21:12

Thanks, Jane. And thanks to you. You've raised so many interesting issues in this interview and there's so many stepping off points for us, but unfortunately, we just don't have the time. But I just want to where have you seen some exciting examples of maths being taught? Well, not perhaps to name the schools, the cases you've researched and examined closely. What are teachers doing in these classrooms that result in students having more positive views about maths?

JILL BROWN 21:42

Thanks for the opportunity. I'm going to really talk about two teachers.

One is from a recent research project related to mathematical modelling, and particularly in his Year ten class, and the other is part of a professional learning research project in a primary school. But I see very similar attributes and behaviours by both of these teachers in their classroom. They both valued mathematics and they wanted their students to do the same. They expected all students to learn and they saw that the task as a teacher was to facilitate this. They discussed important ideas. They drew out what the students knew. They expected students to explain their thinking and to listen to each other. Both teachers, acknowledged to their students that learning can be challenging, but they also expected and supported their students to collaborate and communicate ideas. Mathematical and everyday language was a focus in both the classrooms, whether it was the Year 10 class or the Grade 5 class. And the teachers helped the students learn it.

They didn't tell them what to learn or how to learn or what to think or what to say. But they encouraged them to share their thinking and probe their ideas in both, particularly the lessons I'm really thinking about. But this is typical.

The students knew they'd made progress in developing their understanding, and they also knew it wasn't the same as everybody else, but they knew that they'd learned something important in that lesson. And also the teachers reflected on the lesson and were able to look back and think about particular students, what they'd said, what they'd done, what understanding they demonstrated, and thinking forward about next lesson with those students. But next time those ideas or tasks were used.

JANE HUNTER 23:33

Thanks so much, Jill. Thank you very much for your time. I'm really appreciate the conversation. And I think there are, as Don said, there are so many starting points for conversations that hopefully will be picked up around mathematics, education. It's so important. And as a humanities person, I absolutely agree. And we need to teach maths much better. It is happening in places and maybe the current programs that are being suggested really are not really aligning closely with that idea of helping the students learn and reflection on practice. Absolutely. So thanks so much to.

DON CARTER 24:16

Thank you, Jill.

JILL BROWN 24:17

Thank you very much for having me.

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DON CARTER

Jane, that was such a fascinating interview. Jill had so many excellent things to say and so many points that we could have taken up had we had the time. Certainly, Jill has such a depth of knowledge about mathematics, education, but education in general got a really great handle on the current issues.

JANE HUNTER

Yes. Don, I think it was really timely that we included Jill in this series. And from a mathematics point of view, it's often such a tricky, such a tricky topic for so many teachers, be they very experienced or early career.

And I think what she talks about in terms of planning and using the context to drive the learning in mathematics education has been lost in some of the current debates and being a researcher at a Victorian university. She's right at the cusp, I guess, of what's happening with regard to explicit teaching and the big move by the Victorian Government to push a very sort of back to basics agenda around, you know, textbook based teaching, which is something we've really tried to move away from in recent years.

So I was I hope that people who listened to what Jill had to say will be fortified by the fact that she knows from her own research and research over a long time together with, you know, groups of colleagues. She's very active in MERGA, the big mathematics association in Australia, to really say that this is not what we need to be doing at this moment.

DON CARTER

I agree totally, Jane, and it's good to hear about Jill's research. I feel that there's the media tend to move away or shy away from academic research, and sometimes they go to other commentators, think tanks, when in fact they should be talking to education researchers. And I also like the way that Jill integrated some interesting points, like the point about multiplication. Yeah, the common view about multiplication and she set the record straight on that one. So a very interesting interview.

JANE HUNTER

Yes. Yes. So and I learned a few things along the way as well. Thanks so much, Don. And yes, terrific to have Jill on it. It's a great conversation and hopefully it will spark more conversations as a consequence. Thanks so much, Don.

DON CARTER

Thank you, Jane.