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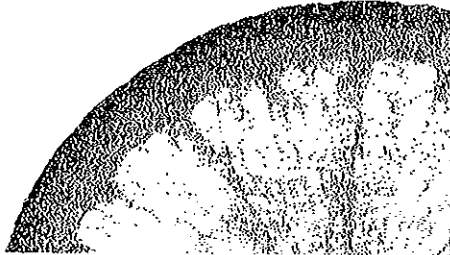
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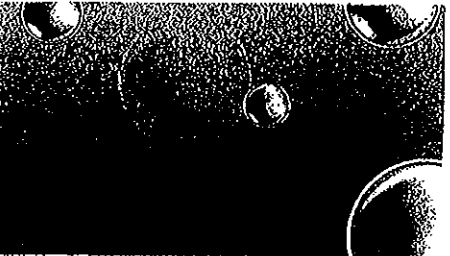
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Schools need to fully understand parental values, motivations and expectations if they want to market themselves effectively, says Stephen Holmes.



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Really connecting physical education and physical activity Want to bring together the social, sporting, strategic and skill-based elements of physical education? John Quay and Jacqui Peters describe an approach that does exactly that.

Multiple intelligences If you think multiple intelligences means you need to create nine different lesson plans, think again. What you really should be doing is designing rich learning experiences that nurture each student's combination of intelligences, say Seana Moran, Mindy Kornhaber and Howard Gardner.

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WE'RE PROUD TO INTRODUCE 'LOOKING INTO PRACTICE: CASES OF SCIENCE TEACHING AND LEARNING,' A NEW SERIES DRAWING ON AN INNOVATIVE COLLABORATION PROGRAM FROM THE CATHOLIC EDUCATION OFFICE, MELBOURNE, AND MONASH UNIVERSITY THAT BROUGHT TOGETHER TEACHERS AND TEACHER EDUCATORS.



Looking into practice: cases of
science teaching and learning

Marching through solids, liquids and gases



EVERY TIME I WALKED INTO MY CLASSROOM for Year Seven Science, my students would always hound me: 'Miss! Are we doing a prac today?'

Whilst the answer was 'yes' as often as I could make it, on this particular day it was, 'No, I'm afraid we're doing theory. Today we are going to look at particles in solids, liquids and gases.'

We sat down and talked about the different properties of substances and how close together, or how far apart, the particles are in solids, liquids and gases. As I spoke and they wrote it came to my attention that the sun shining outside was a more captivating topic for most of them. Watching them closely I saw their hands were writing but their heads weren't thinking. I toughed it out a little more, but just couldn't quite get them in tune with the topic. I too soon found myself wishing I was out in the sun, and thinking about how nice it would be to be doing other things.

Then it hit me. From where, or even why, I couldn't tell you.

Marching. Marching around on the parade ground at the Police Academy. It just jumped into my mind. We were like particles in a solid. Keeping our form. Always moving, but not allowed to break our positions.

'That's it,' I thought as I turned to the class.

Out we went into the courtyard. I gave the students a minute to relax a little then we were into it. Lines and files. The class was quickly into marching form - with a twist. Our arms connected with the people around us, the right arm with the person's shoulder in front and the left arm with the person's shoulder beside.

'Think about the particles within a solid, liquid and gas. Which type of particles do you think we represent?' I asked.

After a short while, 'Um, solid, I think,' came from the middle file.

'Why do we think that?' Again there was a short pause, then, 'Because we are close together,' Sarah offered.

'Correct!' I exclaimed, thinking how clever my idea was, and how it had inspired me into action.

'What would happen if you tried to move - without letting the bonds break?' came the next clever question in my active quiz. 'Try it.'

The group quickly tried to move around, and away from the person next to them.

'We can't go very far,' said Lauren.

'So now the class appears to understand the movement of particles in a solid,' I said to myself. 'But what next?' I thought.

'Who can tell me what we could do to make ourselves into a liquid?' I finally threw out to them.

Puzzled faces looked at me. The strain of thinking was clearly displayed on many faces. This task appeared harder for them than the page of writing we had just completed in the classroom. I spoke briefly about the bonds between the particles.

'Are the bonds stronger or weaker in a liquid or a gas?' I asked.

'Weaker,' came the response from the group almost in unison.

'So if our arms represent those bonds what could we do to make our group weaker?'

'We could let go.'

'Yes!'

It seemed that the sun was awakening the minds of the students and several of them let go of each other.

'What would happen now if you tried to move away from each other?' I asked.

Again they tried to move as we had earlier.

'We can move a little bit further apart,' Laura suggested.

'Excellent. What about the particles in a gas? What would happen to the bonds and particles in a gas?' I asked in response.

Students gradually began to let go of one another. As one student let go of the person in front of them and beside them, they too began to let go of the people around them. It flowed on until all the bonds were broken.

'Now that all the bonds are broken, what happens if you try to move?' I asked.

At that the students spread themselves out over the area of the courtyard. They had figured out that the particles in a gas were

TANYA SOLOMON DIDN'T THINK THAT FIVE YEARS WORKING IN THE POLICE FORCE WOULD HAVE HELPED HER A GREAT DEAL WHEN IT CAME TO TEACHING SCIENCE UNTIL ONE DAY WHEN SHE FOUND HERSELF IN A YEAR SEVEN SCIENCE CLASS TRYING TO TEACH STUDENTS ABOUT THE PROPERTIES OF SOLIDS, LIQUIDS AND GASES.

I saw that the students were almost drowning in class notes, and found myself drowning with them. I didn't see that I had a choice but to get out there and try something different.

a lot weaker, and that allowed them to be more spread out.

'We're a gas!' I yelled to the group.

We gathered as a group again, and headed back to the classroom. As we moved, several students were talking.

'That was great, I really understand what you are saying now.'

'Can we do it more often, things like that? I get things better when we do activities!'

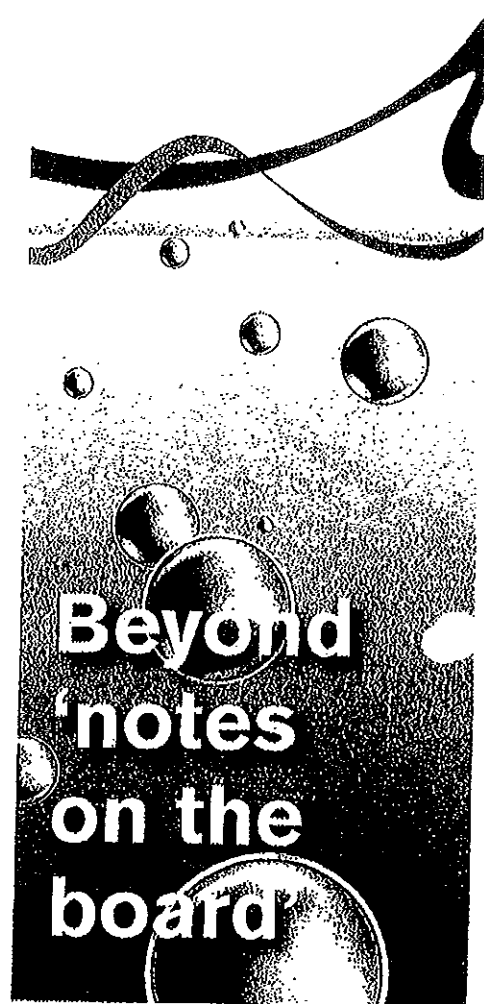
It was at this point that I realised that being involved in a small practical activity can teach students a lot more than writing copious notes. Not only that, but learning in Science doesn't necessarily have to come from a typical Science activity. An inspiration such as this one hasn't happened to me all that often in my short teaching career. I hadn't planned for this lesson to take shape the way it did, nor did I actually think too much about what would have happened if the activity had failed. I saw that the students were almost drowning in class notes, and found myself drowning with them. I didn't see that I had a choice but to get out there and try something different. What would have happened if the activity hadn't worked? No worse than could have happened if I didn't try the activity in the first place.

Taking a risk on this occasion paid off. As we travelled through the remainder of the unit, I was able to refer back to the activity and found the students recall and understanding was far better than I was expecting. They could go back and revisit the concepts. You could almost see their minds ticking over as they re-enacted the activity in their head. ▲

Tanya Solomon is a teacher at Mater Christi College, Melbourne.

A version of this article first appeared in Looking into practice: cases of Science teaching and learning, published by the Catholic Education Office, Melbourne, in association with Monash University. Reproduced with kind permission.

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CASES ARE ONE WAY THAT TEACHERS CAN TAKE TIME OUT FROM THE BUSYNESS OF SCHOOL LIFE TO REFLECT ON THE KNOWLEDGE AND SKILLS OF GOOD TEACHING, AND SHARE THOSE REFLECTIONS WITH OTHERS, AS JOHN LOUGHRAN EXPLAINS.

A MAJOR AIM OF THE CATHOLIC EDUCATION Office Melbourne Science teacher research project that Tanya was involved in was to create ways for teachers to be challenged by their practice and to reflect on their teaching. As a consequence, it was anticipated that participants could then think more deeply about their teaching and consider how to share their knowledge of practice with others. The case you've just read, which came about as a result of Tanya's reflections about her practice, highlights a number of interesting aspects of teachers' knowledge of

teaching that illustrates how important it is to see into teaching in new ways.

Tanya opens her case with a situation that would be familiar to many teachers: her students appear to be passive learners and, in some instances, they are unwittingly encouraged to function that way by the way that teaching is conducted. As Tanya makes clear, sometimes such passive learning is so obvious that it's almost impossible to avoid doing something about it.

In the case you've read here, Tanya shows how. By digging a little deeper into the content she begins to reconsider what to do and why as she purposely acts to make that content make sense for her students beyond the 'notes on the board.' In so doing, she begins to link the abstract concepts of solids, liquids and gases to concrete ways of helping students better understand what those abstractions really mean. This case, then, is one way of illustrating how the knowledge and skill of a teacher can be shared with others as a consequence of reflection on practice.

Tanya notes something that she has no doubt been well aware of through her previous experiences, namely, 'that being

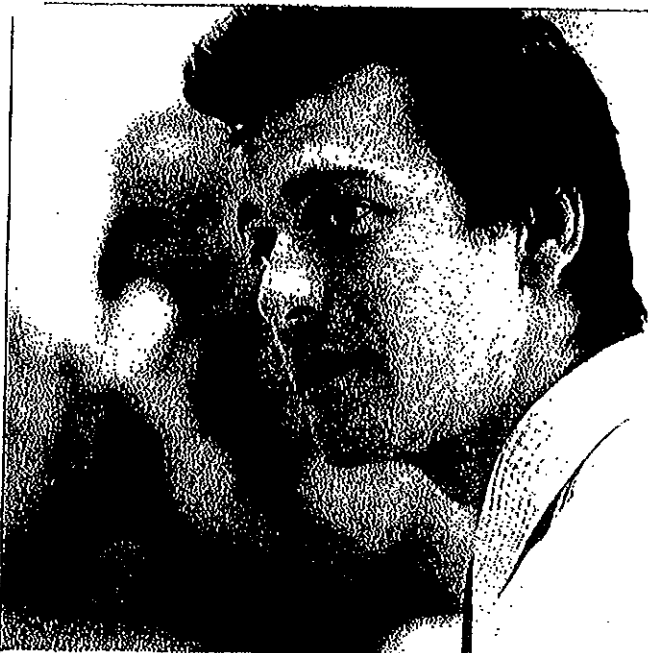
involved in a small practical activity can teach students a lot more than writing copious amounts of notes. Not only that, but learning in Science doesn't have to come from a typical Science activity.' The importance of this realisation is not that it is necessarily new, but that it reminds us of the subtle knowledge about teaching that has perhaps moved away from the forefront of thinking about teaching because the busyness and demands of school life reduce the time available to teachers to reflect on what is to be done beyond delivering the content of a lesson.

Tanya recognised a problem: her students were doing busy work but not learning the content, and she was delivering the content but not necessarily teaching in ways that enhanced their understanding. Because it was so obvious to her what was happening she felt a need to address the situation then and there. She decided to take a risk. Good teachers react in their classes like Tanya all the time, yet they don't necessarily have the opportunity to reflect on that knowledge and those skills that allow them to function in such a professional and responsive manner, and therefore don't always see some of these

features of skilful practice or have opportunities to discuss the nature and importance of such knowledge with others.

Cases are one way of taking time out from the busyness of school to reflect on the knowledge and skills of good teaching, and a way of sharing that with others. As Tanya's case demonstrates, quality teaching matters and needs to be better understood. By creating ways of sharing knowledge of practice it may well be that the profession itself comes to better value the skills, knowledge and ability of teachers. If that happens, professional learning takes on new meaning because enhanced teaching and learning becomes the central concern of quality in practice. ▀

Professor John Loughran is the Associate Dean of the Faculty of Education at Monash University. His research and teaching interests are based on the development of teachers' knowledge and the way that this is influenced and developed through teacher preparation, beginning teaching and professional development. He was a high school Science teacher for ten years before moving into Science teacher education.



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