Transcript of In conversation with Professor Janette Bobis

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Michelle Tregoning – Alright, well good afternoon everybody and welcome to our latest In Conversation. We are so thrilled to be joined today by Professor Janette Bobis of Sydney University. Or, actually, joined a little bit sooner than today because of scheduling clashes.

So, Jeanette, in welcoming you and in welcoming all of our colleagues across NSW, I'd like to acknowledge that we meet on many different traditional lands and pay our respects to Elders past, present and emerging.

This has been a great dream of mine for a very long time to provide an opportunity for our teachers across NSW to get to hear some, it's like a little chip of the iceberg, really, in some of the amazing research that you're leading and working with your colleagues with across Australia at the moment, Janette, so thank you so much for joining us.

Professor Janette Bobis [University of Sydney] – My pleasure Michelle, thank you.

Michelle – And, I'm going to start by asking you a bit of a curly question I think. So in amongst all of the incredible things that you have investigated in your time in mathematics education, one of your most current areas of research is around challenging tasks.

And, I know this is both a really intriguing and complex area of research. So, I'm going to ask you to do something pretty tricky so you will get a bit of a sweaty brain, Janette. But as you know, we're in the business of loving sweaty brains or crunchy eyebrows.

So, knowing what you know at the moment, what are two to three things that you wish all teachers knew about challenging tasks?

Janette – That is a tricky question, Michelle, because the more I explore challenging tasks, the more I keep learning new things that are important. One of the first things that might come to mind concerns teachers who might be just starting out using challenging tasks in their classroom. When challenging tasks are relatively new for teachers and for their students, often teachers believe that challenging tasks are just for their more capable students, all students can benefit from challenging tasks.

So, when introducing challenging tasks, teachers need to be prepared for a higher degree of student confusion and struggle that might have been, might not have been the case normally in their classrooms. They have to be prepared not to immediately cave in to students' expressions of, 'this is too hard', and simply tell the students the solutions or dumb down the task to make it less demanding.

Tasks need to be optimally challenging for all students, so a task might be challenging for one student and easy for another. So, this means that a teacher must design tasks that are challenging for all students and then make judgments about when to prompt and how much prompting is needed for different students. So, some students might need a lot of prompting and others will just need a very little amount, but the important message is, all students need some opportunity to experience a degree of struggle.

If students aren't struggling at some point in a lesson, then they're not actually learning anything new. If the teacher simply tells students the answers, well, they're denying students that opportunity to experience that enjoyment, that satisfaction that we all gain from having lightbulb moments, when suddenly we realize that we see the connections and understand the mathematics more deeply. So, both teachers and students need to build up a tolerance for, and be more comfortable with, struggle in the classroom and understand that it's a necessary part of learning.

So, this leads on to my second point. Teachers have that capacity and the responsibility to reduce or maintain or increase the cognitive demands of a task at any time throughout a lesson, by adopting different strategies throughout the lesson, as the task might unfold. So, in reality there are actually no, there's no such thing as challenging tasks, right? Only tasks that have the potential to be challenging. It's the rich pedagogy surrounding the tasks that actually makes them challenging for each child.

So, my third point might be, no matter how experienced you are in implementing challenging tasks that can be difficult to implement well. There are some things we can do to help. For instance, I recommend that teachers do the task themselves before they give them to their students. By doing the task yourself, you get a deeper understanding of the concepts involved and you can better anticipate where students might start to struggle. So, teachers are then more able to prepare questions and prompts that will help students progress without even without then telling them explicitly how to do it.

If we don't prepare questions for students and get some idea going into a lesson of how we're going to support those students who get stuck, then it's more likely that we'll use inappropriate or unhelpful prompts or questions, or just revert to simply telling them answers. So, anticipation of likely student responses along with the preparation of teacher reactions to those responses is the first part of an overall approach to implementing challenging tasks more effectively.

So, my colleagues and I then recommend an approach to structuring lessons that involves launching the task without telling the students how to do it and then to closely follow that by a period of student exploration. And it's during this exploration phase when students are most likely to express struggle with some level of confusion, right? Like you said or that's where they'll have the 'sweaty brain', most likely. So, if the teacher has anticipated and prepared some of those enabling prompts for students who might be stuck or some extending prompts for those students who might find the task much easier than expected, then they can use this phase of the lesson to adjust that cognitive demand of a task so that it's optimally challenging for all students.

So, during other phases of the lessons, such as when the teacher bring students together to summarise the learning, the questioning strategies and the talk moves during whole class discussion. These are important teaching strategies that are needed to bring out the key mathematical ideas and make connections with students' prior learning. So again, at each phase in the lesson, whether it's the launch, the explore, the summarise phase, learning will be maximized if the teacher has prepared or anticipated likely correct and incorrect responses from students.

So, a great deal of preparation is needed even before the lesson. This preparation, it's easier when you know your students well and when you become more comfortable with challenging tasks and comfortable with students' struggle.

Michelle – Thanks Jeanette. There's a lot in there to think about. One of the things, there's two things that you're really, well, three actually, that you're really making me think about.

One is many years ago I was fortunate enough to be part of a project around student engagement with Western Sydney University, and I met a teacher there, Dan Sprange, who's now principal, and he sort of had this catch phrase of ‘plan hard, teach easy’, you know, and you're making me think about that idea of how it's actually not about making the teaching easier, but possibly about making it more responsive and easier to access the learning of the students when we do that really hard planning work and we then added onto that ‘plan hard, teach easy’ and reflect harder still, because it's in that reflective process, then, when you can come back and say, well, ‘How well was I able to anticipate student responses?’.

‘Where was the surprise?’ If there wasn't surprises, ‘What have I missed in my anticipating?’, too. Or, ‘What have I missed with students?’, because we know that space for surprise is so critical in the ways that we work with students. So, you made me think about that. You made me think about Shawn Achor,

who works in psychology out of the US and he talks about that we've come to misunderstand happiness and the definition of happiness.

And that to have happy people in our communities, happiness is actually defined as the joy we feel as we strive towards our potential and one of the goals in the Department of Education is to support the wellbeing of students to help them feel good when they're at school. But that means making sure that there is challenge for them in their learning and this opportunity to strive towards their potential. Not just always making things easy, that that somehow is a sense of happiness at school.

And the third one is probably is a bit of a gnarly question, Janette, which comes back to this idea of some misconceptions that we have in the field, and one of the misconceptions around teaching is that tasks that have the potential to be challenging are not explicit, and or they don't have explicit teaching nested within them, and we often talk with our teachers about explicit teaching in mathematics being more than just one instructional structure, but it's about knowing what you're doing, why you're doing it, what the maths is that you need to make explicit for students, and then choosing when and how to best articulate that.

And when we think about a structure like, anticipate, launch, explore, summarise, I can see explicit teaching embedded within that framework, and I wonder what you think about how these things fit together?

Janette – That's another really important question, Michelle.

Look, a lot of people hear those terms, 'problem solving', 'inquiry learning', and 'student exploration', and they assume that they mean that there's no explicit teaching on the part of the teacher. Perhaps the teacher's just leaving the students to aimlessly explore, but that's far from the truth, right?

If anything, working with challenging tasks requires more planning, as you said, more planning, high quality pedagogy on the part of the teacher that the anticipate, launch, explore and summarise instructional model is particularly suited to that structured inquiry type lessons involving mathematical problem solving, because if you just wanted children to automate number facts, well, you might choose a different model for structuring your lessons. But the anticipate, launch, explore, summarise model is best suited from problem solving situations when the focus is firmly on developing students' higher order thinking and reasoning and deep understanding of complex mathematics.

The launch, explore, summarise provides teachers with, ‘When is the best time to step forward and provide explicit teaching support?’, and when it's more beneficial to step back and just notice what students are doing or saying. I was in a year one classroom last year working with a teacher and her students on a challenging task, and the task had already been introduced and launched to the students and there were probably about 5 minutes or so into exploring possible solutions and I noticed one little boy looking very puzzled and seemingly not doing much exploring.

So, as I approached, I held back just a minute, just to watch for a short time, to see what he was working on. And just that instant, he seemed to have a lightbulb moment. Obviously, he'd made some connection with the mathematics, right, and he looked up at me and his face was just glowing with surprise, that quickly turned to enjoyment and then he put his head back down and started writing and drawing profusely on the page. It was really exciting to watch.

Look, at that moment, I was really pleased that I hadn't interrupted him with a question about what he was working on. I had made the right decision. He was obviously doing some very deep thinking and I could have spoiled that moment for him by jumping in too quickly. However, in that same classroom, there was another little boy who was also appearing not to do much work. The classroom teacher saw him too and she went up and asked him, well, what he was working on. And that little boy said, ‘Well, I don't know what to do. I'm stuck. I don't think I can do it.’ The teacher very skilfully asked, ‘Would you use some of the animals that we were talking about earlier to help you?’

The problem was around finding legs of animals and combinations to make 20, and she just asked, 'Could you use some of the animals that we were talking about earlier in the lesson?' And instantly off he went and did three different solutions to the problem within that lesson. So in that instant, the teacher knew not only when to intervene, but also, how. She provided an enabling prompt that didn't tell the student how to do the problem, but created some links to prior knowledge and got the students started on this new problem.

In each phase of the launch, explore and summarise lesson structure, there are some guidelines about what and why students and teachers would normally do things, but it does require a teacher to make that professional judgment about when it's appropriate to provide explicit teaching, or perhaps to stand back. The teacher also needs to know and range of what instructional strategies might work, such as talk moves, enabling and extending prompts, some higher order questioning strategies that might work in each situation. And also, of course, how to provide that explicit teaching.

Michelle – Thank you so much, Janette, you've made me really think about the idea that explicit isn't necessarily just an act of telling, and we were talking about this earlier today, that you can be explicit by asking really carefully constructed and intentional questions, or making a connection for students that they have not yet been able to make.

It's not just telling, 'This is what you do next.' I think that's a really important take away message for me, because I think about things I did before, where I might have only made that connection myself around what it means to be explicit in what you're doing. Instead, it's a much broader view around being intentional with what you're doing, why you're doing it, and how you're doing it. So, thank you so much for that, Janette.

We've got a couple of people out about in the field today that we might ask to see if they have any questions that they might like to ask or consider what their colleagues might ask you, Janette, since we have you for a few extra minutes before we close off today. So, are there any questions from out in the field?

Sarah Webb – I'm just going to ask the question, Janette, about trying to capture student thinking and that idea of providing assessing questions as well as advancing questions and in terms of, you know, the enabling and extending prompts that you spoke about. What are some ideas that you've seen work really well about trying to capture the way that students think so we can then use that as a springboard into further learning for our students?

Janette – I think it might come back a lot to, you know, preparing those questions that you want to ask and to do that, you've got to know what mathematics you're targeting; What's the key mathematical idea that you're actually wanting to explore? Then design your questions. You can get away with some general questions.

For example, teachers are often tempted to ask children, 'What did you do?' 'Tell me what you've done here.' But sometimes you can ask, 'What did you find out?', and that type of question 'What did you discover?' 'What did you find out?', children will likely give you a bit more of the substance, rather than give you a blow by blow account of their process for doing it, they'll actually tell you their discovery and that often is their new discovery, and it might reveal more of the mathematical thinking that they've had.

So that could be a general question. Otherwise, some very targeted questions around the knowledge that you're wanting to explore; that would probably be the way I would go if I wasn't quite sure, but I want to 'open the door', if you like, to a child having a longer conversation. Have I answered your question, Sarah?

Sarah – Yes, you definitely have. Thanks Jeanette.

Penelope – We've been talking a lot with some teachers about the preparing for the summary phase of the lesson, of the launch, explore, summarise model. I was just wondering if you had any kind of tips to really support the planning of that chunk of the lesson, and maybe helping us think about ways that we can tune the kids into each other's thinking during that part?

Janette – I guess that's where I might use talk moves quite substantially, is in the summarise phase, but also even before the summarise phase, during the explore phase. While the teacher might not be intervening with the student learning and exploration as much as she might have in other lessons, that's the time when a teacher might be going around and looking at work samples and collecting work samples that show correct solutions and those that perhaps are not quite correct solutions so that we can springboard the right discussions.

And, something else that I've sort of recently started using myself, it's the idea of negative knowledge. The idea is that you can put a solution up, but then ask students to think, 'Well, what won't work in this case?' And sometimes asking what won't work or what don't we know, or that idea of the negative bit, 'What doesn't work in this situation?', can actually get children to think on a slightly different pathway and can start opening some other doorways, and sometimes that leads to some really deep conversations that you can have in that summarise phase.

But again, it's going to rely a lot on the teacher knowing when to ask the right questions and how to orchestrate those questions. Sometimes also having one type of question like a it might be a, you know, what we might consider a lower level question that might be a recall of a fact. But then if you follow that pretty immediately with a different type of question. Well, okay, we've established the fact, now let's ask a why question. 'Why did we say that?', 'Now, why might that be the case?' or, 'Why might it not be the case?'.

So, not all our questions need to be these higher order type questions, but they could follow a pattern of establishing a fact, then go a little bit more deeply with a follow up question. That might be some strategies that could be useful in a summarise phase.

Penelope – It's interesting how different people, I think, find different parts the most challenging, but for myself I find the launch, planning for the launch really difficult, like trying to find that sweet spot of giving enough information for the students to get started but not doing the work for them can be really tricky. But I also then find the summarising equally, probably, as challenging sometimes as well. But I think, you know, like you said, being prepared for those really really helps, and at least it's got you, you might not have all the answers when you walk into the lesson, but having some of them sets you off on the right path.

Jeanette – Actually, Penelope, that's a really good point. You don't go into a lesson thinking that I haven't thought of everything, because you never will think of everything. But you've got to have enough to, sort of, and know what direction you want to take the children, so that if you've got that sort of plan relatively in your mind of the direction you want to head, that if something new and unusual does happen that you hadn't planned for, the teacher's got a little bit more brain space, if you like, left to think on the spot, and if you've got everything else sort of under control and sort of know what direction you're generally heading, then, you know, you need to leave some brainpower, brain space left for those surprises.

Michelle – Janette, I'll just add on to Penny's [Penelope] point and your point is that I would have said something different to Penny, but I think the solution is the same, which is interesting. So, I used to find the messiness of it the most difficult to start with. Do you know, that you felt a lot more sort of out of control? You weren't sure what the kids would do and how they would respond and where things would go to. And for me, in my experience, the anticipating phase and that really substantial preplanning became so critical, because it made me feel a lot more comfortable, because I could map out and go, 'Okay, if this happens here, and if students respond like this, then here's the scaffolding that you can have prepared', in the form of your enabling and extending prompts.

If the students, you know, don't quite understand what you're explaining here, here's you know, I like, I would run through like a mental image of like a movie, in a way, of the representations that I could use to help kids make sense of what I was trying to explain. And I found for me, the anticipating was really helpful in grappling with the mess that I felt that it was. Whereas, like it's interesting to me, that for Penny the anticipating helped her deal with the complexity she has in the launching. Like, it's interesting that that anticipating is a good solution to a few problems or challenges that we have in working with potentially challenging tasks.

Jeanette – I agree with you and you're right, everyone is going to find some aspect slightly different and I think as you become more familiar with using challenging tasks in your classroom, different phases of the lesson become less or more challenging. Most teachers, when they're first starting out, might find the anticipate phase of a lesson the most challenging, right? Because, once you've done a particular task once, you can anticipate more easily what another group of students might do. But of course, every group of students will be slightly different.

Michelle – Well, thank you so much, Janette. You've made me think about someone last year colleague of ours that we work with said, 'There's always someone across NSW who's experiencing the New South Wales syllabus in mathematics for the very first time.' They could have been teaching for 20 years, but they're now working with a group of students in a grade of learning that they've never worked with before, or they're working with a group of students in a way they've never worked with them before.

You know that we're always novices inside of space, and I think that's a really nice message to end on. In fact, it doesn't matter how many experiences you've had in using potentially challenging tasks to support student learning in mathematics, that there's always this moment of feeling new inside of something because you're trying something new, you're working with different students.

Research is telling us a new information that we hadn't heard before, and so in a way, that's where we get to have this great experience in our profession of being lifelong learners ourselves. Which is both thrilling and tricky, because as we know, and as you so well-articulated, learning begins at the edge of your comfort zone. So, as our students have sweaty brains, so do, hopefully, do we, on quite a number of occasions as we're learning alongside our students that we're working with.

So, Janette, thank you so much for giving us some great food for thought this afternoon. We will share a couple of resources with our colleagues across NSW. And yeah, we look forward to hearing about your adventures, and misadventures, in implementing challenging learning experiences for students. Thank you so much for your time, Janette.

Jeanette – Thank you, Michelle.

[End of transcript]