C O R R E C T E D V E R S I O N

EDUCATION AND TRAINING COMMITTEE

Maths and Science Evidence Committee

Inquiry into promotion of maths and science education

Shepparton — 2 August 2005

Members

Mr S. R. Herbert

Mr N. Kotsiras

Chair: Mr S. R. Herbert

Staff

Executive Officer: Ms K. Ellingford
Research Officer: Mr A. Butler

Witnesses

Mr J. Howley, principal; and

Ms H. West, teacher, Guthrie Street Primary School; and

Ms D. George, school development officer, Hume region;

Ms D. Souter, assistant principal, Gowrie Street Primary School;

Ms P. Montgomery, Shepparton cluster coordinator;

Mr C. Downey, principal;

Mr J. Keeshan, student;

Mr B Oakley, student; and

Mr J. D'Amore, student, Mooroopna Primary School; and

Mr D. Poppa, vice principal, St Mel's Primary School;

Mr S. O'Shannessy, principal, Tatura Primary School; and

Ms J. Bannister, Mooroopna innovation and excellence cluster educator.

The CHAIR — I declare open this hearing of the Education and Training Committee which is an all-party joint investigative committee of the Parliament of Victoria. Members today are hearing evidence in relation to the inquiry into promotion of maths and science education. I wish to advise all present at this hearing that all evidence taken today, including submissions, is subject to parliamentary privilege and is granted immunity from judicial review pursuant to the Constitution Act and the Parliamentary Committees Act. I need say that to ensure you cannot be sued for anything you say here today. Welcome, and thank you all for coming. The inquiry we are looking at, as you all know, is into maths and science education. The reference was given to the committee by the Parliament, and we have to report back later this year on ways of increasing both the effectiveness of maths-science in schools and the take-up rate of students who are pursuing careers in maths/science and going on to university, and then following it through.

As you will know, Victoria is a small industrialised state. We increasingly rely on technology and the skills of people who service our industry to compete and, unlike some of the larger states that have major resources of oil, offshore resources or major ore and other exporting natural products, Victoria is competing on a skills basis against some pretty large Asian competitors and world competitors in the international export market. In that context it is the Parliaments' viewpoint, and undoubtedly that of the government which has referred the reference to the committee, that we need to ensure our future generations are skilled and competitive, particularly in maths and science, so we can keep a technological edge in competition with other competing nations and ensure that our economy keeps ticking over and improving well into the next decade. So it is a fairly important inquiry. I understand that it is one that also interests both education and industry. We have been having industry forums as well as education forums. We are coming out to regional Victoria in particular because often the issues facing regional Victoria are different to those in metropolitan Victoria. They are to do with resources and sometimes to do with distance. They are to do with an industry specific issues in terms of the interrelationship between schools education and local economies. So we are pleased to come here.

Shepparton is in the heart of the food belt of Victoria. There are a lot of large industries around here, so we have come here to see what sort of issues are prevalent in schools and what advice you can give us in terms of ways to improve both the take-up of maths/science and the quality and outcomes for students. We are looking forward to hearing in the forum today what happens here. We have a number of presenters. I think there are some schools sitting in the gallery, for want of another word. I ask that you come to the table when I call you to speak. Can I just check who is here?

Ms WEST — I am Heather West from Guthrie Street Primary School.

Mr HOWLEY — John Howley from Guthrie Street Primary School.

Ms SOUTER — Dougie Souter from Guthrie Street Primary School.

Mr DOWNEY — Cliff Downey from Mooroopna Park Primary School, with three students.

The CHAIR — We will start off with Guthrie Street Primary School.

Ms WEST —I am a teacher at Guthrie Street Primary School here in Shepparton. We operate 19 classrooms; there are 430 students. We also have a deaf facility. For the last four years I have been the early years numeracy coordinator in the school, and this year I have taken responsibility for maths on a whole school level. I have put down a few things that I would like to tell you. They are not in order of importance but are just things that have come to me.

First, teachers need a good grasp of the curriculum and what it entails. We have had a lot of change in curriculum over time, and our recent change from CFS to VELS is one of those examples. Teachers need to be familiar with what is expected at each level so they know what it is that they are to teach, and I think teachers need good documents to support them in this. I know when I came out as a beginning teacher we had course advice, curriculum at work — documents or initiatives like that that were designed to support teachers in their planning and teaching phases. I think that is important. Teachers need that scaffolding for clarity and direction, and in my case, when you are a beginning teacher, a starting point for where to go when you are planning and implementing maths in a classroom.

At Guthrie Street we feel teaching and learning documents are integral, so we have worked on compiling a detailed scope and sequence document. We basically looked at the CSF and had a go at working out term by term for each

level across our school what it is we are going to teach, when and how, and trying to get some build up of concepts that we are going to teach through that. We have had people attend lots of PDs, like Michael Ymer, and we have found they have given lots of overviews and lots of scope and sequence documents, but we felt it was important at Guthrie Street to create something that was our own document, that we had put time and effort and thought into doing in light of all those. It was a large process. We started at the start of the year with a curriculum day, had the teachers basically say, 'Let's lay it on the board, what is it we want? What do we envisage our document to look like? What columns will we have? What is important?' Then a group of us went away and looked at how we could break that down over the terms to teach.

It has been a long process. It has taken us half a year to get it to this stage where we are happy to hand it out to you, yet we recognise that there are still other things we want to do to improve this document. I think having the time to achieve initiatives like this is an impinging factor. An extension of this along this train is teachers need to have a good understanding of the content they are to teach. They need to feel confident in themselves and their ability to teach what is required, and this is an area that I think once again at our school we have identified as one we are having a struggle with.

At the start of the year when we had this curriculum day we were looking at professional development options. Who have we got in our school that can give PD to other teachers to help them? We put out a survey to our teachers on that curriculum day on different areas — whether it was measurement, space, whatever — that they would feel confident in giving professional development to other staff members. Basically one person from each year level was rating themselves as feeling confident enough to deliver PD to other people in that area. I think that just shows that teachers need more confidence in themselves and what they are going to be teaching.

Teaching is a profession that has changed over time and it evolves, especially in terms of how we learn best and what to teach, and I think teachers need to be constantly updated with that. I think good maths teaching in training colleges is important and essential, but what you learn there does change over time. Even in the few years I have been out, things have changed, and many teachers at our school will tell you they have had limited professional development options or opportunities since they left teachers college many years ago, and things have changed for them. That was highlighted earlier this year when we had George Booker, a maths person from Queensland, down in Benalla presenting. We had four teachers go to that. They came back so enthusiastic, feeling like they were so enlightened, so positive about maths, because they felt that although they had not been out for a while they were just learning so much more about teaching of mathematics and how children learn. They found it a really good opportunity, and I think that just shows that professional development is the key and people need to feel that they are having regular professional development as they go.

One way of overcoming that is professional development for all teachers, and part of that is that teachers feel they can grow in the areas of their perceived weaknesses or what they do not feel confident about. Once again we found with a school of our size, of 19 classroom teachers, the opportunity to provide professional development to that number of teachers is problematic, particularly with the cost issue by the time you replace them with CRTs so every one can go out. I know we have trialled a lot of options with professional development, particularly sending one or two representatives off, them coming back and training the others. That model has not been seen to work as effectively in our school perhaps as it has in other schools, because people seem to want to have a shared vision and a common good of where they are going to if they are working in teams. That was highlighted with the Booker PD; people went back and tried to get it to come back into the school, but the staff were saying, 'If we had all been there it would have been so much easier to make those changes across our schools and across our sections'. If they feel that everyone is on board with the same thing, then it is a lot easier.

The people who have gone to the Booker PD have done a great job. They are coming back reading chapters, discussing it, trying to get changes through their areas, and once again this is all a time-consuming process. Even for those people to present PD to the whole staff, our staff meetings are that crammed with other professional development and other issues and things happening, we feel that time is a big factor in that. The chance to meet collegiately with other teachers and discuss maths is an area that I think we need help with. We often have teachers at school asking, 'What examples of assessment are there?', or with our CSF, 'What constitutes beginning at level 1? What constitutes established at level 4? How does what my children are doing compare with other teachers in the same school or with other teachers in a different school?'. I think there needs to be more networking of teachers with maths and assessment and moderation.

A few years ago we had here in Shepparton an initiative set up by Denise Howley, which was the early years network, and this was an excellent forum for teachers to get together. That was happening when I was a beginning teacher and suddenly you were networking with other teachers. It was a chance to hear other speakers and to have that link with other people in other schools. I think that was a really beneficial initiative and something that on a similar scale needs to be replicated now. Assessment is one area that our school feels less supported in. More resources on effective assessment strategies are needed, and once again finance is a problem here. There are some really good resources out like the early years numeracy interview that our school has made a commitment to do, but it costs a lot of money to replace teachers while they are testing children, and we need to find the time to do it.

Further from that, the idea of online tracking of the whole school — being able to track your children from prep to grade 6 — is something emerging at the moment that we are faced with, but once again trying to resource this initiative with time, money, experience and expertise is proving challenging for us. There are many practical things that are required on a day-to-day basis. The reference books are essential, so again here we are everyone really taking on board the George Booker PD, but in our budget we only had enough for four copies of his textbook to be provided, one per section, yet we have got in a section 10 people trying to get access to that book — it does not really work. The same with Western Australia's *First Steps*, you have enough in your budget to buy one copy, but when you want everybody to have access to it and be involved you need to expand the budget so that we have got more resources like that.

Classroom equipment is important too. Our early years classrooms really value concrete materials and operate on that, but we will admit that they are lacking to the full extent in some of our classrooms. We do have a maths kit in each classroom with different equipment, but calculators get broken very easily and it is constant finance to keep replacing these things but they are imperative to the program. Additional assistance in classroom — there are a lot of children struggling to pick up basic maths concepts by the end of their first or second year of schooling. Our very good testing with the early years numeracy interview has shown us that at the start of the year there are children out there struggling in maths. If something is not done for these children the gap gets bigger and bigger, and I believe it is harder to bridge the bigger the gap gets. A specific remedial program is needed for these children, and once again the cost to schools for this is very problematic.

A few years ago I attended training in Wangaratta by the maths educator Cath Pearn who had a program in maths intervention, and it was something that I came back really believing in. But our school did not have the opportunity or the resources at that time for us to do remedial work with the children. Now a few years later the school has provided that commitment, but I spend half an hour for four days a week withdrawing some at-risk children in our school, working with them — a small group of four — on maths concepts. I have two grade 3 children and two grade 2 children working over a 20-week program. The time to coordinate that program to plan good specific learning experiences is a big commitment on the school and on my behalf. I recently went to Bendigo to meet with someone who has run a similar program called EMU, which has come through from Anne Gervosoni. It is a program out there to help those children who are struggling, and to get these programs into our schools is needed but I think it is hard to find the opportunity.

The maths intervention so far has been really successful in our school. There have been a lot of positive comments by the parents and the teachers. Parents have come in to speak to me, wanting to observe a lesson, and have said, 'How can I follow up with what you are doing with my child at home?'. I guess the other part of that is that I have got four students on the program, but there are a lot of others that we have identified at our school where it would be really good if they could have the opportunity to be a part of that program.

An extension of the maths intervention is something we are trialling this year with some at-risk children, and it involves a link with our La Trobe University here in Shepparton and through our cluster educator, Debbie George, who I am happy to say is here in the audience. We have been able to work out a program for 15 at -risk students from each of our prep to 2, 3, 4, 5 and 6 areas. The La Trobe students will be coming in. They will have a one-week period each where they will be working with students from our school — that is 41 La Trobe students, which is a really positive initiative. We also have assigned a maths driver at our school for our sections and I meet with these maths drivers on a regular basis to coordinate maths across the school. We have found that this has been a good way to keep initiatives happening to get things going through the school.

We have really found helpful our targeted improvement plan from the end of last year, plus the educators — two of whom are in the room here — have been able to help us, come in, model, give us opportunities. The capacity of these people is great, their influence has been really significant on our school, but I know they are very busy people

and their load prevents us from probably accessing them to the degree that we would really like to. We have provided parent education nights at school along the family maths line, and will continue to do those this year. Parents have responded really well to this. In terms of what factors support high-quality teaching and learning of maths, I feel access to good professional development is one, and access to other discussions with other staff regarding maths is another.

To recap, I refer to some of the challenges. I think getting access to good high-quality professional development for all staff is really hard here in the country. If you teach in the city it is easy for a consultant to come out after school because you do not have a travelling bill. Once you are in the country all that is so much harder because you are already paying for a consultant to come up, so you are usually looking at a whole school day, or something along those lines. Finding the time and money to finance all we would like to do is really problematic as well. That concludes my summary.

The CHAIR — Would anyone else from the school like to supplement the presentation?

Ms GEORGE — I would like to say something.

The CHAIR — Just before you do, I congratulate you on your presentation. It was excellent. It is good to see your enthusiasm and the school's enthusiasm for maths and science. Based on the many presentations I have heard, I am sure you could be a consultant in many areas. If your enthusiasm for what you would like to do was all funded, you would probably break the state budget — and that is good to see.

Ms GEORGE — I am a school development officer in the Hume region and I have been working with Guthrie Street and other schools in this area. One of the big issues I see with the problem with numeracy in schools is that the early years numeracy training has basically been withdrawn. When that started it was a big initiative and a lot of training was done. Now it has been condensed and has been combined with the early years literacy. Instead of running four or five days, there are now two days with literacy. So the whole focus of that early years numeracy has been devalued in a lot of ways. And from working with the graduates at La Trobe, those students have done very little in numeracy at all. So those kids are coming out into our system and they are struggling. Not only do they have numeracy to get used to; they have the whole teaching load to struggle with. From what I am seeing it is coming down to the finance being withdrawn from the numeracy training, and that is just making it much more difficult within schools.

The CHAIR — Are there any numeracy coordinators in this area?

Ms GEORGE — Yes, there are, but there is very little new training, and that coordination training is what is being condensed.

The CHAIR — I understand that, but I think there has been a shift in the program. That is why I asked whether there are numeracy coordinators. How many are there in the schools you have?

Ms WEST — At a lot of schools we would have a numeracy coordinator.

Ms GEORGE — It does not mean they are trained, though.

Ms WEST — I guess with what Debbie was saying, I can see her point, because we have graduates coming to the school, and, once again, while it is overwhelming for these guys it could be included in their training.

The CHAIR — I understand about the graduates. We just did an inquiry into teacher training and we picked up that point. With maths confidence; there is no doubt there is an issue of maths anxiety in primary schools. Do each of the schools have an early years numeracy coordinator? That is all I was asking.

Ms WEST — They probably should.

Ms GEORGE — They are meant to nominate somebody.

Mr HOWLEY — In terms of the funding, it would come in, and I would say to any school of our size — and it is just on the 450 at Guthrie Street — that it would be about a point 2. I guess that would be the money that is being allocated in Heather's role.

Ms GEORGE — And it does not always mean that the coordinator has been trained.

The CHAIR — I guess that is another issue, too. We will have another presentation in a tick; I will take a couple of questions, first.

Mr KOTSIRAS — How many hours or periods a week do you do maths and science? I know it is not straightforward.

Ms WEST — We aim to have the classrooms doing 5 hours numeracy a week. Everyone from prep to grade 6 will participate in an hour a week. But once again, like what we found last year, you can aim to have that, but the curriculum gets crowded with that many different things chucked in, and teachers will admit that if they have to go on an excursion here, maths is the first thing — they will do their literacy in the morning.

Mr KOTSIRAS — And science subjects?

Ms WEST — That gets integrated with a lot of our others, so we would not be doing an hour of science a day, no. You would get an hour a week, but not an hour a day.

Mr KOTSIRAS — How many student-free days do you get a year, where the students are not in the school, so the whole school can have PD days?

Ms WEST — Four.

Mr KOTSIRAS — And the school decides how to use those four days?

Ms WEST — Yes.

The CHAIR — What is the general theme or project of a cluster? When you were first funded as a cluster you would have had an area that you wished to build up.

Mr HOWLEY — There are a couple of clusters involved here; there are three clusters combined in one in Shepparton. Dougie may be able to — —

Ms SOUTER — The initial proposal was focused on middle years pedagogy, which was literacy, numeracy and student engagement.

The CHAIR — And that has moved on to something else now, has it? Or is that still the general thrust?

Ms SOUTER — No, that is still the backbone of the cluster initiative.

Ms MONTGOMERY — I am part of the Shepparton cluster. On that point, we are a phase 3 cluster.

The CHAIR — You are a coordinator?

Ms MONTGOMERY — I am a cluster educator, which means that I am a non-teaching person appointed to a group of schools to support them in their middle years.

The CHAIR — I was chief of staff when the education minister wrote the submission to ERC. I am keen to see how it is going.

Ms MONTGOMERY — One of the issues here is that we are a phase 3 cluster, which means we have only just started this year, so that any of the initiatives are in the very early phases.

The CHAIR — So the three clusters all have middle years as a focus, is that right?

Mr HOWLEY — Yes.

Ms SOUTER — It is funded for middle years. The potential to develop that across the board into early years models where schools are gathering together and being coordinated and developing professional learning teams are things that certainly will evolve as time goes on.

The CHAIR — Do you think it has been successful?

Mr HOWLEY — With the Shepparton cluster — and I will refer to this cluster, where Pam was appointed as an educator just one term ago — we have combined three clusters. In answer to the funding question, I believe it is very well funded and we are developing the program. We have another two years to run; we just started this year. So I believe there will be many changes and the bringing of people together. It will be excellent. By combining we certainly have access to a greater pool of funding, and we have three educators who will be able to combine and provide various services — for example, Pam has a great history in maths and we have brought her on board. I am looking forward to the work.

The CHAIR — That is good. When they were first funded there was a bit of a fear that the secondary schools would take over the educators position. But as we have travelled around it seems to be the primary schools in particular who are using the educators very well to link across the secondary environment. Do you care to make a comment?

Mr HOWLEY — It is a fair comment. The Shepparton group had been meeting for about 18 months prior to it becoming a funded model. I believe we have established a very good relationship; it was always the intent at the commencement of our cluster development that we would build relationships. We actually had meetings on a regular basis prior to being funded. It was a combination. I would speak very highly of the cluster bodies.

Mr KOTSIRAS — You referred to parent evenings; what does that involve?

Ms WEST — Yes, basically we try once a year to have a family maths program where parents can come along and have a little bit of a snapshot from a teacher on maths education. They are working with kids; we have maths activities around the room that they can go and work on with the children. Basically it is an opportunity for parents to come in on an evening and look at some maths activities that would be run in a classroom.

Mr KOTSIRAS — So you do not provide the parents with PD for when they go back home?

Ms WEST — We have not gone that next level. I see that as something different, and that is what we would like to have, yes. With the early years numeracy there was a parent participation pack. A program like that is just something that we have not had time to implement with our parents yet. But yes, we feel that is a big thing that needs to happen.

The CHAIR — At this stage I will call the Mooroopna Park Primary School to come up and make a presentation. Then we will open it up for more detailed questioning. Do the students wish to come up too? I ask each student and teacher to state their name and their form or position.

Mr D'AMORE — I am Jolon; I am in grade 4.

Mr DOWNEY — I am Cliff Downey, the principal of the school.

Mr KEESHAN — I am James Keeshan; I am in grade 3.

Mr OAKLEY — I am Bruce Oakley; I am in grade 4.

Mr DOWNEY — Just a little bit of an explanation, it is a tough week this week which is probably why you do not have people here from the other schools. There is a lot on — for instance, a lot of the government literacy and numeracy assessments have to be completed, hence I have come along. I thought it was a good opportunity because I have some observations that I hope you will find interesting, and towards the end I want to say a little bit about the cluster of schools that we have been involved with, which is a cluster that has been going for two and a half years — that is the middle years cluster — and also what we are doing with the whole of the Shepparton school network.

I thought I would start off by saying that what we see in maths and science education as important in our school — and I know from many years in my own role as a teacher and a principal — is trying to build the interest and the engagement with students in the variety of ways we do things so that they will take up the opportunity to use that later in life. It is about building the interest and excitement with maths and science.

These boys have done virtually no preparation for this, but they are going to speak off-the-cuff for a minute or so about something that I thought would be relevant. What I found interesting in having a brief talk is that we do not

talk as much about science or maths. In science education we integrate studies and because we are now moving and integrating the new essential learning framework in my school, which is being trialled in a few lessons, we do not talk as much about science or maths. With science we integrate the studies, so there will be units of work. The boys have done lots of units of work which might have had a theme or a topic of mini beasts, the human body, the environment or animals and how we survive. When I asked them about science, that was not what they were interested in at all. They were very interested in the chemical and physical sciences. Jolon is going to describe something that he did to do with rocket science.

Mr D'AMORE — I got a film canister and put baking soda in the top and vinegar in the bottom and threw it up in the air, and it went like a rocket.

Mr DOWNEY — The other thing about these boys was the interest that was shown at home, and the involvement of people at home. Jolon, explain how your dad was involved.

Mr D'AMORE — My dad got the vinegar and the baking soda, and he helped me put it in.

The CHAIR — Is it just ordinary baking soda?

Mr D'AMORE — Carbon baking soda.

The CHAIR — Bicarbonate of soda and vinegar; and that explodes, does it?

Mr D'AMORE — Yes.

Mr DOWNEY — One of the things that we have done — and lots of other schools have also done — is family maths which was talked about before. There have also been great initiatives with science in schools with the family science program. We find that if we have an information night, or as we were talking about before, a professional development night for parents, we get very few parents to come along. A few very interested people will come along, such as Ria Oakley who is involved with everything and likes to be informed and really promotes those sorts of things. But we find that the way to get the parents along is to have the students do some experiential learning — making some models or something to show the topic — and ask them to bring those along to share with the families. We find that is really good. James had an experience with a volcano.

Mr KEESHAN — My dad and I were in Melbourne. I have a book which is all about science, and because I am into science and technology and all that kind of stuff we were flicking through it one day and found a page about volcanoes and how they erupt. It said all you need is plaster from Bunnings Warehouse. So we went and got plaster, baking soda, vinegar and other stuff. You make the mould on a piece of cardboard. You get a cardboard cylinder and put it in the middle and cut it to make it the size of the volcano. You paint the volcano whatever colour you want, and then you put the baking soda and vinegar inside. It takes about 10 seconds and then it erupts. It was exciting and I really liked it.

The CHAIR — Do you use brown or white vinegar?

Mr KEESHAN — Brown.

Mr DOWNEY — We are trying to build interest into learning, which is very important, but also, as was mentioned before, having a sequence of learning activities, making sure that the students are building on existing knowledge. It is a very different role for the teacher now to manage that kind of experiential and sequential learning to just running a weekly session of learning in a particular area, and that goes for maths as well.

The CHAIR — Is that because you have to keep good records of what you have learned in terms of the topical approach you are taking, as opposed to having separate lessons? Is it like crossing off what you learn but in a different recordkeeping manner?

Mr DOWNEY — One way I can address that is to say that it is much more about focusing on the students learning and their sequential build-up of concepts and knowledge than about the teaching. The teaching is enormously important, of course, but just ticking off the lessons learnt is not good enough any more. It is a matter of really understanding what the children know.

In the maths area, as was mentioned before, we have early numeracy interviews. It happens in lots of schools, but especially in my school. The teacher sits down at least once a year and spends half an hour for each of the strands the child is doing in that year and does some experiential things in order to understand in a one-to-one way where the child is at with their learning. That is an excellent way of managing things. It helps the teacher to set up learning experiences in the classroom which are pitched at the levels of the children's interests. We have some students here who are very interested in moving forward. The maths they are doing is ahead of and more diverse than the majority of other students in the class. The challenge for the teacher is to keep them going. We also do problem solving with all the students, but particularly those students. It includes finding a way to pose problems for the children either in small groups or individually to address them, and Bruce is going to talk a little bit about how much he enjoys that kind of maths.

Mr OAKLEY — I like problem solving. I am really good at it because at home mum gives me problems to solve — for example, money problems — and I have to work them out. That is really fun.

Mr DOWNEY — Bruce, can you talk a little bit about how you have maths contracts in the classroom?

Mr OAKLEY — We have maths contracts. They include tasks that we have to do. One of them asks you to do a time line of your life from birth to age 20. You have to think about your future goals and use a bit of imagination in making the time line.

The CHAIR — Does each student have the same contract, or different contracts?

Mr OAKLEY — The same.

The CHAIR — What happens if you do not fulfil the contract?

Mr OAKLEY — I do not know; I am still in the middle of it.

Mr DOWNEY — The variation in how it is addressed is only known to the individual student or in their group. They are not as aware of how some other groups are working differently.

The CHAIR — Could I have a look at that contract?

Mr DOWNEY — We can table that for you if you want.

I want to emphasise the experiential learning and the building of existing knowledge, and I will tell a quick story. I have done quite a few science activities and teaching. I was working with a group of 5 and 6-year-olds doing a unit on the human body and how our body works. I took the children outside and we ran around the school to understand something that they could easily compare and experience themselves. We tested our heartbeat and we talked about how the blood flows around the body and how the heart pumps it, and we felt our heartbeat. We took a rough check to see how fast our hearts were beating. Then we raced around the school and checked it again, and we all agreed that the heart was beating much faster. A week later I came back and reviewed it, because we should review what is happening with the children's knowledge. I asked the students, 'How did we find out that our heart was beating faster?'. They said, 'When we ran around the school we found that the heartbeat was faster after than before'. I said, 'That is great; we have learnt something there. What other kinds of things could we do to see whether or not our heart would beat faster or people's or animals' hearts would beat faster?'. They said, 'We could run around the house or we could run around the school again'. When I asked if there where other kinds of things we could do, they said, 'No, that is what you do; you run around the school'. In other words, what the children had fixed onto was a particular relationship of one concept with an experience of another thing. Just to display the importance of how complex the concept is, they had not understood that it is actually exercising the body; it was a particular type of exercise that they had linked with. So children need a wide range of experiences and lots of different media. We do a lot of teaching, and children can regurgitate a lot of information, but for moving on to learning at the higher levels of secondary school, into tertiary levels and into careers in maths and science, it is important that we get those concepts and understandings right from the early stage and do plenty of work on particular things — not too many topics but plenty of time on those.

Let me know if you want to move on and you do not have time, but the politics of the curriculum are very important for people who are making decisions about allocations of funding and what is important in education. At the moment, even though it is great to see the inquiry happening with an inclusion of science education, there is not

a lot of interest in science education in the media and in terms of government priorities. We have had a very good Science in Schools project going, but if we compare it to even 10 or 15 years ago there is very little emphasis now — for instance, when information on student progress is collected centrally by the education department, the government at state level and nationally, literacy and numeracy are the only areas in which there is an interest. There is no collection of data at all beyond the school level. For the interests of parents and teachers, for the purposes of progressing with learning, there is no collection of data on student progress in those other curriculum areas in primary school.

I think that indicates there is almost an hysteria — this is a personal opinion, of course — with the concentration on literacy and numeracy. Of course they are vitally important, but what then happens is that people get the impression in the community, even in other sectors of the education system, that primary schools are literacy and numeracy factories and that really all that is about is sitting down and getting as much knowledge as possible about literacy and numeracy into those kids and that areas like science and maths, in terms of the experiential things and linking with experience or projects, are not nearly as important. But of course there are many people within primary schools who do not believe that, as you can see today from the presentation that we had earlier.

Another point is we were talking about professional development being just vital for teachers, as was mentioned earlier. It certainly is the case, as we are constantly reminded, that in the private school system there are many more opportunities. There is certainly more funding to some extent, but there are also many more opportunities. There are less face-to-face teaching school days and there are far more pupil-free days for professional development and teacher education in the private school system. We have heard the minister say recently that there was a belief that parents were not happy with the idea of more pupil-free days for teacher professional development. Yet what we see is that a large sector of the community is very prepared to accept that in the private school system. I would certainly put forward that those days are very well used. If we go back 10 or 15 years I think there were eight teacher-learning days available in the year, and they very well used.

Talking about the cluster of schools, in the Mooroopna area, which is my area, we have had a concentration on numeracy as a priority of our middle years cluster and building the interest of students, and having common curriculum day focus activities linking small schools so that teachers from small schools can come together. We recently had a day at my school with Michael Ymer and some of those schools. What has been very useful in our cluster is having what we call a data committee so that representatives from each school get together and regularly collect data using the same sorts of testing instruments in each school, so that we know where our kids are at not just as a school but also as a cluster, and we can compare that and strategically put in place improvement approaches, say, with professional development in numeracy.

Also, I am a member of the Shepparton network management committee, which is made up of school principals. We have a strategic plan as a network of schools, and one of the three priorities we have is numeracy, because we feel that is an area that our students overall across the network are a little behind the levels that we would like right through from primary to secondary. We have already started some initiatives. One particularly is just making sure that each school in the network of 65 schools — actually there are less now, because a few have moved off from the Hume region recently — has numeracy as a key plank in the improvement for their own schools, but also sharing strategies. We had a presentation at a recent principals meeting with principals actually discussing strategies in numeracy, which I think is an excellent initiative.

Mr KOTSIRAS — Can I just ask any of the students: can you think of one lesson that you have enjoyed over the last two months not just in maths and science, but any subject?

Mr D'AMORE — When I was in Ms James's class learning about trading with maths addition.

Mr KOTSIRAS — Why did you enjoy it?

Mr D'AMORE — She taught us so well, and when I did it the first time it got so easy.

Mr DOWNEY — Do you think there was anything special about the way that the lesson went or was it just how the teacher explained things?

Mr D'AMORE — Yes, it was just how she explained things.

Mr KOTSIRAS — The other two boys, any lesson that you remember?

Mr KEESHAN — When we have technology we go over to the computers. Because the teacher takes the time to explain and teach us about technology we do not really make many mistakes when we print it off. I really like doing technology because I understand it, because the teacher takes the time to explain it to us.

Mr OAKLEY — Last year when I learnt trading in subtraction, at first it was hard. Then I got used to it, and it was easy.

Mr KOTSIRAS — What made it easy?

Mr OAKLEY — Practising it.

Mr KOTSIRAS — Did the teacher give you everyday examples that you use at home or when you go to the shop?

Mr OAKLEY — Yes.

Mr DOWNEY — Did you use materials? Were you using MAB or anything like that, Bruce?

Mr OAKLEY — Yes.

Ms SOUTER — I am from Gowrie Street Primary School. I have just recently moved to the school. My background, I guess, has focused mostly on the middle years. I would like to talk briefly on student engagement. I would just reiterate and reaffirm a number of the things that Heather and Cliff have already spoken about. But I guess what is most important in terms of effective and quality teaching and learning is that the teacher does make a difference. If we can prepare our teachers to be highly effective teachers, we will get the runs on the board. I think one of the most important things in the work I have seen in the cluster, the network and the region is that effective teachers explicitly teach, they model and explain, so that the children really know what is expected. Without confidence in the area of maths and science, I guess we are limiting our teachers in doing that. It comes back to the effective model for professional learning. I believe there is wide scope and lots of opportunity in clusters now where we can really trade our expertise across the primary and secondary sectors and build relationships and professional learning teams where we can learn from each other and tap into best practice to really ensure that our teachers are delivering quality instruction.

The professional learning model which I prefer — and I have seen lots of different models — and which affirms all the things we have been talking about today is where you can have really focused, targeted and specific professional development for teams of teachers so that we get some deep learning taking place in effective teams where teachers can collaborate. They can discuss and problem solve and work through their school-based issues, which are generally fairly global, but depending on the students you are working with there will be specific issues that you would like to work on. It is a model where you can bring experts into your school for periods of time and the experts model and teachers learn from them — you can see what it looks like and apply it to your own situation. You put some time between those visits to give teachers an opportunity to trial, explore, develop more questions and build on that model. Obviously it needs a lot of funding to support that, but we have been able to use that model in this network with AGQTP funding. We have been able to use that model with school development officers in targeted improvement plans, but we need to be able to utilise it to a greater extent. I think in all areas, regardless of what the curriculum is, open-ended questioning, allowing students to problem solve and work in collaborative teams is a really powerful way for effective learning to take place.

I believe, if we provide relevant and real-life experiences when we are teaching maths or putting science into practice, students can make connections with the real world. When we are doing maths we need to see how this is connected to the world I live in, the community I live in and how I apply it and what the relevance is for me. It needs to be purposeful; it needs to be meaningful. One of the examples I can think of with a real-life maths learning experience is the Earn and Learn program that many schools would probably be familiar with. It is a Rob Vingerhoets program. I have done this program myself in one of the schools I have worked in. We had an hour and a half allocated to that program weekly, and the kids set up their own businesses. They had to advertise what their business was. We had money, we had bank accounts, we had a banker; we had trading taking place. We had red light specials where everything was discounted by 25 per cent. This is what our real world is about, and this is where real learning takes place for kids. Students were managing their own money. They had to pay rent for the site where their business was opened. Those sorts of examples really cater for student engagement. There was no

problem with getting the class set up and cleaned up at the end of it — everyone was always there with their money and their trading, and a lot of enthusiasm for the content and the subject they were involved in.

Hands-on experience — I think our boys talked today about the learning that took place in their school. They talked about the explicit instruction where the teacher explained really well.

Utilising resources — we need to be able to visualise and see and manipulate to really learn, so we need to be utilising those materials. Breaking a lesson down into the small parts — effective teachers do that particularly well. They group their students together, they explain, 'Today we are going to be learning about … and last time we did this we …', so they are making connections for the students from the previous lesson into this lesson. They break their students into groups depending on ability level or focus area and really hone in on the specific focus for that lesson. At the end of the lesson they bring their students together and they share the learning that is taking place, so what I found out can be shared with Don or Heather and that learning is compounded and reinforced. That reflection time on the learning that does take place is really useful for teachers, because it informs them on what they need to teach the next time — 'I understand this group learnt about this, but there is still that group over there that I have to deal with'.

Passion is the greatest thing that teachers can bring to a classroom. I do not know what the recipe is, but passion is transferable; it is infectious. We have to make sure our teachers have energy and passion for what they are teaching; we need to look after them and ensure that we can do that. There are lots of different solutions to any one problem, and I think that sharing time when we bring our students back into the class and actually look at the ways we solved a problem is really essential, because there are no rights or wrongs in terms of the way you got the answer. Often there is a right or wrong answer in maths, but the strategies of how to get there are perhaps much more important than the right answer you got, because we have to apply this to the technological world we are living in. It is about problem solving and trying different ways and new ideas to achieve different things.

I have probably covered most of the things that I would like to talk about in terms of student engagement. There have been lots of innovative initiatives in maths and science. I think the tournament of minds is one of the most powerful things we see happening in maths and science. It is a real opportunity for teams of students to become totally engrossed in a problem over a long period of time. The deep and rich learning that takes place is probably the most powerful. I know teams I have worked with on the tournament of minds over the years. These kids are in secondary school, many of them have left school — I do not want to indicate how old I am. These are the things kids remember, because they have had really deep learning. They have done it in a team, they have done it collaboratively and they have worked together to achieve certain things. The rich and the deep learning is not so much in trying to tick boxes and get a whole lot of outcomes achieved but in actually working to solve purposeful problems. One thing we sometimes overlook in terms of being focused on content in middle years is being able to negotiate the curriculum and allow students to make some choices in the things they want to learn about. That means it is not just open slather and come up with a topic, it is more providing a structured guideline and allowing students to explore within their interest to achieve certain outcomes. When students have a voice in what their learning is going to be about, then you have a much more committed student and a higher level of student engagement.

The CHAIR — Thank you. Would anyone else like to say something before we open up to more general discussion and questions?

Mr POPPA — I am Don Poppa from St Mel's Primary School in Shepparton. I am representing some of the Catholic schools. First of all I would like to thank you for this opportunity. It is good to hear such great things happening across our schools. One of the things I feel a little bit remiss about is that we probably do not share enough with each other. I see Pam across the room there, who I worked with 10-odd years ago. It is really important that we value each other and the work we do as educators and that we see ourselves as colleagues. One of the things I have heard about here from the boys and from what is happening is that the teaching experiences we give our children have to be real-life experiences. They have to be experiences they can relate to, and they have to be fun as well. Sometimes we get caught up in all the administrative side of teaching: the new VELS that are coming in; how we are going to implement them; how we are going to do this and that et cetera — there is lots imposed on a classroom teacher. I speak as a classroom teacher as well as being deputy principal and also PD co-ordinator. There are lots of things on our plates as teachers.

One of the issues we really need to look at — and we say it all the time; I have heard lots of people say this — is removing 30 per cent of the stuff we do, whatever it is, so we concentrate on doing less but doing it really well. If we did that in both science and maths we would get the results we are after. We would get kids who are engaged in learning, and we would get kids who are interested in society and the world about them. That is hard when you have all these things you have to do. You talked about resources before and having the confidence to do it, but I think it is a challenge for us and it is really important to take that one step back and ask, 'What is good for our kids?'.

Two issues I really wanted to talk about were, firstly, students at risk — working with students who are not meeting the so-called benchmarks, levels or whatever you want to call them. One of the things we have been trialling — and again the problem is time and trying to get your head around that stuff — is a program which has been put out by ACER. It is called EMM, which means elementary maths mastery. It really works on auditory skills, sort of rote stuff, continually running through specific base number problems and space problems, the whole strand. It takes time and it is targeted at a specific group.

Another program we have used — and are still using and trialling — is one called SINE, which means success in numeracy education. It is a CECV initiative which looks at assessing children, seeing their particular needs, looking at growth points in maths when you look at the early years numeracy, and then identifying children who are not meeting the mark, so to speak, and going back and doing a more intense, clinical interview with them where you can actually pinpoint where they are at where their learning is happening. It takes time, as mentioned before, for a classroom teacher to do that. I feel it has to be the classroom teacher; you cannot get another person in, because if you are working with that child one to one you need to have that time with the child so you know where they are at. That all forms part of assessing, and the important thing about assessing is that it is a time to go to that data, to do the interview or whatever, to analyse it and then to inform your teaching to help meet the student's needs. From there you report back to the student and say, 'You are doing a really good job. This is where you were; this is where you have gone through'. You report that back to parents and to other teaching colleagues. This means there is communication amongst the staff, so that when children are moving on the staff know what is going on.

The other issue I wanted to talk about was science. I know that in our school there has been very little professional development happening. We made a commitment last year, because when I plotted the PD that happened over the last five years, science came up with a zero. We used one of our four planning days, our four curriculum days, to work on science. But that is only one day, and we probably need another five days, if not more. The issue again is time and giving the curriculum enough time in the classroom for the children to be able to experience and manipulate it and also for the teachers to be able to get their heads around it and know what is good teaching practice and what exactly is expected of them. That is basically what I wanted to say.

The CHAIR — Thank you, Don. We now have Tatura Primary School.

Mr O'SHANNESSY — I do not want to go back over ground already covered. In the science field it has been recognised for some time that it is an issue, in that we are not doing enough with it in Tatura. We have had to really promote our Science Week activities. We have a visiting artist that week who does science activities with the children and also promotes the whole concept of drawing up your own science project and then having a big expo. We have had as many as 120 exhibitions of science experiments. That is the only way we have found of getting it to work, because we have found the same things. We have a strong focus on English and maths. The sorts of things everyone has already mentioned are the same for us. It is about the quality of teaching, it is about numbers in classrooms and about the better our teachers are the better the learning is. We were just recently talking about whether it is better to bring in specialist help, but we are leaning now towards coaching the teachers in the classroom to do it better. This may have already been covered prior to my coming in, but they are the only two things I can mention that may add to what I have already heard.

The CHAIR — Thank you. I will open up the inquiry to questions.

Mr KOTSIRAS — Throughout the inquiry I am hearing that the science taught in primary schools is at a minimum. Teachers are bored when teaching science. They feel uncomfortable and think they do not have the content knowledge to be able to do a good job, so they are bored with teaching science and to some degree maths as well. Students go on to year 7 and year 8 with a poor understanding of science and maths at primary school level. Suppose you got one wish in terms of resources and funding, what would be the one thing you would want in your school or region to ensure that science is taught and that teachers are enthusiastic about teaching science and

therefore students would find it enjoyable and want to go on and learn more about science and mathematics? I am happy to hear from every single school.

Ms MONTGOMERY — Could I speak to that, but with regard to maths?

Mr KOTSIRAS — Yes.

Ms MONTGOMERY — My wish would be that we had a non-teaching, highly specialised mathematics coach in every primary school. That person would be well trained in both coaching teachers in classrooms and in content knowledge and pedagogy.

Mr KOTSIRAS — In every school or in a region or cluster of schools?

Ms MONTGOMERY — In every school. It would depend on the school size; we have some very small schools where a shared model would be much more appropriate. But in a school the size of Heather's — she said earlier that she had 0.2 time — she needs to be a full-time person without a classroom responsibility. She needs to be someone that goes into classrooms every day to work with the teacher and address problems at the chalk face. That is the way to improve teaching.

Mr KOTSIRAS — Is that helping, or is it better to teach the teachers?

Ms MONTGOMERY — That is a way of teaching the teachers. It is teaching them on the job.

I have recently returned from New York city where I worked as a full-time maths coach in elementary schools. That was my job. I would meet with teachers; we would plan a lesson in mathematics, then I would go into the classroom with the teacher. I would demonstrate small parts of the lesson. They would take most of the lesson, and I would coach them in their performance — what might have been a better question to use, how to support these children who had a misconception about the concept. You would meet afterwards as a team of teachers to share your experiences on that common lesson.

Mr KOTSIRAS — Would that person be there for the next 10 years, or is it short term — one or two years?

Ms MONTGOMERY — No. At least a year to see any improvement at all. A very long-term project. You are probably looking at three years to be getting some improvement. It is not a token model, it is a deep and profound model that works because the support is there in the classroom.

The CHAIR — The $400 million might be a bit beyond our recommendation, but we might have a go at one of those.

Ms MONTGOMERY — It has been done, I have worked in a system that did it, and they made the money available to do it because they thought it was so important.

Ms BANNISTER — I am Jenny Bannister from Mooroopna cluster. I would like to talk about Science in Schools, which I implemented at the last primary schools forum. That was an excellent model, I thought, for getting science right through the school. I think it was a success because it was given support the whole way through, and money — even from the start, with the component mapping where teachers were given time to think about their teaching and reflect and then we could fill the gaps in the areas that were obviously lacking. It was an excellent program, and I do not know if there was a similar maths model — MYPRAD , was that a similar type of model?

Mr DOWNEY — Yes, some similarities.

Ms BANNISTER — I cannot speak highly enough of the SIS model really.

Ms WEST — I think what Pam suggested was excellent, and if that is too much money-wise, if we looked at upping the time fraction for numeracy coordinators in a school from 0.2, even if it was 0.5 or 0.6, it would be something to help. Here I am working 0.2 with these at-risk people, and as Pam said, I do not even get to go into the graduates classroom. I have had a chance to pull them out after school and work for a couple of hours on numeracy PD, that sort of thing, but to get in alongside them in the classroom and help them where they would feel

it at the grassroots is not happening. At least if there could be some middle way leniency in upping that fraction, that would be really helpful.

The CHAIR — Would you also support that better maths science emphasis at teachers college?

Ms WEST — Definitely! What Debbie is saying is paramount.

The CHAIR — One of the issues for state government I know, and I have had discussions with the minister on this, is that the federal government spends a lot of money on educating new teachers — it is a four-year course, a full degree — and then they come into the system and the state government has to straightaway pick up the ball to try to bring them up to proficiency in some of the key areas, as should be done. There is an issue there. There is a report which highlights that there needs to be a greater linkage between the needs of schools and what is happening in our universities so that teachers are a bit more teacher-ready when they come into the system.

Ms WEST — I agree, because I trained through Melbourne uni and did the four-year course. We did maths every year of that four years and we were planning sequences of lessons by the end of year 1 and each year building on that, and I actually felt prepared when I came out of that four-year course. But I have talked to other people from other unis who have not come out with the same degree of confidence that I did, and I was shattered really.

The CHAIR — Anxiety reigns!

Mr KOTSIRAS — When you have received first year teachers into your school, have you found them up to speed, equipped, confident to take maths and science in a primary school? This follows on from the question about whether the universities are doing enough in maths and science to equip primary teachers. Should primary teachers have done maths or science in years 11 and 12, do you think, before they go into primary teaching to ensure that they have some background in science or can they pick it up once they go into the school?

Ms MONTGOMERY — Would you have enough teachers if you had that requirement?

Mr POPPA — I do not think that is the requirement. I would say that the requirement is for good pedagogy, good teaching practices. I have heard a lot of people — graduates — come out and say, 'Four years of uni taught me nothing about being in the classroom. It is not until I was actually here doing it and facing the myriad of problems that you get in a classroom from a child who cannot read, to a child who excels at whatever you give them and the range in between that I realised. The graduate teachers come out and have to deal with those issues, and they probably do not think they have been prepared well enough or have had enough experience.

The CHAIR — Many of you have reiterated that in maths and science in particular there is an issue of maths or science anxiety amongst a lot of teachers in primary schools. They do not feel confident in their own knowledge, and so it goes down the hierarchy of the crowded curriculum in the classroom, and I think that was Nick's point. Should we make sure that there is a greater level of proficiency within the university system so that teachers come out feeling confident of their own knowledge and ability in maths and science so that pedagogy works better?

Mr DOWNEY — If you go back a few years, you see there was some consistency in the teacher training approaches amongst the different universities and colleges. That is not the case now. A lot of the principals comment on the fact that there is a big variation between the universities in the way that teachers are prepared.

Mr KOTSIRAS — I understand that teachers are trained to learn and be equipped to be able to go out in the classroom. I understand that. We were both maths teachers at one stage. But I am just thinking that if I were put into classroom to teach, say, modern Greek, I would be able to get the books and learn something to go into the classroom, but I would not feel confident about teaching Greek or Italian. Perhaps teachers who do not have a background of some sort in science or maths feel the same way. They too would find it difficult teaching maths or science because they do not have the content knowledge. Superficially they do, but if a grade 5 child asks a bit more, they might ask, 'Gee, what do I do?'.

Ms WEST — I think that is true. It comes back to the teacher preparation course. A person may not necessarily have to do years 11 or 12 maths, but once they get to a teacher training course we should make sure the content is included then. Some people who come to teaching later on in life as mature-age people and have not

done years 11 and 12 maths may make very good teachers, but they still need to feel confident about their competency in teaching and content knowledge, which is what we have found at our school. I agree with what you are saying, but it should be done in the teacher training courses.

Mr DOWNEY — We have many graduates who come in with an excellent preparation and become teacher leaders in maths and science in schools within a couple of years. I would not like you get the impression that all — —

The CHAIR — We did. We had over 40 recommendations aimed at greater consistency and quality control in our last report on teacher training. The government is looking at those, and so is the Victorian Institute of Teaching, which registers courses. Many of our recommendations are to do with course registration requirements and upping the requirements of university education faculties to ensure that we have greater quality control of the pedagogy, the ability and the content knowledge of teachers as they come into the system.

Mr KOTSIRAS — Mind you, the deans of education were not too pleased with some of the recommendations!

The CHAIR — You cannot please all of the people all of the time!

Mr O'SHANNESSY — I would like to go back to the point that Cliff made earlier. Some of our graduates are quite confident in maths and science, and when they get to the school we do a lot of work with them, but our school is measured in maths by maths number measurement and in English by speaking, listening, reading and writing. That is what my school, my pay increments and my teachers' success is judged on. Therefore, science is the second fiddle. We fit science into integrated studies, and we have a big boost to try and build it up at a particular time of the year, but it is second fiddle. So what do we do about it? When we decided to do something about literacy we put in literacy coordinators and used them in various ways, such as in coaching and professional development. We do not do that with science because, quite frankly, under the present system it does to count. If we want it to count, we need the support, the profile and some sort of assessment of how well we are doing. Until that exists we will have a crowded curriculum and something will have to go. If science is not an important thing — we are in an area which has an institute for agricultural research, and our parents are reasonably satisfied with what we do in science, but boy oh boy, if there is a drop-off in reading or a change in the readers or the statistics or anything like that, the school council is jumping up and down. It is the same with maths, and to a lesser degree it is the same with physical activity, because in country towns sport is very, very big. In some ways science is like languages other than English. If you do not have the person to deliver it, it takes a backseat and there is no-one there to follow it up. So it is a case of, 'Crowded curriculum. Science. Okay, give it a blast next year. Let it go this year'. Not good enough!

The CHAIR — I have a couple of questions. One is fairly straightforward. You mentioned the network that operates and that each school will do triennial reviews. Presumably in those triennial reviews there is a local data collection, I guess you would say, and you identify strengths and weaknesses within the school; is that correct?

Mr O'SHANNESSY — Yes.

The CHAIR — When you go through the network do you share that information so that if schools are suggesting that science is a weakness or maths is a weakness, or different levels, as part of a network do you have a look at what has come across your triennial reviews and try and have a broader solution? Is that the sort of thing you discuss, or is it possible?

Mr DOWNEY — It is starting to be discussed at a network level, which is a big group, but certainly a lot of that discussion goes in the clusters — middle-year clusters.

The CHAIR — What about in terms of the regional office? Do they go through your training reviews with you and say, 'Okay, we have obviously got a problem in this area about maths or geography, or whatever?'. Is that the sort of thing that happens?

Ms SOUTER — Once again the data that is collected at a regional level is still really focused on literacy and numeracy.

The CHAIR — Good point.

Mr DOWNEY — There is no mention of science in that document at all.

The CHAIR — No, but presumably the triennial reviews could be a model, at a school or regional level, for data collection to feed into it an action kind of container?

Mr DOWNEY — Absolutely, and that happens.

The CHAIR — Good. The next question is a bit more difficult. It has been one that has been brewing in terms of the evidence we have had. We have an issue with knowing mathematics at the senior levels of knowledge gap. Mathematics is clearly a sequential area of study, and if you miss out a certain section when you are doing quadratic equations in years 11 or 12, or whatever you are doing, suddenly students hit roadblocks because they have a gap in their knowledge down the track. I understand the strong point you are making about the depth of knowledge, about understanding how to solve problems, but when it comes to mathematics, all that is true, but there is a sequential knowledge base. Here is the question: if that is the case and schools are doing it via topics or via deeper understanding or by contracting to do a few things rather than a lot, what is crucial, I would have thought, would be how students' knowledge of these areas is recorded at a school level and how that is transferred on, either through primary school or across into secondary, so that when teachers have students that are having problems, they have some proper record of what has been studied and what has been missed in students. Is that a fair comment because my next question is how do you do that under the system you have outlined?

Mr DOWNEY — If I can respond, I have been involved with a lot of initiatives over many years to do with coordinating information between the primary sector and the secondary sector, and I think the current middle-years cluster shows a really good possibility for an improvement in that area. Basically the issue is you have students going from one teacher who has a pretty intimate knowledge for a whole year, sometimes more than a whole year, and pretty detailed information and records, which get passed onto a secondary school system where you have teachers who have fairly short amounts of contact with students, and they want things to be précised, if you like. They will want a sheet with all the maths information, which is very extensive now with those schools that do the early numeracy interviews. They have great databases of really in-depth knowledge on each particular strand and with each particular child. That does not go on. It is a précis, a very brief summary of where the kids are at, but within our network of schools, and as far as I know Shepparton as well, that does happen.

The CHAIR — So each student has a précis of what they have learnt in their primary school that goes forward? There is not a freedom of information issue here, is there?

Mr DOWNEY — There has been, but that has been resolved.

The CHAIR — How was that resolved because it has been an issue in other schools?

Mr DOWNEY — It basically came through the central office of the education department that that information can be passed on now.

Ms SOUTER — One of the other solutions perhaps is that in our clusters we are using common assessment tools. So that the tools that we test for numeracy in a primary school are also the ones that we are using in the secondary schools over those middle years that we really can track without being repetitive and collecting the same data from a different source and testing kids beyond — —

The CHAIR — Is that happening, is it?

Ms SOUTER — Yes.

The CHAIR — It does happen now or it is in the process?

Ms SOUTER — It is becoming a practice, yes.

The CHAIR — If I were a secondary teacher and I had a look at this I would know exactly what the students were doing. If not, I would like to know what they have done. I would like to have the knowledge to go through right through to VCE level. If that is happening, that is very good. Could I go back to the clusters? Each cluster is funded, as I understand — and let me get this right — at $200 000 and something for the first year, and $80 000 ongoing, which is salary cost in each case plus on-costs; is that correct?

Mr DOWNEY — Yes, give or take $50 000.

The CHAIR — How much is the first year?

Mr DOWNEY — It is per capita — for instance, in the Mooroopna cluster there was funding for an educator-coordinator and other activities of $180 000 total at the beginning of the fund.

The CHAIR — First year, and then $80 000 ongoing for the rest?

Mr DOWNEY — That is right.

The CHAIR — So there was $100 000?

Mr DOWNEY — Yes.

The CHAIR — I am coming back to what you have just said. When the minister was devising this — and this was her idea — she wanted to have schools that had freedom rather than just a straight numeracy or English coordinator — schools worked out what they needed. But one of the aims was to improve the professional standing and ability of teachers particularly in that first amount of money, that $100 000. That was always meant to have a substantial ease of understanding of professional development component. Is that what is happening in the clusters?

Mr DOWNEY — I would say to a great extent the concentration of that funding is on professional development.

The CHAIR — To enable teachers to take leave, or schools to get people in?

Mr DOWNEY — Professional development, release them to have think tank-type activities.

The CHAIR — Has that worked? Obviously it seems that the educator is working, the group discussions and working out priorities in the cluster. Is that initial PD working well in the first cluster?

Mr DOWNEY — Yes, and I am probably the only person here on it — so is Shaun.

Mr O'SHANNESSY — I think it is. The challenge in it is to find common needs across a variety of small schools, large schools, secondary schools. That is the challenge, and I expected it to be more powerful, but because you have to bring in a broad range of schools and a broad range of abilities and experience, it is a challenge to do it, and I think, as Cliff said, we are doing quite a good job of it. It is certainly helping, but it is difficult to make it really dynamic because of the broad range, but I do not have any answers so I do not think I am in a position to criticise it because it is quite effective.

The CHAIR — I was just trying to get a bit of feedback. You have all said that the professional development is urgently needed, but I was wondering how well that initial part of the cluster funding went in terms of what you used it for.

Mr MONTGOMERY — I have only come into the cluster for the past six months, but it was very obvious to me that there was a great fear with maths. That was the biggest worry with the teachers in the middle years.

Mr O'SHANNESSY — Given that funding, it has been easier also to get the best people up to service a greater number of people. That has the tremendous strength of it.

The CHAIR — I think one of the points for us is everywhere you go it is always the situations that teachers at universities always want more money, because they love kids, they love their profession, and they want to do the absolute best, but one of the important things for us in making recommendations is to ensure that anything we recommend will maximise the benefit, and that is why I am wondering what is happening with the cluster initiatives, because obviously you have done a lot in maths and science from it. I think there was $80 million — a fair amount of money over three years — and it is good to get feedback to see how effective it has been if you are going to make recommendations for more in the future.

Mr DOWNEY — To put it simply — and I hope this helps — the government decided 10 to 15 years ago that it would create a self-managing school system, so that is exactly what has happened. Schools are completely

self-managing in their decisions about their priorities, about their planning, their professional development. Now you have an initiative which is saying, 'No, you actually belong to a cluster and you are going to make decisions together and coordinate all your activities.' That is actually quite a big challenge.

The CHAIR — That is a good point.

Ms GEORGE — I would just like to say that the cluster educators and school development officers can only spend a certain period of time in the schools. What we have found is if there are no drivers in the school to continue on the work that we are doing with the teachers it all just stops. While you are in the schools there is a measure of success, and that is why Guthrie Street has been great with Heather because she is a good driver and she can keep things going, but only getting one day out of the classroom — —

The CHAIR — Yes, I understand that. You are saying that the initial $100 000 or whatever you got for each cluster for professional development of the teachers has no ongoing impact?

Ms GEORGE — No, I did not. No.

The CHAIR — You have to think about it or whether you spend more.

Mr DOWNEY — It is a bit deceptive. You see, that is in the Shepparton area where they have not actually had that funding.

The CHAIR — Okay, right.

Ms GEORGE — It has only just started.

Ms MONTGOMERY — Could I speak to that? That is why I am feeling that from the Shepparton cluster point of view it is too early for us to respond to your request, but if you would like to find out, as Debbie alluded to earlier, how the early years numeracy initiative went, we are well placed to comment on that because that is a few years down the track. You really need to ask that question when the school has had a few years and funding has been sustained or, in the case of early years, pulled out before anything really happened.

Ms GEORGE — I have come from the Seymour cluster and I think our cluster educator was in there first and you can see a huge difference in what has happened over the period of time, but she has made sure that in those schools there are people there.

The CHAIR — Good. Excellent.

Mr HOWLEY — Just in terms of the Shepparton cluster — and it has been explained that the Mooroopna cluster started a few years ago — we have just really commenced the work that is going to go on, so I think we will be able to respond to the question at a later date. One thing I would make clear in terms of the Shepparton cluster, the concept was developed around first the need for PD and to provide that in a country area. As schools here would realise, the cost of bringing professional people with great initiatives to Shepparton is extremely expensive. We have been involved in a differentiated curriculum at Guthrie Street over a number of years. To bring Karen Green from Melbourne to Shepparton was costing us more for her travel and everything else than the actual person, and as a result when we put this initiative together the idea was to bring three clusters together, first because we had secondary colleges in the Shepparton where children would go into them all, but also because we realised that we needed more money than simply one cluster. I would sympathise with the Mooroopna initiative because although it is a fair bit of money we are in a position where we are going to have three clusters of money that we can bring people together. When we bring presenters here, when we want ongoing professional development provided to our schools, we are going to be able to do it. It is not something that is going to be, 'Hey, this is going to happen today'. This is something we are still developing, the understanding and the needs of schools, and then we will provide it. I believe clusters should be ongoing beyond their first three years and I have heard rumour that that may be the case. I think there are some great learnings out of it, great practice, great money.

The CHAIR — Funding for educators?

Mr HOWLEY — Yes, the educators would continue after that initial time. But come back in 12 months and I would like to respond to how Shepparton has gone in numeracy.

The CHAIR — We will do that, maybe on a different inquiry — —

Mr HOWLEY — In fact we would like to come down to Melbourne. We will have a do down there. Just invite us down!

The CHAIR — We are going to break for morning tea, so before you go can I thank you all for your information. I would like you to join us for morning tea and we can continue the discussion for a short while. Can I just say that it is refreshing to hear the enthusiasm you put in, and it is exciting what is happening here. One of the great things about regional Victoria is it might be more expensive but the schools seem to work a lot better together and there is not quite as much competitiveness as you might find in some city areas. You seem to be doing some great things in maths and science and I certainly look forward to coming back in a year or two and seeing how it is working out. Thank you, and I thank the students in particular.

Witnesses withdrew.

C O R R E C T E D V E R S I O N

EDUCATION AND TRAINING COMMITTEE

Maths and Science Evidence Committee

Inquiry into promotion of maths and science education

Shepparton — 2 August 2005

Members

Mr S. R. Herbert

Mr N. Kotsiras

Chair: Mr S. R. Herbert

Staff

Executive Officer: Ms K. Ellingford
Research Officer: Mr A. Butler

Witnesses

Mr B. Porter, assistant principal; and

Ms H. Peake, science coordinator, McGuire College;

Mr P. Feain, assistant principal;

Mr J. Abraham, maths teacher, Shepparton High School; and

Ms N. Hayes, maths and science teacher, Kyabram Secondary College;

Mr K. Gray, acting principal;

Ms R. Waight, maths learning area leader; and

Ms K. Utber, science learning area leader, Wanganui Park Secondary College; and

Mr A. Freijah, assistant principal; and

Ms S. Gill, maths-science learning area leader, Mooroopna Secondary College.

The CHAIR — I declare this hearing reopened, and for the benefit of witnesses I will read a short statement. The Education and Training Committee is an all-party, joint investigative committee of the Parliament of Victoria. Members today are hearing evidence in relation to the inquiry into the promotion of maths and science education. I advise all present at this meeting that all evidence taken today, including submissions, is subject to parliamentary privilege and is granted immunity from judicial review pursuant to the Constitution Act and the Parliamentary Committees Act. I read that statement at the start of today's hearing, and really that is all I needed to do for the whole day, but it is important that you know that this hearing is covered by parliamentary privilege. The evidence you give has to be truthful, but you are also free from prosecution for slander or libel — but hopefully that will not apply here today.

This morning some primary schools gave evidence and we had some lively discussion about primary schools and about the clusters that are operating. We are very pleased to open this secondary school forum to find out what is happening in secondary schools in the area, to hear from you about what is working and what is not working and to hear any advice that you can give us about how to make it better.

Maths and science education is important to Victoria. We are a small industrialised state. Unlike many of the other larger, more agrarian states, we rely on our export markets, particularly manufacturing, technology and services, for a lot of our income, and as such we are competing with large, very wealthy neighbouring countries who are expending large amounts of money on maths and science education. How we go in the future and how the state progresses is very much dependent on the knowledge and skills of our work force, and maths and science per se are vital to that ongoing economic success, so this is an important inquiry. We have to report back to the Parliament later this year, and the government will have six months to respond to our recommendations. We are hoping that what we take from today is either some good thinking material or some direct recommendations that we can make to government. I ask that when you first start speaking you give your name and your school, and if people from the gallery would like to contribute — which would be good — I ask them to come forward and give their name and where they are from or what they do. These proceedings are being recorded and you will be sent a copy of the transcript in a couple of weeks. With that, I will open up the meeting to our first presenter.

Mr PORTER — I am Bill Porter, the assistant principal of McGuire College, and my background is in maths teaching. I would like to welcome everyone to McGuire College. I will start with maths at the college. We have a traditional approach in this school, with horizontal groupings from years 7 to 10. Our year 10 students access all possible VCE maths. We are also a SEAL school, a select entry school. The students complete the first four years of maths in three years. Currently our first group is in year 11, although they are year 10 age. Interestingly, our best mathematicians in year 11 come from this group.

I will refer to some of our concerns. We are concerned that there is a drift away from mental arithmetic and manual calculation and a dependence upon technology. A greater emphasis needs to be placed on approximation and estimation skills, as a large number of students will blindly accept an answer produced by a calculator. Will the introduction of computer algebra systems, CAS calculators, exacerbate the situation in the senior end of the school? With the shift towards applications of maths, entertainment maths for better engagement and problem solving and project work there has been a loss of time for skill development and breadth of course work. I am not in any way denigrating the work they do, but there has been a cost, and that cost is a lack of preparation for the higher end kids for VCE, particularly math methods 1 and 2. There is a low success rate in units 1 and 2 of math methods, so there is a poor take-up of math methods 3 and 4, and particularly specialist maths units 3 and 4.

There are about 300 year 12 students at Shepparton secondary colleges and less than a dozen out of that 300 attempt specialist maths, and it has been the same for the last few years. The three schools collaborate and run a combined single class, and we call it shared resources. In this school we have a large number of non-English-speaking-background students, and some with little or no formal education. In the main they have significant difficulties with modern maths books because they require a high level of English in order to understand the work, and so they struggle significantly.

Turning to staffing, we have difficulty in attracting maths teachers where maths is their major subject. Usually maths is a second subject — for example, physics and maths, chemistry and maths, PE and maths or commerce and maths. It is very rare to get a maths major. Another concern is that there is not enough literature on careers in maths. There seems to be a drift away from maths by maths-minded students into IT courses and careers.

I refer to resources. The resources we require are maths specialist teachers. Perhaps there need to be some sort of monetary incentives for students to take up maths as a major. We also require a greater emphasis on maths education and prerequisites for primary teaching. Perhaps further maths 3 and 4 should be a minimum maths prerequisite for students to take on primary teaching. A program that was running many years ago which I was involved with — I do not believe it exists any more, but it was particularly beneficial — was a program called FAMPA. I do not know whether people here know about it, it was the Family Maths Program, Australia. It encouraged families to become involved in maths. It was basically for primary, but it was for junior secondary as well. I used to teach at Shepparton High School; we ran it there, and it was a very successful program. I also think a reintroduction of district networks for maths would be quite beneficial. As to professional development for maths teachers, there is a reluctance for people to go to Melbourne, because you have a 2-hour drive, you do a PD, and you have a 2-hour drive back. Perhaps there needs to be some local professional development running.

With mentoring of new maths teachers, while we have our own mentors within our school, perhaps there needs to be some mentoring with teachers at other schools, neighbouring schools. We have five maths teachers in this school with less than two years experience and one experienced maths specialist teacher. The generation of ideas and how other schools operate and what is happening in other maths classrooms would be beneficial for those new teachers. Literacy is included in all teacher training, but numeracy is not. Perhaps numeracy needs to be included in all teacher training.

I move on to science. McGuire College for science is pretty much the same as it is for maths. It has a traditional approach, horizontal, with full VCE offerings. Again the best scientists we have in year 11 come from our SEAL group. McGuire College has four science rooms, all of which are 30-plus years old. One room has a new fume cupboard. That was installed two years ago. The other three science rooms have condemned fume cupboards. All four science rooms are in their original configuration. The rooms are neat but in a poor state for delivery of a modern science curriculum. None of the rooms have modern scientific equipment and they are under-resourced. The rooms are uninspiring, with antiquated troughs and benches and a poor layout. We have put in an application for the Investing in Schools grant to update one science room.

As a school we have been involved in the Science in Schools program for the past five years. Despite the high priority we have for science, we have been held back by a lack of funds to make necessary changes to the infrastructure. Our science teachers have been handicapped by the lack of funds to purchase up-to-date equipment to implement a lot of the ideas they have to improve engagement, understanding and student outcomes. We have worked closely with Wilmot Road Primary School with the Science in Schools project, but there is a need for more links with primary schools in science. There are OHS issues with our science prep room. There is a lack of space and funding to improve the situation; it is quite critical that we get some funds for that. There also need to be greater links with industry in the sciences — chemistry in particular, with the new chemistry study design. And the needs that we have for maths staffing are similar to those for science. That is my presentation. Does anyone have questions?

The CHAIR — We will have a major discussion at the end, but it will be useful to ask a couple of questions.

Mr KOTSIRAS — With the SEAL group, you said they do four years in three years?

Mr PORTER — Yes.

Mr KOTSIRAS — They do what — years 10, 11 and 12?

Mr PORTER — They do years 7 to 10 in three years. We call the first year ACE, accelerated curriculum enrichment. There are about 15 SEAL schools in the state; we are one of them.

Mr KOTSIRAS — Have you done any research that indicates that the kids who do that course excel more in maths than the kids who go straight into normal classes? Is there any research about that?

Mr PORTER — Yes, certainly our AIM data supports the fact that they are gifted and/or talented. We actually have a 3-hour series of tests to get involved in this program. We have about 50 applicants from across the primary schools in this district for up to 25 places. It is set and assessed by the University of New South Wales. The kids in general are average or better in maths, science and English. We rank them, and we do not want to compromise the program, so sometimes there might be 23 in it rather than 25. They do their first four years of

secondary in three years and then they move straight on to year 11 and do a complete year 11 course in their fourth year. They do a little bit of 11 and 12 in their fifth, and a straight year 12 in their sixth. It is possible that they could finish their secondary in five years, but we do not encourage it. By the end they should have eight or nine year 12 subjects under their belt, which maximises their ENTER score and gives them a far greater breadth of subjects.

Mr KOTSIRAS — Do any drop out?

Mr PORTER — From here over the course of the first three years we would probably have one or two. We either remove them because they do not have the motivation, or they may move away from the town. But the drop-outs are very low. In the city there is a tendency for the kids at schools running SEAL to do their first four years in three, but then move on to a private school to complete their secondary in a private school.

The CHAIR — How many students do you have?

Mr PORTER — We have 660 full-time students, and then we have another 120 coming in to do VET programs, counting as 0.2s, which takes it up to about 680.

The CHAIR — You run a SEAL program, and presumably if you have gifted students you will accelerate what they learn?

Mr PORTER — Yes.

The CHAIR — But you were saying that in maths and science your qualification levels or experience seems to be low and your science facilities are poor.

Mr PORTER — Yes.

The CHAIR — How do you blend the two of them to become a SEAL school? Do you understand what I am saying?

Mr PORTER — To be a SEAL school you apply to be a SEAL school, and I do not believe you need to produce a certain level of facilities to become a SEAL school. You apply for it, and you either get it granted or not, and only one school in a district, I think it is, is allowed to be a SEAL school. Our science rooms — —

The CHAIR — Maybe I can do this another way. Is it an issue if you are dealing with gifted students that you have limited experience and qualifications — some new teachers and poor facilities?

Mr PORTER — Yes, we are very careful about who we allow to teach SEAL students.

The CHAIR — So you pick from — —

Mr PORTER — We select our staff carefully for that. We want staff who are enthusiastic, are supportive of the program and have the appropriate credentials, and at the moment it is working very well. But for the mainstream kids, certainly our science facilities are not engaging. Our staff do the best they can with the facilities. Would you like to talk to the science coordinator?

The CHAIR — Maybe. I was thinking that we can go for a tour at lunchtime.

Mr PORTER — She is here.

The CHAIR — That is excellent; that would be great. We might move on, though. We will have more of a discussion later. Who would like to present next?

Mr ABRAHAM — My name is Jerry Abraham, and I teach maths at Shepparton High School. I came to Australia three and a half years ago to do my master of engineering. I finished that and then I decided to take up teaching because there were only two Australian students in my class, and when I asked them where the rest of them were they said, 'It is not cool in Australia to be educated'. So that is what led me to become a teacher, and that is what I am enjoying at the minute.

Overheads shown.

Mr ABRAHAM — This is a quick video to give you an idea as to what I think effective teaching and learning is about. It should look something like this. They are actually dancing to *Grease*. That to me is what effective teaching and learning is all about. It was about both of them actively being engaged with each other; they are both learning from each other, and it is all about relationships. That is what I have learnt up to date in my year and a half of teaching. Of the eight teachers of whom I asked this question, six responded that time would be what is required for effective teaching and learning, even before I could finish the question. Only two of them were polite enough to actually wait for me to complete the question before saying 'time'. Time for what? To prepare myself; to prepare myself not in terms of the content — I might know the content — but to prepare myself so that I can address every issue the student raises. I do not want to look like that. And time also to get to know the students, because I have found that after getting to know them, if I can break past the relationship barrier, effective learning actually takes place automatically. I can then anticipate what they are going to ask, and I can also challenge the way they think. I have not come to this stage yet, but that is what I would like to be able to do with my students. So, I require time for those two.

Also I require time to teach them the skills and strategies, which I have to plan out myself. As Bill was saying earlier, students quickly work out the skills just to get to the answer without actually knowing what they are doing. That is a major concern that we have in both science and maths areas. I would like them to actually go through the proper thought process. They can be abstract in their own ways, but I would like them to actually develop the skills and strategies and then come up with an idea. There is no harm in their getting their strategies right, but skill is required as well. Another thing is the need for meeting time for teachers to reflect, implement and discuss what we are doing. The new term I suppose is PLTs, professional learning teams. We have been implementing them at our school and have found them to be really effective. Teachers get together and share ideas. Our school is also involved in a project which has been supported by the federal government — Yachad. It involves two Israeli teacher trainers coming down and helping us with our literacy and numeracy programs and accelerated learning amongst the Koori students. We are focusing on trying to improve their levels of literacy and numeracy.

Classroom size — the first two points I find to be a bit of a joke and a bit of a dream.

I would love my classes to be low in numbers, and I would like to deliver that personalised curriculum for everyone. The joke is that I was in a class of 60 students when I went to high school in India and Dubai. This would definitely not work over there. To me personalised attention in school was the fact that the teacher could actually call out my name when the attendances were marked. We responded by our roll numbers. It would just go, 'One; two; three — absent; four; five; six'. It is was more like prison, if you look at it that way. This is my dream, to see every class of this size.

Funding and resources — I have not been in the education system long enough to understand how all this works, all the funding and resources, but I understand it is a kind of static model: if you have 600 students, you get $6000 per student; therefore 3 million, $600 000 is what you get. You can do whatever you want with it; it works that way. It was nice to see Yachad come along and implement a different system. We are really happy with what is going on.

Gender differences — in maths girls do better at lower levels; boys do well at higher levels. More girls do maths methods, and more boys do specialist maths. It is even reflected amongst the teachers: lower year teachers are primarily female, and secondary school maths teachers are primarily male. I have no idea why this is. I am currently doing my master of education as I am teaching, and the research shows that boys are able to see the bigger picture better and apply all the small concepts they have learnt to fit into that big jigsaw, but girls just see them as snapshots. The same is the case with physics. When I did my teaching round at Dimboola — yes, in the sticks! — that was exactly what I got; my class fit the research definitions. I had one girl and three boys, but I do not see any reason why more girls cannot do physics, because research has shown that when girls do it they do as well or even better than the boys. The same is the case with biology; it is female dominated and is seen as a girls' subject. Both of these are even reflected among the teachers. Primarily there are male physics teachers and female biology teachers. I see no reason why this should be the case in Australia. Definitely when I went to school there was no certainty, so that if I had been blindfolded I would have been able to say that a new teacher walking in the door to teach me maths in year 12 was male. I could never have done that; I was taught by a female teacher anyway. I find it strange that students over here say, 'We have a new biology teacher; she must be cool' — they say 'she' immediately and not 'he'.

International versus national standards — at least compared to my background, we are far behind. My cousin recently came over with her parents to visit Australia. I had my year 8 textbook at home, and she asked, 'Why are

they learning areas of rectangles in year 8? We did this last year'. Her last year was year 4. So that in itself was telling me that we are really far behind. I totally agree with Bill when it comes to mental arithmetic. I had a year 9 student work out 3 times 1 on the calculator. His instant reaction was to take out the calculator and punch in 3 times 1 equals. I said, 'You used four keys; it took you at least 4 seconds, you could have answered it in 1 second. You do not need your calculator to do that'.

I believe the statement 'Knowledge is power' is not enforced enough over here. Back in Dubai we really mean that — we say, 'Money is not what you are learning for. Money can buy you a house, but it cannot buy you a home'. I keep saying this to my students all the time. Money can buy you a hospital bed, but it cannot buy you a life. Money can buy you the best suit that you can look A-class in, but it is not going to bring intelligent words out of your mouth when you open it. Knowledge to me is absolute power.

Literacy and numeracy skills — year 10 students write statements in response to an assessment question, 'I do not no' — that is, the word 'know' is spelt, 'no'. That to me as a person who learnt English as my third language after the national and state languages, is pretty pathetic for year 10 level. Let us face it, the real world out there is vicious, and we need to prepare our students for that. It is basically about survival of the fittest. I totally believe in that.

In conclusion, I believe wholeheartedly the line — I do not know who said it — 'To teach is to touch lives forever'. Teachers are said to plant seeds of knowledge that grow forever. We are the ones who decide whether they will grow or rot forever. My request to the committee today is to actually help us to help the students. We are the ones who are in the real setting out there and what we voice to you is what we experience and I would like you to help us by taking those really big decisions. We really need to act now and I do not think there is a better time than with the introduction of the Victorian essential learning standards. I am really for it and I am really excited that the holistic approach to education has come in. I will just finish by saying something in Sanskrit which was the motto of my school. It is 'thamasoma jyotir gamaya', which means from darkness to light. I think that should be the experience of every teacher and student because they have to be taken from darkness to light and we as teachers were lighted to lighten.

The CHAIR — Thanks for the presentation. It is the first audiovisual presentation we have had and it was excellent. You are obviously very keen and dedicated and we will have some questions at the end. We have another presentation from Nicole Hayes.

Ms HAYES — My name is Nicole Hayes, I am from Kyabram Secondary College and I am a maths-science teacher. I have only been teaching for two and a half years. I am really representing a cluster instead of the secondary college and I wanted to talk today about a numeracy project that we are currently involved in. It is a Department of Education, Science and Training middle-years literacy and numeracy initiative and it is a cross-cluster action research project.

There are 13 schools in our cluster, 8 of which are represented in our professional learning team. This professional learning team consists of 17 teachers from secondary, primary, government and independent schools, teaching from grade 3 to year 9. We have mostly leading teachers in this learning team, but we do have some graduates as well. Stage 1 has involved this learning team designing and trialling rich authentic assessment tasks, so open-ended problems in maths classes. The focus has been on the tasks being real. Our first task was measuring distances around our body. The second task was about organising a party. The focus has also been on monitoring student progress and providing feedback for students with the focus on assessment <u>for</u> learning and not <u>of</u> learning. We have also been using rubrics and a lot of our teachers have not used these before and that is the trend that is currently happening in assessment. In addition to these trials the professional learning team has been mentoring other teachers in their schools and surrounding schools to then implement these tasks in their own classrooms and we have also been providing PD to all the teachers in the cluster, in good maths teaching. That has been looking at games and activities that engage students and are fun but still provide for ongoing assessment of benchmark skills and assessment for learning.

Some interesting points to come out of the project are a lack of specialist maths teachers, not just in primary but in secondary; a lack of time for numeracy leaders and coordinators in schools to meet within schools and also within the cluster. Often there is no numeracy coordinator in a school whereas there is always a literacy coordinator. There has been a lack of concrete authentic learning tasks, most of it seems to be fairly abstract and from text books. We are finding students depend on rote learning and recall rather than developing strong number sense and being able to apply and problem solve. A lot of schools are under-resourced in numeracy and need to build essential

equipment for hands-on approaches to learning maths. To combat these interesting points we have been trying to build a supportive approach to maths teaching and providing graduates and new teachers to maths with a stronger structure. We have found in the secondary system it was highlighted that the scope and sequence or assessment and curriculum plan was not very strong and so all of the PD that has been provided for those secondary schools in recent years has been to the benefit of those teachers who were involved, but it has not been ongoing or sustained.

In addition to this project the cluster is about to start a science project from the Australian School Innovation in Science, Technology and Mathematics, which is looking at ongoing change and improvement in schools. It involves four primary schools in the area, three of which have student numbers less than 50 and are struggling to provide their students with engaging science. The project will allow for local professionals and experts, students from tertiary institutions and teachers from our secondary schools to go to these primary schools and provide them with some specialist science teaching that will enable the primary school teachers in those schools to gain more confidence in those areas.

The CHAIR — Thank you. We might proceed to the next presenter.

Mr GRAY — My name is Keith Gray, and I am the acting principal at Wanganui Park Secondary College. I will talk about structural issues with relationship to maths and science initially. In our middle school, which is years 8 to 10, we have a vertical modular grouping system which allows students to select all subjects depending on the theme that they want to follow and depending on their ability. This is in conjunction with their classroom teacher who has a clear idea of their ability level. They will select which type of mathematics they want to study and they will be selected and they are on semester-based units. The ones I have on the board show that the names of these things are thematically based which is something to create a little bit of interest for students, and there is a selection of different levels. We have got levels from one to quadratics, which I think is level three, and we have got four levels in some areas in our studies in those three years. We have some girls-only subjects in mathematics. Mathematics and physical education are the only subjects in our school which are single sex. Girls do not have to select girls-only subjects; they can select co-ed subjects if they choose.

The system allows students to follow streams of mathematics or science that they are particularly focused on or interested in and it allows them to fast-track or slow-track according to their ability. A student who is competent in mathematics will move through the levels in mathematics in our vertical modular grouping system much faster than another student would. Our system is structured so that given that students are not only talented in one or two areas, they might be talented in maths and science but not in the humanities areas, our system allows them to promote or to go faster through the areas of their strengths and mark time or spend their time at lower levels in the areas in which they are not as strong.

In science the units I have mentioned there — Jurassic Park everyday chemistry animals garden grow genetics forensic science — again are just examples of the sorts of topics or the sorts of areas that the students can select from and there is some area that we hope students will engage in and we have structured our system to promote that engagement, to give kids something that they are interested in and at a level that they can cope with. The promotion from one level to another is on teacher recommendation. They select which area they would like to study in; they are counselled in the fact that they need to get a breadth of education.

We would not let a student go through and just do all the biological sciences in every year level. They need to get a breadth of science study so we would ask them to take more than just the biology, physics or chemistry streams. A new unit this year is forensic science. It is in its infancy but already proving popular. The units in our school run if they are selected. If students do not select genetics it will not run; we will not offer that unit. We will offer it next time when the students make their selection, but if students are not interested in studying that we take it off the list and we do not run the class. As I said before, this allows for fast-tracking and slow-tracking and allows students to better prepare for their VCE studies. We find that probably 60 to 70 per cent of our year 10 students are fast-tracking at least one — and usually only one — VCE subject.

It is not about structure; it is not about providing a course structure for students to follow. The key is passionate teachers. If you do not have teachers with passion, the students' engagement and their enthusiasm for their subject wanes accordingly; the two things are proportional. To get passionate teachers into our schools is a recruitment issue, it is a teacher training issue and it is an issue about supporting teacher growth. When they are in the school we want to support that teacher growth as much as we possibly can.

I am just talking from Wanganui's perspective, but I have taught in a lot of schools in my time and I know about other schools. The schools in Shepparton have some fantastic teachers, but I do not think we support them nearly enough in what they want to do. They want to do bigger and better things with their kids, and their kids' interests are their focus. We do not support them anywhere near as much as we should. There is a lot of PD about. I know it has been mentioned before that there is a lot of professional development for teachers outside out schools, but access, attendance and bringing back it to the country is an issue. We would like time to mentor, time to coach, time to work together, time to share ideas, time to be a real peer support person and a colleague so that we can develop our own abilities and focus on the things that work and make sure we do more of them. If something is not working we need to be able to share with each other the fact that it is not working and discard it, change it, tweak it, or whatever it needs.

With respect to networking, particularly in country areas, district and in-school networking is about all the networking we can cope with effectively. I am talking about in-school networking: just having people in the same area, their offices and their chairs in the same area so that conversation can take place and they can walk into their staff room or their office and share the fact that they have put smiles on the faces of half the kids in their mathematics' lesson because they tried something new. Sharing those experiences and those successes breeds enthusiasm and encourages people to go one step further.

I am now going to mention something that is critical to education and teachers that does not happen in many other industries. When teachers walk into work at the start of the day the bell goes at 9 o'clock and they have to go to class because there are 25 or 30 students there who need their attention. At the end of that hour the bell goes again and they move on to another class, and then another one, and then another one. If, in our business, we want to promote a new program, we want to share a new idea or to implement a new strategy, do we take time out from our normal day's work to do that? The answer is no, we cannot because the kids come in tomorrow and the next day and the next day. Teachers do not get time to promote that new project or that new initiative as they would in many other industries where you can put your work on hold and concentrate on the task at hand. We have to do it around the fact that teachers are in front of classes for most of the time. We have to really recognise that and say that these people are committed. They are certainly not in teaching to make millions of dollars; they do it because they are committed and we need to support that commitment.

In the country we have in-school networking and district networking, but in Shepparton the schools network is not as good as it used to be. When VCE first came in we networked a lot more than we do now and teachers miss that networking and sharing. It would be good to bring that back — and the industry and enterprise clusters that we have going now are a way of doing that. Our middle years program is another way of doing that. People appreciate those networks, but again they have to do it in their own time because they do it voluntarily outside their normal school working time.

State, national and international PD — we would love it. If we travel to Melbourne for state PD it is an access problem. Nationally and internationally it is also an access problem, although data and research information can come to us via the Internet and via visitors and we do send staff overseas. We are lucky enough to have one of our staff members travelling overseas to do some PD this year, and our principal went earlier in the year.

See a Great Program Day is one of the initiatives we use at Wanganui Park. We realise that other schools and other institutions have some fantastic programs and we do not get the chance to allow teachers to go and have a look at those on many occasions, so we allow staff to go and have a look at a good program of their choice on one of our student-free days each year. The 80-odd staff in our school on 31 August this year will be selecting a program they have heard about, read about, seen or heard a whisper about. They will travel to it all over the state — sometimes interstate — just for a day, to find some good ideas and see what works for somebody else. It is a fantastic day; it is by far our best PD day and has been for years. I just wish that when those teachers come back with fantastic ideas, as they do every year, we could be more supportive and give them the resources and the time to make sure those programs are adapted for the Wanganui Park culture and make things better for the kids in our school.

Things like maths labs, IT hardware and software all help. I refer to maths labs in secondary schools. Maths labs are usually one particular room you teach in and when you leave your last class with 2 minutes to get to your next class you keep your fingers crossed that when you get there the last teacher has left the maths lab just how you want it. You hope your kids will leave it just how the next teacher wants it because we do not have provision for people to maintain it; that comes out of the teacher load as well. It is things like that that really help teacher effectiveness. The provision of these things, the maintenance of them and the training for staff to use these sorts of

things effectively in the classroom is probably where we are missing out. I have seen in many schools on many occasions that the facility is there but it is not being utilised because it is an extra workload and an extra time commitment, so teachers — even though they are passionate and would really like to do it — cannot implement these things on an ongoing basis in their classrooms. We need to support them to do that.

With respect to data collection and coaching, over many years maths and science education has been researched, examined and changed all over the world and we continue to do that. We have seen it restructured many times. We have new curriculums sent to us or set out and we are asked to provide input to a new curriculum. They give us a new set of documents and they ask us to implement it in our schools and in most of those situations it has been to our advantage. I think on an ongoing basis we will see more data collection, we will see more research and we will see more structure changes. But the thing that really needs to change is that we need to look at the data collection closely, look at what really works for the kids in the classroom, so that we are able to coach our teaching staff in the way that suits them in order for them to improve what they do in the classroom so that the kids get the most out of it.

One of the things that we have done at Wanganui Park recently is to collect data on what our school community values about our school. In doing so we asked all our staff to interview parents — we interviewed about 250 parents. All staff were involved in the interviews. The interviews were structured so that the questions were first of all prioritised by the parent. We put a whole heap of queries to the people about what sorts of issues could be concerns of theirs about our school and we asked them to prioritise those as to which is the most important down to which is the least important. It was not surprising to see that the most important aspect that they value in our school is respect. It is about the relationships, and that was mentioned before. It is about the way people work together. The thing that was valued the most was the implementation of a school uniform. That is not surprising. They value the teacher learning, they value the relationships, they value the respect that people show for each other. From that we have embarked on a coaching program, which is in its infancy. What we hope to do with that is to use ourselves and coach each other, to give each other feedback, to get feedback from students about how we are going as teachers, about how they see us as teachers and how we show our respect for them and them for us and about our relationships. It is more so in that aspect than just the curriculum. It is not about what we teach so much sometimes; it is about the way we go about it. That coaching program is in its infancy. We have dedicated a lot of staff time and effort to this program this year because we believe it is really important and will make a change for our students.

I would love to go back to school and say, 'The coaching program we are doing, we have some time to do it. I do not want you to do that for the next week and a half, I do not want you to do that in the third week in term 4 because we are going to devote some time to really make sure this works'. We cannot do that; teachers will be required in front of our classes. Teachers do these sorts of things on top of their normal role. I think the passion we have in the teaching profession needs to be acknowledged and respected. We are very proud of the teachers who teach in our schools. If we can support them to grow like they want to grow, I think it would be fantastic. It is about passionate teachers and keeping them passionate, training them effectively. I could probably make a comment about teacher training and the fact that they come to our schools on block release for two or three weeks and then go to another school for two or three weeks, and then they come to school and we want them to teach effectively, and they want to teach effectively. I think we should give them a little bit more experience in the classroom with somebody around them to support them and coach them.

The CHAIR — Thanks, Keith. We have one more presenter.

Mr FREIJAH — I have not been invited to present officially.

The CHAIR — Can you give your name and title?

Mr FREIJAH — I am Alby Freijah and am assistant principal at Mooroopna Secondary College. I guess what I would like to do is add to a few points that have been raised, certainly from our perspective at our school. We are a secondary school, years 7 to 12, with about 874 students. We can talk about specific maths-science numbers and programs if you would like. However, I wanted to touch on something that Nicole mentioned about authentic learning tasks. I see this afternoon you have an industry round-table discussion. I am happy to put something on the table for that now and see the link between the authentic learning tasks within schools and those being developed in consultation with industry. I think when you talk about authentic learning tasks or rich tasks as such there needs to be authenticity.

I am not sure whether you are familiar with some of the authentic tasks from the Queensland education model; they have been developed quite intensively with local industry. If we are talking maths-science authentic tasks, really we are looking at what maths and science is used in industry, what skills do our students need to leave school with, whether it is through apprenticeships or tertiary education. I think from our perspective in Mooroopna we are looking at trying to involve industry where possible. An example of that is we have just had five year 11 students spend a week with SPC Ardmona in their factory, working on a real problem they have identified and looking at real solutions that they present to their management team and which they will take on board to make some improvement. It is a bit like what Keith was saying — that is on top of or in addition to their regular schooling. If we can have some flexibility in ensuring that that is part of their regular curriculum, then students start to see that connection between school and real life. Again, that would be a challenge. It will be interesting to hear what industry has to say about that this afternoon.

The other thing I wanted to touch on is numeracy programs. From my perspective, literacy and numeracy have been a focus, but I think we have not got past that first word at times. We have got to the literacy, and a lot of literacy programs have come through schools, but my personal belief is we have not quite gotten to numeracy yet. I do not have the answers. Our school is in the 22nd percentile with our AIM results. We are pretty pleased with the work we do with our students. We have quite pleasing VCE results. I do not think it is a reflection on any school in particular, but I do not think numeracy has been addressed as much as we would have liked.

The final point I would like to make is on professional development. All of the schools have their own methods of resourcing professional development, but I think the mentoring role is critical — where teachers are working with each other in the classroom, giving each other support, bouncing ideas off each other, critical reflections of each other's practice. It is critical to work through the principles of learning and teaching that are just coming out in line with the Victorian essential learning standards. That is really about looking at effective teaching and learning or effective pedagogy. You talk about buzz words like PoLT, but I think pedagogy is another one. What is it? If you look at it, it is really the art of teaching and how do we teach. Again, I do not think we are at that stage yet where we really have structures in place or a framework in place that we can say, 'This is effective teaching and learning'. I think the principles give us that framework that we can start on.

In terms of resourcing, our school was fortunate enough to be funded with three mentor teachers in addition to our teaching staff. That was through the leading schools fund. At the moment we have employed two full-time staff. They are working with our teachers in the classroom on their teaching and learning, on their curriculum development. That has been happening for only three or four weeks so it will be interesting to look at the data once we are a bit further down the track. I just wanted to touch on those points, but I do think it is important that schools are given some flexibility and resources to implement some of these programs and support our teachers.

The CHAIR — Would anyone else like to say anything quickly before we open it up to discussions or questions? Speak now. As I say, if you would like to contribute during the course of the questions, just come forward to the microphone. I will start off with some simple questions. Keith, in terms of your student choice approach in maths and science, how do you get over the issue of knowledge gap at VCE, where students are doing maths methods and they are doing advanced quadratics? I will use that as an example. Maths is undoubtedly a sequential study, as are aspects of science. How do you ensure that the students have had a sequential learning stream to do maths methods, say, in VCE and do well at it?

Mr GRAY — Perhaps Robyn would like to answer that.

Ms WAIGHT — Our students have a fairly structured, guided pathway to go through, so we have certain units that they must have completed to complete VCE maths.

The CHAIR — In the junior and middle years?

Ms WAIGHT — Yes, in the middle years. So before they can do maths methods they have to have completed certain units along the way.

The CHAIR — What does that mean? If the students are choosing methods, does that mean that they are choosing to do maths methods in an early year or every student has to do those units?

Ms WAIGHT — No, every student does not have to do those units. Students who do general maths may have taken a different path to general maths from that taken by kids who have done methods. They will have done similar units. They do not have to choose at an early age, but they probably are — —

The CHAIR — So if students want to do maths methods they would have to choose at around years 9 or 10 to do certain — —

Ms WAIGHT — Yes.

Mr GRAY — There are a couple of units that are prerequisites pretty much for those particular mathematics, but on the way to get to there they might have selected different types of mathematics at each level. It is not a sequential line. Maths is quite sequential but it does not have to be that way. Our data is showing us that if a student misses one of the particular algebra units on the way through they can still get to the end pathway because they will pick up other skills in mathematics in another stream that will allow them to overcome that.

Ms WAIGHT — Our system also allows students to do two maths units in a semester, so if they missed something they can pick up a unit.

The CHAIR — At year 10?

Ms WAIGHT — Yes, because our system allows them to. We have students who do two maths units or two sciences at the one time or two Englishes. Given that — —

Mr GRAY — Maths is one of the areas where they have to average at least one maths unit each semester.

Mr KOTSIRAS — If they are not on average, can they still do it? If you have said, 'No, you haven't done this', but the child wants to do maths methods or specialist maths, can they do it?

Mr GRAY — We are flexible, are we not?

Ms WAIGHT — Yes, we are flexible. We do have some kids who do that and in that we would be in consultation with their parents as well; we bring them into it.

The CHAIR — The question is how well they go at it, of course. That is the issue.

Ms WAIGHT — Our VCE results are very good.

Mr GRAY — Maybe we could give just a couple of points on data on how well it goes. I said before that more than 60 per cent of our year 10 students are fast-tracking VCE. If we look at the VCE data, when we first encourage students to fast-track, we say, 'We want your year 10 son or daughter to do a year 11 subject'. The parents say, 'Hang on; are they ready for that? Are we going to disadvantage the students?'. Our data shows that if we look back at the VCE results of our fast-tracking students in their year 11 and year 12 courses when they have finished year 12 and pick the best results they will usually be in the subject they fast-tracked in.

The CHAIR — Is that 60 per cent of fast-tracking in maths and science?

Ms WAIGHT — No, we have very few fast-tracking in maths.

Mr GRAY — In maths they fast-track in unit 2 in general maths. But in science, and particularly in biology, our results will show that if after they have completed year 12 the students look back at their results usually in their top two or three will be their fast-tracked unit.

The CHAIR — Does that imply that you have a strong career counselling role happening in the school in the early years or the students are just going to pick their various units?

Mr GRAY — The whole school is counselled.

Ms WAIGHT — Yes.

The CHAIR — So you link it, do you?

Ms WAIGHT — Yes. The way the school is set up we have home groups so our kids are grouped together in years 7 to 12 where they have two teachers as their home group teachers who are like their counsellors as well. You keep them. I have been in the home group I am in for seven years, so I have seen the kids go all the way through the school.

The CHAIR — I am not sure what will happen here, but one of the issues raised at the industry forum we had in Bendigo about the problems with students in the apprenticeship stream — they might do VET or VCAL or just go on and do an apprenticeship — is that those students had dropped out of maths at an early age. Many apprenticeships are in the building game where you have quantity estimates, et cetera, so mathematics is fairly important. That was one of the issues raised and that is why I have raised the issue about counselling and student choice.

Ms WAIGHT — We have probably had a fairly big push that most students at year 11 do at least foundation maths. That probably has not been as big a push as it was a few years ago when there was a really big push. Our previous careers teacher really pushed that. The apprenticeship issue was coming up then: they required maths and they did not have it.

Mr GRAY — You were right before about counselling; it is really important. We have an extensive counselling system that goes right through the school, with the home group teachers. Everybody in the school is involved. When students are in year 10, out of our staff of 80 we have probably 40 volunteers to do VCE counselling, and they pick up two or three students each.

The CHAIR — Keith, you mentioned earlier data collection being important. This is a question to all those present. In some ways it is Jerry's point about where students are, in Australia and Victoria. Do you then set targets for increasing student attainment? Particularly in maths and science do you look at the take-up rates and work out strategies to increase those? Do you look at areas you are poor at at a faculty level and devise strategies to improve that? In short, what is your ongoing quality assurance regime and how do you link either targets or outcomes to what you are doing in your classrooms, particularly in maths and science?

Mr GRAY — In our school we take all the data collection of student performance. Let me clarify that: when we look at the VCE data that we get from external examinations and assessment and internal assessment procedures we take all that data and look at what is effective and what is not and develop some strategies. In our triennial review it will say, 'We need to lift this by this' or, 'We are aiming to lift this by 5 per cent, or whatever'. We do those as a matter of course. More so with that, though, I think the culture in our school is that we look at everything we do in the classroom and if it is not working — and it might not be, because we are measuring a test result or examination result — we look at the things we do not measure, the things that are more subjective and more difficult to measure and we seek feedback on that. We use the department surveys — feelings about school — and we use other information where we select data to collect ourselves. We have collected data on our year 7 program because our year 7 program is prior to our VMG and we need to know how that transition program worked and how kids felt about that. We build the recent data we have selected about the relationships and strengths of teachers and their effectiveness in as well.

The CHAIR — Do you set broad targets, like increasing the number of students undertaking physics and maths or increasing middle-year levels of attainment?

Mr GRAY — In some areas we do, like improving VCE results — we have set targets about that. We are really happy with our VCE results, but even though we are happy we are still wanting to go the step further.

The CHAIR — They are more general statistics. What about other schools?

Mr ABRAHAM — We have actually started to push them a bit more. We have maths streamed at Shepparton high and we are actually pushing the top classes way beyond what is prescribed. For example, at year 9 they are probably being stretched to even year 10 algebra, or whatever the topic is. We stretch them a little bit more than they feel they should be. So there is more of an academic rigour coming into force.

Mr FREIJAH — To touch on what Keith was saying, I think all schools will develop priorities in certain areas from their reports. But we have retention targets and VCE achievement targets but probably not specific to maths-science — —

The CHAIR — I am going to cut to the chase and ask how many people here have targets to increase maths attainment and to increase the number of students going through into specialist or further maths, physics and chemistry?

Mr GRAY — No, not specific targets. In science we targeted the fact that numbers in chemistry and physics were down some years ago.

Ms UTBER — I am Karen Utber, and I am head of science at Wanganui Park Secondary College. We had a female physics teacher who came a couple of years ago, and physics numbers rose. It was not necessarily because she was a female; it was just a change.

Mr GRAY — It was the way she did it. It is about passionate teachers.

Ms UTBER — Yes. It was a different approach. It was the female way, which is — —

Mr KOTSIRAS — Is there a difference?

Ms UTBER — There is definitely a difference. Having taught for 20 years and having five children of my own and coming back into teaching, I teach very definitely now having all those children. She is very patient, very tolerant and spends a lot of time with individual students, very much wanting to know, as Gerry said, how these kids learn best. She spends a lot of time doing that and focuses on it. We are talking about a passionate teacher.

The CHAIR — Have you had an increase in students undertaking maths methods, physics or chemistry in recent years, or has it been static?

Ms UTBER — Fairly stable.

Mr PORTER — I believe in the last 10 years there has been a definite fall-off in specialist maths.

Mr KOTSIRAS — Why?

Mr PORTER — I mentioned it in my paper — —

The CHAIR — The point I am getting at is that if there has been a fall-off in specialist maths, and if the physics and chemistry is stable — and basically these are statewide issues — I wonder why schools per se are not targeting that? I am not critical of you because it is across the state. Why would you not target that as a specific area for schools to increase — —

Mr GRAY — We do not need to. Our students do not need specialist maths. Specialist maths is a prerequisite in very few tertiary courses now. Because of the degree of difficulty in specialist maths and the effort that students have to apply and what they get out of it — because let us face it they are after a good ENTER score; we are driven by this damned ENTER score — they do not see the value in doing it. I think the students are not selecting specialist maths because they do not need it to get into the courses of their choice. Why would you put yourself through the rigour of doing something that is not essential for getting into the course and you are not going to grow much out of it, but which is going to take a lot of your energy when energy could be spent in the other subjects so you can still get a great ENTER score?

Mr ABRAHAM — And the same course is done at university anyway. First year engineering at university requires specialist maths. You get to do it there anyway. When the students go through what the subject covers in the first semester at university, they come back and say, 'Why did I do specialist maths?'.

Mr GRAY — They do, don't they?

Mr ABRAHAM — It defeats the purpose.

The CHAIR — Physics, chemistry? I mention them because — —

Ms UTBER — I think we have had an increase in chemistry because it is a prerequisite for a lot of things that the kids are interested in — for example, physiotherapy and those sorts of things. So when we counsel our kids, if they are unsure of the direction they want to take, we often say, 'How about keeping chemistry?'.

The CHAIR — Early counselling is moving kids into chemistry; is that right?

Mr ABRAHAM — Not necessarily.

Ms UTBER — Not necessarily. They have to have that interest, but if they are unsure we tell them to stick with the chemistry. In a lot of cases we counsel them to stick with the chemistry.

Mr KOTSIRAS — I asked this question of the primary schools this morning. If there was one thing that you wanted government to give, whether it is funding, resources or infrastructure, what would you ask for to ensure that students chose maths and science, enjoy maths and science and participate more in maths and science. I want to see if all schools have the same wish.

Ms HAYES — I would say funding. I come with a bottom-up approach. I think funding for junior maths and science to engage students so that the choices they make are for subjects they enjoy. There is not so much need for career counselling because they will already have that mindset. We have already got them in at the (enthused) bottom level and we are then going to help them to move towards the areas that they are already interested in.

Mr FREIJAH — I agree. I think also funding for additional teacher resource time, whether that is for curriculum development and whether it is built into teacher mentoring and team teaching, but certainly to allow some flexibility within the school organisation.

Mr GRAY — I think you know what I want.

Mr KOTSIRAS — We have heard it so many times!

Ms UTBER — It would be funding. The schools around here are older and I would love to have all the up-to-date technology and lovely science labs. I have taken kids on excursions to places and you should see their faces when they walk into a properly equipped science laboratory. If we had all that equipment we would spend the time in learning how to use it. There is no way that you could not engage kids if you have funding for that stuff.

Mr ABRAHAM — I would like to see funding for resources and teacher time. We faced the problem doing the Yachad program. We had to take our own time to make sure that the program was supported.

Mr KOTSIRAS — When you talk about resources, what do you mean — equipment?

Mr ABRAHAM — Equipment, yes, especially for the lower years. If you can engage them there it would solve a lot of the problems of subject retention rates, like in physics or even specialist maths so that students remain in the same subject even if they do not move up to the next level.

Mr PORTER — I have already mentioned funding. We have four science rooms that still have the original timber painted benches, 30-year-old taps and gas outlets. It is not inspiring.

Mr KOTSIRAS — I understand that you all get four days a year of PD on student-free days. Be honest; we were all teachers once. I taught senior maths, pure and applied mathematics. Are those four PD days worthwhile in the way they are currently structured — and it will be hard for principals to admit to this — or does there have to be a change to the way that PDs are allocated?

Ms GILL — I am Susanne Gill, and I am the maths science leader at Mooroopna Secondary College. We have been involved in the learning bridge, which is the Investors in People program. We are not accredited yet, but we may be moving that way. It is about being very careful with your PD resourcing. Alby and I have recently been learning about making sure that your PD is about professional development of your staff, and I think that is what we have to do. We have to spend a lot of time ensuring that the resources we have with student-free days are used effectively. We have to make sure that we are making use of the staff at our schools. At the moment we are putting a lot more time and energy into doing just that. A lot of the schools today have said, 'Our maths and science staff are at varying levels of enthusiasm'. We want to make those staff enthusiastic.

I think I have come up here by default. I want to get back to the last point because I want to talk about resourcing as well. I lead my maths-science meetings with 20 staff and I am continually being told that our resources are not up to scratch. We do not have enough equipment. 'Wouldn't it be great to have robotics on the Lego?' and all the rest — and they are throwing these little things at me. I truly believe if we could resource the staff to the

requirements that they have, they would be more engaged, they would be more enriching in their teaching and therefore it would flow through to our students. So that is something from my point of view at Mooroopna that I really believe would make a big difference.

Mr KOTSIRAS — Is there some partnership between the secondary schools and the primary schools? Is there a transition program for grade 6 to year 7, with science teachers, methods, going to grade 6 to speak to the teachers and vice versa? Is all that happening in the area?

Mr ABRAHAM — Yes.

Ms GILL — We have got a cluster with our 11 feeder primary schools and our one secondary college and it certainly is attempted at all sorts of levels, but again, specifically with maths and science there has not been a lot of resourcing. We do manage it, one science maths day a year with all our grade 6s coming to our high school and taking part in activities with the year 7s, but I think we could do more along those lines.

Mr KOTSIRAS — Can I ask another question?

The CHAIR — Were there any more answers on the PD?

Mr FEAIN — Yes, I would like to say something on the PD, if I may.

The CHAIR — Yes.

Mr FEAIN — Peter Feain, I am the assistant principal of Shepparton High School. On PD days, we were discussing it at our staff meeting a week or so ago. We have had the introduction of a number of different programs across the secondary school, whether it be CSF or VISE, VCE, VELS, the new VELS et cetera, and never does the department allocate time for the schools to get a grasp of those concepts, the new programs or have time to work on those as a staff. They expect the schools to do them within their normal program whereas if the department was able to say, 'We will allocate one day each semester during the course of this year for the schools to work on that in addition to the four PD days' it would be a help. It would be of some use to the schools. But absolutely nothing is given every time a new curriculum thrust is introduced. It is up to the schools to manage their own time and push other things aside to work towards that introduction.

With the four PD days, to call them PD days is a misnomer. One day basically has to be the start of the year, the first day of the school year, to get things organised. There has to be at least one day during the course of the year, maybe two, for teachers to work on report writing. That might leave one day for PD, so there are not four PD days. There might be one PD day. For schools to cope with that they have to cheat, perhaps, and nominate days — I know schools around here would not do that. Schools might have to manipulate things and call them something else and not have students at school. I think in terms of resourcing the schools the department does not do a very good job at all. If they are serious about PD they need to make a genuine commitment to it.

Mr KOTSIRAS — I assume there are still staff meetings after school once a week and faculty meetings happening after school and all that is still going on?

Mr GRAY — Yes.

Mr FEAIN — According to the agreement, of course, we have so many free hours of meetings every week and some of those are administrative meetings, some are student management meetings and some of those might be curriculum key learning areas, PD et cetera, yes. Staff are always working and schools are always working on PD within the PLTs, et cetera, the small groups, but then schools also need to be given consideration when the department wants us to do broader things. If they want the change to be effective through the schools they must make a real commitment to the schools and to time.

Mr GRAY — There are meetings on four mornings before school and four days after school in our school, not involving all people, but this — —

The CHAIR — What about the end of the year when the seniors go? At the end of the year when the seniors go, do you reallocate across your timetable classes so that teachers can do report writing and there is a time for professional development then?

Mr GRAY — You have got to do a trade-off there.

The CHAIR — Oh, I love a trade-off.

Mr GRAY — You see, the trade-off is that if I am teaching a juniors class, if I am teaching a year 8 science or a year 7 science, towards the end of the year after October and the VCE students have finished their classes and they are in swot factory teams, the teachers that have taught those VCE subjects need to be with those kids to support them right up until their exams, and after that, yes, we can use those teachers. If another teacher comes into my classroom to help with my year 8 science, first of all I need to prepare the work for him or her, so I do not really get much benefit from it, and I think the students in any classroom respond better to their own teacher. Every time you change the teacher in front of a group of kids, the effectiveness of what happens there is not the same. We have to do that. For all of our PD other than the four days — and PD should not come in chunks because that is not the best way for it to occur, and we send a lot of people on PD in our school, lots and lots of them — every time we do it, the thing about is they are missing their kids and the kids are missing them in that class, so that is an important aspect of that PD.

Ms PEAKE — Helen Peake, McGuire College science coordinator. Who says women do not teach science? One thing that has come up is that we have KLA meetings where maths and science have a meeting, nominally once a fortnight, but there are several things about that. There are time limits. What my staff keeps saying is, 'We would like to have PD where the science department can get together, have a morning, an afternoon, a day would be brilliant, to talk about what we are teaching, how we are teaching it, what PD we need'. I do not know if this is the way with other schools, but here at this school I have people from outside my department teaching science, so I might have someone who is in the PE department, or whatever, other departments, technology whatever. There is no forum for us to meet with those people. We are the same. We have meetings before school, we have meetings after school. There is no forum to do that, and I would like to sometimes see a PD day put aside for KLAs to meet and discuss what they are actually doing, and that is not built into our PD. It is not there. There is always something else. With the new VELS that is starting next year, we still do not know where we are standing with VELS. We need to use some of our PD time to work out what we are doing with that and with a whole heap of other things.

Ms HAYES — I would like to second that. From the research I am currently involved in with this group of teachers, the most favourable thing they have found is that the time they have spent together sharing the things that they have done in their classrooms has been more valuable than anything else they have done in the last couple of years. That time for ongoing mentoring and coaching and providing each other with PD has been really valuable.

Ms PEAKE — We are part of the Science in Schools program and there was some funding for that. I used part of that funding to take my entire department out for lunch, and then we would stay on and would have an afternoon and talk about what we were doing. My people were saying that that was the best time they had had, not just in terms of the fact that they got a free lunch, but that they could sit down together and talk about things. 'I have just tried this really good prac, just doing this thing' — solid nuts and bolts, what we are doing in the classroom, what we want to do, what we need.

Mr KOTSIRAS — In schools is the maths department in one room and the science teachers in one room?

Ms PEAKE — Where we have our meetings?

Mr KOTSIRAS — No, your desks, your staff rooms, or is it one huge office space?

Ms PEAKE — They tend to be. Ours is.

Mr FEAIN — Each school is different because of the age of the school. With our school we have a maths office with probably five teachers in it and the rest of the maths teachers by necessity are scattered throughout the staff rooms, so there is a physical problem.

Mr ABRAHAM — They are generally with others like phys.ed, so they might have their office where all the phys.ed teachers are.

Mr KOTSIRAS — I found that if most of them are in one room they tend to help each other or advise each other, or with first years share lessons.

Ms UTBER — I just wanted to add to Helen's comments. I have had the same comments. Our best PD has been an evening session where the whole science faculty meets, has a meal and then we have to share a best practice, and we have done that, whether they be hands-on activities, whatever. Then we extended it a bit further and asked heads of other faculties to come or send a representative to see what science was doing, and that created a bit of a buzz through the school. But on top of that I would like to see a PD day where all the science people or representatives got together in the districts to share best practice in terms of what resources we are using to engage kids. In genetics, for example, GTAC in Melbourne is fantastic and a great excursion. Other schools might not know anything about that. I would like to see a PD day set aside for that.

The CHAIR — This is pretty impressive here as well, I can tell you, and I have been to a lot of schools.

Ms UTBER — I am up the road, and this is the first time I have been here.

Ms GILL — This is not on our ground. This does not belong to us, and so we do not have free rein.

Mr PORTER — This is a district facility.

The CHAIR — I understand that. The committee has been to the gene centre, and I am just commenting that this is pretty good as a regional centre when you look at the gene centre.

Mr FREIJAH — I think an interesting point has been made about resources and how we use them. Our school has just purchased six or seven electronic whiteboards, and one has been installed in each of our faculty areas. It is now the time for us as a school to support our staff and provide professional development in using them. We talked before about funding for resources and staff time and said the most effective PD is learning on the job whilst we are doing it and sharing with each other. To come back to the four PD days and their value, you need a whole day to maybe start things, but you also need ongoing resources and funding to make sure things happen.

Mr KOTSIRAS — My experience was, and I agree with Peter, that our PD days were just to survive the first day and organise for the year, report writing and then we possibly had one PD day with our students.

The CHAIR — Can I take up that point? It is part of what I was saying before. You are a large school with more than 800 kids, and you have a fairly big resource base. Presumably you are analysing success and poor performances; you are devising action programs on how to improve and you are monitoring outcomes — simple, straight, core business stuff for schools. We have heard there is a lack of resource for equipment in science labs and issues with PD days. When as a school administration or leadership group you plan, do you say you will allocate some of the PD days to the faculty and look at funding levels for labs and whether they are adequate and whether you need to put more from one faculty into another in terms of lab assistants? Is that part of how you do your core business? Do you sit down with the science department and work that out?

Mr FREIJAH — Absolutely. Susanne might be able to talk a bit more about it.

The CHAIR — I am just trying to get to whether equipment is an issue of internal allocation or whether it is a case of, 'If we could have much better, we would be absolutely delighted'?

Mr FREIJAH — I think it is both. If you talking internal allocation, you have to have enough funds to reallocate. If you are looking at fee payments and parent contributions, you have to have a bucket there to reallocate. I do not think any school would say no. They are fairly specific. They have priorities and have to spend that money in this area. That reallocation happens. It is very tight. If you are looking at a staffing budget of say $5.5 million you are pretty much going down to the last $30 000 or $40 000. Things are very tight.

The CHAIR — So if you are a large school in a middle-class area with 80 per cent of your parents paying fees, you can probably equip the lab well. If you are in a poor area with a limited budget, teachers are going to struggle to have their resource for decent practical science. Is that fair or not?

Mr FREIJAH — If you could get 80 per cent.

The CHAIR — I am bringing it down to a basic level.

Ms GILL — I think the priorities of the school are shared across all areas, so maths/science is not always going to be the highlight. It is hard to say, 'This year we are going to allocate $50 000 to do a science lab'. It is not

practical. If you look at the charters and goals of every school here, they are probably looking at general things. What is going to address that is smaller class sizes. In achieving greater results, increasing numeracy and literacy and VCE scores, that is what we are doing. We are putting all we can into the teaching and staffing and getting class sizes down. There is never the fat to create a new science wing.

The CHAIR — Outside of capital works, though, a few years ago there was $5 million for libraries and extra books and there was $5 million for sports equipment. Sometimes in the budget at the end of the financial year there will be a bit left over and you can do it. In terms of resourcing, would that be an issue — would extra dollars lift up science labs or would you give it to a region to buy equipment to be shared that schools could never afford themselves? What would make a difference in terms of science in particular?

Mr FEAIN — I have two comments. If, for example, commonwealth grants come on stream as they are promised for school improvements and they can be used by schools in a specific way, tagged grants if you like, you probably could. If you go back to the Whitlam era when a lot of the science labs and libraries were built by federal grants, that could be. The other thing is that with some of the state government program money we get, and I refer to Access and Excellence, funding is given for a three-year period and you can employ teachers and have a real impact, because you can then start using a couple of teachers with small groups et cetera. It is three-year funding, and when it goes that staffing is gone. Whilst you may have put in some good programs, the impact of having specific teachers there to deliver it is often lost and watered away. Governments love giving funding for three-year periods, election periods, but schools really need that type of funding to be embedded in their SRP so it can be ongoing.

The CHAIR — I think the cluster funding came after the election and in a non-election year. It was not one of the promises.

Mr PORTER — I was going to say with the infrastructure cost, I have just gone through that process here to upgrade one science room. You are looking at about $90 000 to $100 000 just to do a basic fit-out of a room, and not the equipment. The equipment was about another $40 000 to $50 000. It is a fairly substantial hole in a school's budget to do something like that for one room. We have got four of them.

Mr FREIJAH — Can I add just one last point on that: I think we have got to be serious about the type of students we are trying to engage as well. We are trying to engage visual learners — they are on the computers all the time. They use DVDs. There is interaction. If you are talking about maths/science, we are competing with the hands-on subjects. We have to engage our students quickly in the early years with some of these resources, not necessarily brand-new science rooms in most cases but resources so that students can say, 'All right, I will learn science and maths by using some of these resources'. They then get a taste for it and do it in their middle and senior years.

The CHAIR — If you go to Apple out of Seattle, they will say that young people are digital natives. They can learn many things — they are used to working on split-screen computers and they want things to be instantaneous. Most teachers are digital migrants or immigrants, and there is whole issue there in terms of how young people learn visually nowadays. I think that is another inquiry. Thank you very much. The time you have given here is much appreciated. I know it is a very busy time and it has been very useful. We will get the Hansard report out to you in a few weeks. The committee and I might have a few follow-up questions. If it is okay, Andrew Butler, our research officer, will get in contact with you and see if we can get a few more answers. I declare this hearing adjourned.

Witnesses withdrew.

C O R R E C T E D V E R S I O N

EDUCATION AND TRAINING COMMITTEE

Maths and Science Evidence Committee

Inquiry into promotion of maths and science education

Shepparton — 2 August 2005

Members

Mr S. R. Herbert Mr N. Kotsiras

Chair: Mr S. R. Herbert

Staff

Executive Officer: Ms K. Ellingford
Research Officer: Mr A. Butler

Witnesses

Ms S. Sutton, business liaison;

Mr M. Nelson, manager, economic development; and

Mr D. Rochfort, director, corporate and economic development, City of Greater Shepparton;

Mr T. Tennant, director and mechanical design manager, Rubicon Systems;

Mr M. Breuer, general manager, Coomes Consulting Group;

Mr R. Schubert, general manager, human resources, SPC Ardmona Operations Ltd;

Ms D. Taylor, president, Shepparton Chamber of Commerce and Industry;

Mr J. Crawshaw, committee member and past chairman, north-east Victoria area consultative committee, and business development manager, The Factory;

Mr D. Lythgow, manager, Shepparton Science and Technology Centre;

Ms J. Hippisley, executive officer, Goulburn Murray LLEN;

Mr L. Short, executive officer, Campaspe Cohuna LLEN

Mr A. Hughes, head, Goulburn Valley Environmental Consultants; and

Mr P. Ryan, chief executive officer, Goulburn Ovens Institute of TAFE.

The CHAIR — I declare this hearing of the Education and Training Committee open. For the benefit of those present, I inform you that the Education and Training Committee is an all-party investigative committee of the Parliament of Victoria. The members here are hearing evidence into relation to the inquiry into the promotion of maths and science education. I advise all present at this hearing that all evidence taken today, including submissions, is subject to parliamentary privilege and is granted immunity from judicial review pursuant to the Constitution Act and the Parliamentary Committees Act, which means you cannot be sued for what you say.

Welcome. It is terrific to have such a large number of industry representatives here today, it is very much appreciated. It is certainly a substantial turnout and we are thankful for the time you have given to be here this afternoon. Hansard will be taking notes of all that is said. It is an extremely difficult job — in fact, by far the most difficult job of any parliamentary job. Therefore to start off I would like you to give your name and where you are from so that we can map who is who and where you are sitting.

For those of you who are not familiar with Victorian parliamentary inquiries, we get references from the Parliament or from the government to look into areas of need within the Victorian community. This is the first parliamentary term that this committee has been in existence; before 2002 there was no Education and Training Committee of the Parliament but as a reflection of the importance of education and training to our economy and to our society, the Parliament established one in this, the 55th Parliament.

We have had two references prior to this: one was into higher education and university numbers, which was a fairly controversial one, and one on which we had a split opinion on party lines; the second one was about teacher training which all three parties had unanimity of viewpoint. We were all in agreement but the deans of education were not I must say, but we are working through that now — but that is not to say that the deans were not incredibly helpful in doing the inquiry. This one is our third inquiry.

We will make a report and recommendations later in the year as to what needs to be done to strengthen maths and science education, and the government usually responds within six months as to whether it agrees, accepts the findings , gives an implementation program or says, 'No, we do not agree with that; we are not going to do it'. That is how the process works. It is fairly important, and this inquiry is particularly important to us and to the government in that Victoria, as you know, is a small, industrial state increasingly reliant on technology, our industries' capacity to compete and the skills of our work force to keep that competitive edge.

Whilst that has said a lot, it is in the context of our having major competitive nations to the north of us, like the Asian nations that are investing heavily into their work force, and we as a state probably more than any other state are competing with many of those nations and ensuring that we have the capacity of our population and future work force to be skilled in the maths and sciences necessary for high-tech and high-service industries. It is fairly crucial; and to be perfectly honest we are not doing so well right now when we look at international studies. That is not a reflection on schools or industries or universities, it is more a statement of fact and our job is to try and get recommendations that are realistic, workable, able to be implemented and which will substantially increase the number of people proficient in maths and science in the population over the next decade or so.

Mr SCHUBERT — Can I ask questions now?

The CHAIR — You can ask plenty of questions shortly. That is essentially what our task is. In doing that we have of course had various industry groups, lobby groups and education groups give evidence. We have travelled interstate to see what some other states are doing. We are now at the stage where we are travelling through regional Victoria and holding forums on primary, secondary and tertiary industry to try and gather opinions and ideas about what is happening and what should happen, and it is in that context that we are here. In a moment I will see if there are people who wish to comment directly before we have a question and answer session. Do you have any questions about the terms of reference and what we are doing?

Mr SCHUBERT — My question is purely and simply in terms of how you benchmarked international experience. I just cannot quite understand 'the overseas countries' and how you confirmed that the overseas countries were doing it better than we are?

The CHAIR — There have been a number of studies done recently by ACER, TIMMS and PISA by the OECD and there have been substantial studies that have benchmarked levels of mathematical attainment and we have rated at different levels on those. The other issue is in terms of the physics and chemistry; we have had substantial briefings from the education department about the levels of take-up into those areas, so the TIMMS and

the PISA studies are international benchmark studies and they look at how well we are doing maths in particular. The education department has provided us with substantial data on the number of students taking physics, chemistry and maths-specialist subjects which are the top end and then how many of those are moving on.

To give a snapshot and without pre-judging the inquiry — and I would not want to do that — it would seem that there is an issue with primary teachers being anxious about maths or not having had a great deal of training or not having confidence in themselves in maths and science. There is an issue with boys in junior secondary dropping out or wishing to be spoon-fed; there is an issue with middle years, as there is in every subject, about how you engage students whilst keeping a systematic course of study. At the senior levels there appears to be an issue where there are not enough people doing the specialist maths, physics and the chemistry and there are a lot doing biology, but those that are doing that appear to be doing so to get a high university entry score and are then going into other areas rather than engineering, science or the hard sciences and maths at university. That is a broad snapshot of what we seem to be seeing now.

Mr SCHUBERT — Thank you.

The CHAIR — I am happy to go around the table for you to make some comments about your experience in terms of maths-science at whatever level, or how your industry or group is seeing the current situation here.? Maybe we will start with the TAFE.

Mr RYAN — I am Peter Ryan from Goulburn Ovens TAFE. We would agree with the observations that you have made that there seems to be a lack of interest with students wanting to take up maths and science. I should say that even though it is quite a few years ago I taught chemistry in schools. Even then the number of students taking the subject as a proportion of the total population was quite small.

I am in a bit of a quandary in the sense that when we look at the industry end of what we need in terms of skills as employees at the end of the day, it is more about the attitude of the individual and their ability to learn on the job that is an important aspect rather than saying, 'You must have a qualification in physics or chemistry or whatever through the school system'. My view is that we have too often put everybody into silos very early, saying, 'You may not be good at maths, so you do not do it from year 10' or even before that, and you start to select them out. When it comes to employing a whole range of people, those who have dropped out of maths early — and often not for their own reasons of capability but for a whole lot of environmental or teacher reasons and so on — have lost confidence and then do not want to be involved in what might be a science career even though they have the capability and the industry is actually able to train people up if they have the right ability.

I think we need to be quite clear about what the outcomes are that we want in terms of maths and science and just how many across the population we need that are highly tuned and are going to be very specialised engineers at the top end and how many we need in terms of really broad skills across the whole work force, and how you might achieve that. My guess is that we need to put some attention into the large numbers across the broad work force as well as thinking only about how you get some elite students through at the end.

Mr HUGHES — I am Andrew Hughes and my main interest in this is that I have been privately tutoring years 11 and 12, and first and second year university students for about 27 years. I presently have 27 year 11 and 12 students that I am privately working with as well as a couple of students from New South Wales and a handful of students from Melbourne and La Trobe universities.

I have to agree with Peter to a large extent and also with Steve on the comments about specialist maths. I would make the observation that there is only one university course in Australia that requires specialist maths —that is, engineering at Melbourne University. I am presently working with six year 12 students doing specialist maths and though I might sound as though I am coming from the students' perspective, I am doing that on purpose. I can have a student who is going to do very well in specialist maths but if you ask them to add one-half and one-quarter, , their answer will be two-sixths.

We can relate that back to what is lacking there. Luckily you can give them skills on the calculator to overcome that basic arithmetic problem, and they go on. In the past I have also done some Koori tutoring here and was surprised to find that an average year 11 student could not work out what 15 per cent of say $550 was. I had an incident come up when a student was curious about a K-Mart special and could not work it out, and I think that is about a year 6 skill.

Following on from that, speaking to a couple of principals from primary schools around the area, we asked the same question of teachers, and less than 10 per cent of primary school teachers can do in their head basic percentage-type calculations. I was astounded at that. It is not something that has been officially written up or anything, it was just done initially as a bit of a curio, but I do agree that the problems that have been mentioned earlier are real ones and maybe it is going to take a few years to come through. An ex-student of mine is presently doing a dip. ed. at La Trobe, and she was one who got 26 for methods maths and she cannot add fractions, she has to do it on a calculator. She will be teaching primary school students next year. Maybe I have generated a rod for the back of the system there, but I see that as a concern. One thing I would have liked to have suggested for the committee if it was at all possible, is that I think members would benefit greatly from trying to get students' perspectives. I have very little involvement with teachers in the area, yet I am most probably teaching or working with as many year 12 students as most teachers do and work purely from the students' point of view. They are only there to try to get as high a score as they can at the end of year 12.

The CHAIR — I have a 17-year-old son who hates maths methods, and I am struggling to keep him studying to the end of the year.

Mr HUGHES — I hated it too when I was a student and — I should not be saying this but — someone, maybe a teacher, one of the old woolly-mammoth types who were around back then, turned around and said, 'Don't let it get you down, Andrew. If you learn to do your maths really quickly, then you will be able to do it quickly, get it out of the way and go and do something you want to do', and that has always been my attitude. The trick is to make it look simple, and the students respond to that.

The CHAIR — Thank you.

Mr SHORT — I am Lindsay Short from Campaspe Cohuna LLEN. I guess I support what Peter and Andrew have said, but I also would like to comment going back a bit earlier than that in making the learning part more interesting for kids. We have got to try to engage kids more in the subjects of science and maths, and probably many others as well actually. I have, as Steve just said, actually gone out and talked with kids, knowing that I was coming here today and got some feedback. This is the feedback I am getting: that it is boring, it is not a subject we really want to do. My own son dropped out of maths after year 11 because he was sick of transferring product from one book to another and he thought there has got to be a better way of learning maths. I think we have got to look at a better way of engaging kids in subjects that can be boring and can be difficult.

Ms HIPPISLEY — I am Jennifer Hippisley from the Goulburn Murray LLEN. I am running out of intelligent things to say after that, but I guess I am a parent of a year 12 student who is doing maths as well, and so I will talk a little bit about that and about my conversations with other young people. I think Lindsay is right; it is dry and boring. They probably are doing it to get a higher score, not necessarily for the love of the subject.

I wonder about the smaller proportion that Peter alluded to in his teaching career, whether it is always going to be the case that there will always be a much smaller proportion of people who are interested in the specialist areas anyway. If that is the case, then it is likely things will not change unless we do something radically different. But it seems to me we need a different type of learning — you have probably heard about things I know people around the table have heard about — for example, the E-team concept, where kids go in and problem solve with companies, say for a week. That type of learning, where it is more a problem-solving approach and hands-on learning, where you really see much more of a purpose and a method in your madness, if you like, with what you are doing. It is not just an abstract concept but something that becomes real, and I think that is what engages kids. I will leave it there.

The CHAIR — Danny, thank you for the use of this facility. It is an excellent facility.

Mr LYTHGOW — I am a bit biased here. I have got the right recipe here, from what I have seen in the past. There were six of these centres opened in the early part of the Jeff Kennett era. Not one of them now operates, other than ours, in this manner. The rest have been absorbed within the schools infrastructure. It has made a significant difference here. We have got about 60 primary schools that visit us — not all schools. Issues that we have got are that with touring museums that are engaging and attract kids — a lot of that is at Scienceworks, with distance to travel — I would like to see incentives for some of those resources spread around at venues such Bendigo's science and technology discovery centre. We work very closely with them. We are developing work projects and displays with them.

We work with data logging a lot in the primary school, which might surprise a few people. Grades as low as 1 and 2 have been involved with Lego Robotics, where there is a lot of programming and data logging for kids to move a robot around, to have it move to music, which is engaging kids in higher skills prior to getting into secondaries. I know that the secondary school here has got a pretty good robotics program, so we are feeding kids towards that program, but once again that equipment is expensive and schools need to be resourced appropriately, and my belief is we need to see more of these centres being funded with support from the museums to have touring exhibits that engage people more with hands-on and interactive science exhibits.

Mr CRAWSHAW — I am Jim Crawshaw from the Apprenticeship Factory. Most of my dealings with this sort of area — and I agree with everything that has been said today — have been basically with people on the unemployment listing and also with new apprentices and apprenticeships. We have found that the difficulties in people achieving just the basic things in mathematics have been a real hold-up to their career development and their progress in the workplace, and I think it is a shame that they do not really understand and they are not given an understanding early on in their careers of the need to progress in these sorts of areas.

In problem-solving, everyday activities there is a need for an understanding of mathematics. The point was made before about percentages, I guarantee if you walk into any retailer around Shepparton, they will not understand the difference between a mark-up and a mark-down and how you get there, they are just simply told, 'This is how you work it out', and they really do not understand what a mark-up is or the mathematics of the equation and why they are doing it. It is just basic mathematics that has never been explained to them, even if they have done a retail course it has never been explained. Those are the problems that we really face, right from the early levels — the appreciation of the need to follow the basic maths right through. You do not have to be a generated scientist to understand the basic essentials in just getting a job and being able to cope with that job and being able to relate to that job. I think that is where we are missing out. As Peter said before, there are ones that want a fuller stream right through to degrees in engineering, but there are others that just want to get to a certain standard. I think these fellows are lost by the wayside.

Ms TAYLOR — I am Dawn Taylor from the Shepparton Chamber of Commerce and Industry. I am also part owner of a joinery in Shepparton. I probably can talk more about the joinery than I can for all the shops in the town, but what we have found over the years — I have been there 24 years now, and when I first went there parents used to bring their boys in to see if they could get an apprenticeship or a job there because what they would say is, 'Our son is good with his hands' which meant they did not think he was real good with his brain, and so they would put him into something where he could build and did not have to actually think or work things out.

In those days things were not worked out before they were done, whereas now, with computers and the other technology we have, maths is probably more important than it has ever been before, even in our industry. I agree that children need to be involved in maths right from the very early aspects of their education so that they understand that maths is around them all the time. If you asked children about maths they would probably say they do not like it, but what they are talking about is the piece of paper that is put in front of them which they know is going to have a test on it. They do not realise that while they are playing their computer games and doing other things a lot of the time they are actually developing maths in some way. It should probably be made a little bit more fun for children. There is also a need to help them understand that maths is something that is used in virtually every job you could possibly have — and hobby, when it comes right down to it.

I was watching *Catalyst* the other night, and they were speaking about the development of the brain. Apparently, if it is true, the brain is not fully developed or past the childhood state until it is 25 years old. If you are talking about kids who are 16, 17 or 18 doing really technical maths, their brains may not even possibly be ready for what they are doing, so you are only going to have a handful out of 100 who are willing to accept even sitting still long enough to work it out. Perhaps we may need to consider the fact that it does not all have to be done during VCE or in high school, but there should be an opportunity for people to come back and redo it when they like it. For example, that man over there said he did not like maths and now he loves it. It could be just that kids are not ready to accept it at the age we are trying to force them to do it. I think there is too heavy a reliance on computers and calculators — and I must admit I do it myself — and they take away the thought process. All you have to do is push the buttons and you do not have to know how the answer gets there. I think we need to go right back to the start and explain things.

Mr SCHUBERT — I am Rod Schubert, and I need to be a little bit provocative from the start.

The CHAIR — Unusual for SPC, surely.

Mr SCHUBERT — Hands up those people who do not find some parts of their job boring — I think it is part of life skills. There are some boring aspects to life for a 15 to 18-year-old, and maths may be that boring part of their life. There is nothing wrong with teaching them that, as far as I am concerned.

I am a bit with Dawn, though, when she said let us make it a bit more fun if we can. Just because somebody is bored does not mean they should not do it. I do not think we have the front end right if they are bored. By the 'front end' I mean that we need to educate our kids much more solidly in the necessary life skills. I am not blaming the educationalists. I am not blaming them at all, but if we have something that is boring people, we need to make sure we try and get rid of that boredom. Then again, the conundrum is: boredom is a part of life. Every job you undertake is going to have a certain aspect of boredom associated with it. The front end needs a lot of fixing as far as I am concerned — letting kids know what the necessary life skills are. Using the example that Andrea used earlier, take the kids on a tour downtown, get them to understand 15 per cent discount and what that really means. Get them out there so they can see what the real world is about. Take them to a restaurant and let them see how much change they get when they buy their cup of coffee. Those are the sorts of things that, maybe in a small way, show how we might be able to fix it so that it is a bit better than what we have now.

I am probably being a little bit provocative, but the difficulty we have is that we used to recruit a substantial number of apprentices each year — we would have anything up to 25 apprentices at any one time. We are getting back to that only because there is a skill shortage in certain areas. We run all our apprentices through some ACER testing — mechanical comprehension, some basic maths and some numeracy skills, all that sort of stuff. When I started with the business 10 years ago a pass rate might have been something like 18 out of 30. It is disappointing that now the pass rate now is about 12 out of 30. That is the disappointment, because you just have not got the skill sets. These are kids who are sometimes at year 11, and to aid the selection process and eliminate kids pretty quickly it seems a bit harsh to be saying, 'Unless you have got HSC don't come and talk to us'. Only on rare occasions will we take kids who have got year 10 or year 11. We are talking about kids who have done HSC, but you sit there and say, 'Listen, we will have to accept a pass rate of 14 out of 30 for mechanical comprehension or maths'. It is a very disappointing situation.

Our issue is about rural locations being able to attract quality applicants in areas such as engineering, research and development, quality control, some of the food technology subjects and clerical and finance. We pay above the odds; we are considered by some as being socially undesirable because of the amount of money we pay. We pay additional sums of money because we try to get the best. That is why we have to pay those additional sums. The difficulty is that, even though we are probably paying levels of remuneration that are above the odds as far as the region is concerned, we are still not getting the quality of applicants that we need. That is why we are starting a cadetship program through the media. There are a few other initiatives that we are implementing. What we say is that if those devils out there cannot give it to us, we will get it ourselves in our own small way to see whether we can show somebody else how to suck eggs and how to get people into the business who are going contribute and contribute fairly quickly to get it running after two or three years, because right now we have not got it. We do not have those necessarily skill sets in the business, and we struggle. You will see on a monthly basis our ads either in the print media or on sites like Seek to attract technical people.

Our biggest issue that we will confront over the next three to five years is engineering expertise. What that means is that we are actively pursuing some substantial increases in capital expenditure funding because we cannot necessarily get the expertise. To some degree we have to contract out some jobs because we cannot get that expertise. That goes back substantially to the skill sets and the educational standards that are available. It is okay for you guys who live in the city; maybe you have a different set of circumstances to what we have, but it is extremely difficult to attract the right calibre of people to the region. We are no different to any other rural location. I am quite sure you will hear the same story from other rural locations. It is something that needs to be fixed.

Mr BREUER — I am Mark Breuer from Coomes Consulting Group. I also wear another hat in the Goulburn Valley, and that is that I am on the committee up here for Engineers Australia. I am probably assuming that you will be engaging with Engineers Australia at some point in the process, either through the Victorian division or through Canberra. Certainly we also see a lot of Rod of what just talked about. There is a huge skill shortage in engineering, and we are often at the end of that. The next five years and even beyond is going to be absolutely critical.

Putting the Engineers Australia hat on — it is about making it fun and making the kids aware of what maths and science lead to and what are the roles. Mostly engineering is about fun. It is a fun job, and it is practical. You get to go out there and play with big machines and all sorts of things — crash cars and things like that! They are the things that make kids sit up, look and listen so they can see where it is going to progress to. We also get involved through the careers teachers with EngQuest, which is a national competition involving kids in secondary schools coming up with an engineering solution to a problem, if you like, and the schools put the entries in. Each school throughout Victoria is invited, but we have received only two entrants from this region. We always offer to go out and assist students in preparing their entries, so there is a fair bit of work for the careers teachers to get that information out to the students. That is all I have to add at the moment.

The CHAIR — In terms of engineering — and as I said earlier — on Sunday I represented the Premier on a steam train ride. When the train got to Bacchus Marsh from Melbourne they had to turn the engine around — it was an R class 707; 18 tonnes of locomotive and another 8 tonnes of coal, and probably 40 tonnes of turntable. If you ever asked kids, 'How would you swing that locomotive around?', the answer probably would be with a massive motor and all sorts of vices. Of course the whole thing works on a fulcrum. They just bring the locomotive in, balance it centrally until the tracks lift up and down. One bloke can swing the whole 240 tonnes around. That sort of practical engineering approach in terms of science and maths is a great way to demonstrate to kids the practical nature of what is happening. I was amazed by it.

Mr TENNANT — I am from Rubicon Systems. I agree with almost everything that the previous speaker said. Just by way of background, I am a partner in a technology firm. We deliver leading edge technology to the water industry throughout Australia and also overseas. We have a presence in Shepparton, which is essentially manufacturing and project management. We have an office in Melbourne where we do most of our research and development — our software development. I am one of those Melbourne University engineering graduates that Andrew talked about before, with a pure and applied physics and chemistry background. My business deals with the electrical engineering department of Melbourne University to a large extent in its research and development programs, and we deal with some fairly astute and intelligent and world leading maths, science and engineering people. We do not have trouble recruiting electrical engineering and computer science graduates to our business in Melbourne, but I guess it is because there is an available pool of talent in Melbourne — and I can relate to what Rod and Mark were saying before about the inability to get high-quality graduates in regional areas. We do struggle in Shepparton, but we do not struggle in Melbourne.

The other thing that occurs to me — and I put on my hat as a father of four teenage kids who are in years 7, 9, 11 and first year university — I have spent a fair bit of time tutoring the two oldest in maths, and they are bright kids, but I am absolutely astounded at their lack of understanding of basic arithmetic, and I think we have to distinguish between high level mathematics and arithmetic in this analysis. I believe there is a difference. Highly intelligent maths students will go on and pursue illustrious careers in science and technology and engineering. That is fine. There will always be those kids and there will always be the path there for them, I think, but it is the basic arithmetic in our kids that I see as lacking, and that is equally as serious as a dearth of upper end mathematics experts.

Mr ROCHFORT — Again I am supportive of all the comments that have been made previously. I could probably say as a higher level issue that I think the subject we are dealing with is quite timely. Maths and science education is closely related to the amount of innovation that is generated by our region or state or country, and that has certain implications in terms of competitiveness on all those levels as well — so I think it is a very important topic that we are discussing. I would support the need to get the base blocks right on a very basic level — the arithmetic side of things. Once you move on from that there really is a, 'What's in it for me?' sort of decision from the student's point of view, and it has to be somehow engaging. They have to see the practical upshot of why they are studying that, and I think they could probably ask that question at school or at university: 'Why am I studying this? When am I actually going to use it?'. That is a focus from an education point of view.

I take on board some of the examples we have already mentioned. They are exactly the sorts of things I am talking about — the robotics thing that Danny mentioned; the exciting things that can be involved in engineering and science and mathematics. They are the things that should be promoted to the student, in my view. Equally, I think there is a key for industry to play a role there in terms of showing students that this is where you use it in a day-to-day activity, this is how it is applied in the real world, and that will give it relevance. I guess at the upper end, that very peak specialist view, one of my concerns is there need to be adequate jobs to warrant the years involved to get to the pinnacle of engineering or research scientist study. We need to ensure that there are jobs in

the community for them and that they are at internationally competitive wages. I think other states apart from our own, and other countries around the world, are more aggressive in their recruitment of high-technology and innovative employees, and that is something we should be conscious of. I guess we are talking in many respects about a very long process here if we talk about primary school aged students starting to learn some of these skills, and I wonder whether there might be some attention also paid to opportunities for adult education in maths and science and re-educating or re-skilling.

Mr NELSON — I am from the Greater Shepparton City Council. I was just wondering what 15 per cent of 550 was, for a start! I do not think there is a great deal that we can add. Everyone has made some pertinent points and certainly given me an understanding of some of the careers and that interactiveness with people and personalities and where it can lead to. I do not know what school age is the target, but I think if there is some understanding of what has been provided out there, that overcomes some of the perceptions that people have about industry, and certainly with some of the skills that are required at SPC as well, having an understanding of that, that can lead to school retention. One of the council's key focus areas is its tertiary education strategy which brings research and development opportunities for provincial Victoria and also addresses skills shortages that we currently face as well. I suppose I speak from a very general level and a higher level as well.

Ms SUTTON — I agree with what everybody has said virtually. When it comes to arithmetic and things like that, you need to teach kids times tables; put them on the back of the toilet door, which is one way of getting kids to learn — really reinforcing the old, do-it and say-it and learn-it way. Teachers now have to make the subject more exciting so people will want to do it. I know when I went to school I absolutely hated maths and I gave it up as soon as I could. When you look back now, you think maybe if you had kept going something else might have happened in your life and you might have been able to do something else. We have all got old heads on our shoulders and we need to put an older head on young heads and shoulders so they can see what they could do with their lives if they do maths and science etcetera, and where it will lead.

Mr KOTSIRAS — You have all said that there is basically a problem with students coming out of school into the work force. Are there any innovative programs and partnerships between industry and schools that you know of which have worked well whereby schools know what industry wants and therefore works out the curriculum to meet those needs? Do you know of any programs in the region which meet those needs or there is a link between industry and schools?

Ms HIPPISLEY — The E team — it is not called the E team any more, it is called Teen Innovation, is a great one. I know that they have been here in the past.

Mr CRAWSHAW — Given the opportunity, given the challenge, it is a fantastic way of getting young people involved in the workplace and understanding the basic operations — the fact that you have to be there at 8 o'clock and take your lunch, and you have to mix with other people, you have to get on and use the phone, you have to make inquiries of people and ask questions. These young people, green from school, are exposed to this, and it is a great way to educate them in the basic everyday things.

As Rod was saying before, this is one of the problems that we have in industry, that you get people who just do not understand the basic principles of getting on with each other in some cases. This is a team exercise where they can come into a business, be given a project to work on and they have got to go and do the groundwork; they have to go and find out what it is all about, they have to go and do the analysis of it and report back again, and they are working in conjunction with management and people on the floor, and hopefully they actually get a program given to them that they can see the end of result of. In our particular case it was a marketing promotional program that they actually took right from the floor and right from the product and developed a marketing tool, put it onto a selling disk and that sort of thing, right through. It was quite an eye-opener for us to see the way it worked and the enthusiasm that it generated. But, you know, that is one area that certainly does work.

Mr KOTSIRAS — But if there are children out there who cannot add or add fractions, or work out 15 per cent of $1.50 or $5.50, has industry actually told, first of all, the schools that there is a problem, or the region? Is there an industry group that is saying to the schools, 'You are giving us children or students who cannot add and that is a problem to us'?

Mr CRAWSHAW — I think that message has been a continual feedback to schools for a long time, with all due respect. I think that industry has not been backward in coming forward to report these same problems. In

past groups — and I can go back four or five years when we had an industry forum up here — and the very things that we are talking about here were talked about then: skills shortage.

Mr KOTSIRAS — What should schools do then?

Mr LYTHGOW — Vocational education programs in schools have offered a lot with that. In most programs they stipulate X number of days on-the-job training. In business office admin the kids are, for 40 days within their two years, required to be in a realistic office environment as work placement to pass that, so they are going out there and seeing what skills they have got to bring with them. I have seen kids go back and continue after that to work hard at that area.

I am involved with VET multimedia. We do a lot with programming — Flash, Director and scripting languages et cetera — so we get kids from an arts point of view that we are teaching programming, so we are getting them into IT languages et cetera. One that really disappointed me in SPC days a few years back — it is not SPC's fault here — the program was marketed wrongly for laboratory food technology skills. I know of kids who went on to uni to do food technology subjects, but we could not attract them into that VET program and it did not run. SPC was wanting to take kids: 'Yes, we can give you 40-days placements in our food labs to understand microbiology and all those styles of things', but the kids who were coming in, as you get to years 8, 9 and 10, where you are targeting to pitch these to the kids: 'Hey, you need to do this', they said, ' VET, no, I do not want to be in on that one; I am going to go this way'. The VET factor deteriorated from getting kids into what could have been a really good scientific program. The food technology one is still sitting there and I think it probably needs to be readdressed for this area whereby we need to get back to kids at years 8 and 9 to say this is an option that should be looked at seriously, so you are going to get a bigger stream of kids involved with those style of programs.

Mr HUGHES — I think there has been a lot of involvement by students going and seeking out things. I have presently got two students who want to do pharmacy next year at one of the universities. They are both working in pharmacy shops. I know of one young lass who for the last two years has managed to get herself a part-time job working in the courts. She wants to do law at Melbourne University next year. When you have got ad hoc students going out and doing those things off their own bat and having to use friends and whoever they can to get those sorts of positions, it sounds to me like maybe there is a need for some facilitation there.

With the fear of rubbing a few people up the wrong way, I predict that within the next 10 years or so we are going to get back to the system where we have tech schools and high schools again. We are starting to see that happen now. If you have a look at year 12 students and the subjects they do, let us say they want to do specialist maths, maths methods, physics and chem., their other subject has to be English, they have no choice; but if they are not doing all of them, let us say they just want to do maths methods and chem. because they want to do nursing, say, what they will do is health and human development or something like that. The students refer to them as veggie subjects because I guarantee that anyone sitting around this table could go and do that exam at year 12 level and they would get an A plus.

There are the old tech school subjects still there and they have an excellent place to be there. However, it is nearly being a little bit racist, but the students who are going to go on to uni and need to excel at science and mathematics, they are the old high school students, whereas the tech students who are going to play a very important role in the community and do the more VET-type hands-on work are getting lost in the system because of the mismatch. We are already seeing it. The fact that the VET program has come in and we now have got VCAL, if you have a look in the schools there is a certain amount of streaming those two ways and my prediction is, give it 10 years.

The CHAIR — We will take that up in just a tick.

Mr RYAN — I would like to make a couple of comments. The first thing I would say is that the quality of teaching of our best teachers and the quality of our best students is actually better than it ever was. We should not sit here thinking the whole system is terribly bad; that is not the case.

My view is really about how do we lift the bottom end to make sure that is effective? I just know in our business, and probably all the other businesses, it really depends upon the quality of your human resources. This goes back to the ability of teachers at the primary school level to really enthuse those kids who might have a different learning style to have the confidence that they can get there. Some will get there quicker than others. But we need to start to concentrate right back at the primary school, right back to when we recruit teachers, so that whatever they do they can actually make it practical and make sure that these numeracy and literacy skills are developed all the way

through. It just seems to me that we try to fix things at the VET end — and Danny is right, we will see a resurgence of technical education, which we applaud — but it still remains that the system is currently set up for the best kids to do very well and kids get left along the way because of the capability of the broad range of teachers.

If you are not a maths and science teacher you are not going to be able to give that confidence to those who are struggling and convinced them, that, 'Yes, you can make it'. My view is that everybody can make it. It is just a matter of being able to dish it up the way that is relevant. I think there needs to be a close look at the recruitment of teachers and a recognition that this as a long-term program. There needs to be industry support and popular media support to say these are important issues and we need to have a much higher esteem for the profession of teaching, who are doing this very important job.

The CHAIR — When we are talking about basic arithmetic, we are talking about primary school and what is coming out. Is that the sort of level you are talking about?

Mr RYAN — Yes.

The CHAIR — Basic fractions, knowing the multiplication tables pretty well, being able to work out change, measurement, space, that sort of thing; is that it?

Mr RYAN — Yes, absolutely! They need some science principles too.

Mr CRAWSHAW — As Pete said, they need some science principles too. They need to understand the mechanics of working things out.

The CHAIR — We had a primary school forum this morning and I think it is fairly recognised that there needs to be a greater push there. I was just trying to work out the LLENs — I will put it right on the LLENs here. If industry continually says this, what do you feed back? Do you have these discussions with primary schools in the area and say, 'Look, we have a problem here'?

Mr SHORT — It think it is to create direct links with industry and schools, to develop the relationships between the two together rather than us being the one that is in there doing the toing and froing. I think it is about developing the relationships much stronger. We are actually doing that in our region, in developing industry leaders who are actually communicating with the schools and trying to get the message across a lot more clearly about what it is they require of the system.

Mr LYTHGOW — I would like to speak on the LLEN here. I reckon they do a really, really good job with the VET. With the way the clusters have been organised here, the 14 or 16 schools — I am not sure; government and non-government schools — all have agreed VET days. If schools have programs they want to deliver, they will do it on their own timetable. If they have numbers that are not going to be viable for it to happen at that school, they will share it on a common Wednesday. So students, no matter what school they are at — from Rushworth to Kyabram to Cobram to Euroa — can all attend on that Wednesday at that school to do that VET program. This is where, with the food technology, I see it that we should readdress that to get the kids who are doing the maths, chem and physics to look at food technology and what is in it so that is where they are going to work. In the end you go through a biol and a chem area to readdress that one to get kids. VET is not all hands-on education as such. With the food technology, it really disappointed me that the kids cannot be attracted; they cannot see why. We need to attract the maths-science kid to look at a VET program that will really open the door for them perhaps.

The CHAIR — A number of employers in Bendigo expressed a problem, and I am not sure whether it is exactly the same here. They were saying that students doing VET or vocational studies in school are the ones who want to go into an apprenticeship and it is that same group who tend to drop out of maths early, yet in a lot of apprenticeships now, and probably in the past, you need reasonable maths skills — in the building game and in a whole heap of other industries. There was a systemic problem, I think they would say, in counselling students in what the needs of jobs are. A whole heap of particularly boys would say, 'I'm going to be an apprentice, so I'm going to do a trade and do VET and VCAL. I don't need maths'. But it is those same students who really should have been told, 'Listen, if you want to do that, you have to really apply yourself to maths'. So the issue became one of counselling and a bit of guidance for students about the needs of various industries and jobs and mathematics. Is that an issue here?

Mr HUGHES — It could be said that some of the best maths and science teachers in this region are not people who went straight through high school, did a BSc then a dip. ed. and took a job as a teacher. I should not say it, it is a bit nasty, but there are a number of teachers who are accused by students of having never left school. As to the ones who seem to do the best job in that area, I can think of an ex-water commission civil engineer who is a physics teacher in one of the schools in Shepparton; we have an industrial chemist who teaches maths and chemistry elsewhere; and I know where there is a chap who is qualified in computer programming who is teaching maths. I have looked around the region, and over the last 10 years I have been working with students from just about every school in the region I have continually got the comments, 'Oh, Mr Cooper, he is an absolute legend. He is the best chem teacher we have in the school', whereas with the other one they do not even want to go to his classes because they do not learn anything. I think there is a flaw in the teaching system there. A couple of times I have asked the question: does the secondary and primary education system really exist for the benefit of the students? The old woolly goats seem to be getting the best results out of the students. They are not into the new maths.

Ms HIPPISLEY — I think the LLEN here works very well with the industry — as most of the other LLENS do as well. With the industry reps on our board and in our membership, I think we are doing a reasonable fist of starting to turn the whole thing around with schools and industries talking and communicating much more closely together. That is about focusing on the vision that young people have and trying to change that — on what their vision is of being in the manufacturing industry and what that entails — and getting the industry people, the champions, to actually talk to them in a fun and interesting way so they can see a purpose and an end result for what they are doing. We can always do that better, but there is a big emphasis on that at the moment and there are lots of people working on that. An example is that we took all the year 10s from one of the bigger high schools here to SPC Ardmona and listened to about 10 to a dozen of their young employees from all different trades and professions get up and give a whiz-bang talk on what they did and how they got there — what happened to them after they left school and where they came from. They ranged from a civil engineer to an accountant to a personal assistant to a fitter and turner. At the end of that I think the kids who were there all of a sudden had their eyes opened and they saw that there could be a place for them in that. If they knew that maths and science were part of that, then that would give them the incentive. That is about awareness of pathways and stuff.

I was just thinking that back in the secondary system everybody is becoming a lot more innovative and creative in how they teach things. Science is probably creative, with places like this around here that the schools use. But maths seems to me to the one where it is the textbook, and you sit down and basically it is still the old chalk-and-talk stuff. That is probably the bit that needs to shift.

Mr LYTHGOW — Is that because the exam is structured in a way that you have to teach to the exam? Can you be innovative and step out of the square? Is it going to cost the kid because of the structure of that requirement at the end of the year?

Mr HUGHES — On that, if I might butt in with a bit of statistics which you might have access to, the discussion I had with the chief examiner in maths methods a few years ago is interesting. There are two maths exams in year 12. Some of you might be young enough to know them. The second exam is applications, where there are real-world questions. The other exam is multiple choice and short answers but pure mathematics. Year in, year out the second exam marks are generally half the first exam marks. So the kids are doing the chalk-and-book work but you put a reading comprehension part into a maths question and people do poorly. In fact what happens in putting together the mark for a year 12 student is they generally take the second exam mark they get and double it and add that to the first exam mark — because they are both out of 50 — to generate a percentage. It is purely just statistics so that both exams have the same relevance. There is an acute problem — and I suspect you will hear this from other places — in terms of assessment — —

The CHAIR — In students understanding how to use the maths.

Mr HUGHES — Students do not know how to read a question about a bucket with a hole that is leaking water out: there is the equation for how the water is leaking out; how long does it take to empty the bucket. They just look at that and panic. It really goes back to a reading comprehension exercise. In fact I have even asked students, 'Don't you do reading comprehension in junior high school?' — I remember I had a green-coloured textbook called *Understanding* that had paragraphs and questions about them, and I have actually used that book with some of them — and they say, 'No, we've never done anything like this before in our schooling', which surprises me. Maybe they have forgotten. But it is that sort of thing coming into mathematics.

The CHAIR — One of the other points that has been put in terms of industry's response that kids do not have the skills et cetera is that in the past young people have left school having their mathematics and employers would basically then train them in how to use that maths and do things, but in industry today productivity is a lot sharper, margins are a lot shorter and the old days of taking on an apprentice and having them sweeping the floor and basically carrying them for a year and a half are over, and employers expect stronger skills upfront to start. What is you view of that, in terms of credence?

Mr TENNANT — That is absolutely right — no question.

Mr KOTSIRAS — And I presume that the students are older, as well — 17 or 18 — and therefore they expect a bit more or better pay than they did some years ago when they used to leave school at the age of 15.

Mr TENNANT — I guess so. There are some expectations amongst — —

Mr CRAWSHAW — I think that is one of the problems you have. Their peers are getting paid — if they have a job, whatever they are doing — a lot more than what the apprentice is getting paid, and that is always a problem. The guy might be keen on doing what he wants to do, and then all of sudden he sees young Fred down the street buy a new car, and then it becomes, 'That is where I am going'.

Harking back to Peter Ryan's point, all this really starts in primary school. I look at some of my grad kids at school and I wonder where the hell we are going with the things at primary school that they do not seem to be doing — reading and maths, the very basics. It is quite frightening.

Mr TENNANT — I see that extending into the lower secondary school in exactly the same manner.

Mr CRAWSHAW — You could be right. We have got to start at the bottom and lift the bottom up, as Peter said, right from the start. It is that area we have got to lift up.

Mr SCHUBERT — The only comment I can make on that is that you get a kid and you put them through the ACER tests and you say, 'Okay, we have lowered the standard there'. You bring in kids from school and you have to re-educate them in basic literacy and numeracy skills. We have done that; we have actually paid year 11 and 12 kids to go and do numeracy and literacy skills to catch up. I do not have the answer to the problem, but it is a big problem for us.

We have just won a fairly big Premier's award for the number of apprentices we have employed. We employ about 25 — big deal — and we still get an award. I think that is a disgrace that you can have only 25 apprentices and you get this southern region award or north-eastern award or something. It is a wonderful thing, but the point about it is that it is blight on us if we only have 25 apprentices. Those are our skills sets for the rest of our days. On top of that, what we do now is, rather than — —

The CHAIR — Why is that? Why have you only got 25? Is it because it is too costly?

Mr SCHUBERT — You started alluding to it before — you have got to spend time on them. We do not have them sweeping floors any more, we just not do that sort of thing. To get them to hit the floor and run pretty hard — because you have to increase productivity, the margins, all the things you espoused before — you need somebody to get in there and start performing fairly quickly. We go to great lengths to try and shorten the time of their apprenticeships. If they have been very good, we will make their apprenticeship three years rather than the normal four to try and fast-track their apprenticeship.

We now employ a substantial number of adult apprentices, because at least they have some life skills. They have gone shopping with the wife and they understand what a 15 per cent discount is. They understand some of the life skills; they have a better work ethic. We say they have gone through the Brer Rabbit stage which all teenage boys especially go through. I am not being chauvinistic when I say this, but boys normally go through a longer Brer Rabbit stage than girls. We want to get them when they have passed the Brer Rabbit stage and are at a stage where they have some life skills. It costs us a lot of money, because generally they might be a food preserver or a trades assistant and they will be earning $600, $700 or $800 a week. We do not care, because we know that individual is going to perform and react much quicker than a junior person.

The CHAIR — In respect of skills sets, do you not think that — referring to Jim's point — the fact that when it comes to apprenticeship wages young people can get a higher wage by working part-time at the local

Kentucky fried chicken outlet is impacting on the calibre of — I guess you would say — the applicants you are getting?

Mr SCHUBERT — Yes. We pay well above the apprentice rates of pay, so we do not necessarily — as I alluded to in my opening statement — have the same problem attracting apprentices. Every other business in the region that has to attract apprentices will not be happy with us because we pay well above the odds.

Ms TAYLOR — I would have to say that we have apprentices. Joinery or cabinet making is a four-year apprenticeship, and we usually have at least one every year. Therefore you have four going through at a time. The majority of people who come looking for jobs are young, as opposed to what you were saying before. They can be anywhere from 15, and they very rarely have their licences before they come looking for a job. They do not want to stay at school.

We have had VET and others, and they are usually the kids who are in danger of stopping going to school. They try to keep them at school for that extra time by allowing them to have almost a day off rather than go to school. We have five apprentices at the moment, including one adult apprentice who does very well. He came in and really knew what he wanted to do. The younger ones have trouble, and so do some of our qualified people, filling out their job sheets. The spelling is atrocious. I rely heavily on spellcheck myself, but they really just cannot spell ordinary words. There is one who is 40 years old and he spells 'and' without a 'd', and he has done that for the 15 years he has been at work. Because of their education they are basically locked into not being able to go much further in life. That is not a recent education thing considering he is 40 years old, but definitely boys need a lot more nurturing I suppose when they come into the schools. They are at an age in mid-high school when they really just want to rebel a bit. To keep them under control the schools have to be very strict, and then they do not want to be there. The way the schools are teaching, the rules and systems need to change if you want young boys in particular to stay there.

Mr LYTHGOW — Just a couple of little other things — I have stepped back into primary school mode now. Literacy and numeracy is prescribed — X hours per day. Two hours a day minium is set aside in all government schools. The class ratio is either 1:20 or 1:22 from prep to grade 2. That is implemented That has made a huge impact. It is going to take a few years for that to come through for those kids that have had that, but in the last two or three years that has started to impact. How far do you extend that class ratio to improve the one on one? Do you sneak it up a couple more years and say it should be up to grade 3 or 4 that classes do not extend out to 25 or 30 kids? That is one little issue.

I have heard a lot said about engagement. Other innovative technologies are just hitting our markets — such as interactive whiteboards. I know quite a few schools around here are going to equip every classroom with one of those. Those boards will engage kids in literacy and numeracy. Instead of the old days of a blackboard where you wrote with chalk, and then came along these modern whiteboards and then the whiteboards that you can print from, have a look out, if you ever get the opportunity, to see an interactive whiteboard — curriculum resources. The ones we have looked at have been developed in England. There are curriculum resources in geography, science, numeracy and literacy. We have just acquired licensing for that here to train schools in this area. I know funding is being sought for 30 of them in the next two to three months. I honestly believe those boards should be in every classroom, but it is a case of the dollars.

The CHAIR — Is that one of the problems? I had a look at a group of five-year-old kids next door using the computers and doing some pretty whizz-bang things, but just picking up on your point on spelling and that sort of thing, is it the case that a lot of young people now are learning a whole set of skill sets earlier as opposed to traditional ones? Maybe that is the issue.

Ms TAYLOR — They definitely do.

The CHAIR — The skill sets they are learning at this age are not really what is needed in industry right now. Maybe that is an issue.

Mr TENNANT — I do not want to get off the track, but I want to pick up on a couple of points previous speakers made. The bigger problem we have in our company is not mathematical skills — it is oral and written communication skills. Professional graduates cannot express themselves adequately on paper or orally. It is quite embarrassing. They cannot put a proposal together to a customer or a decent technical report. They cannot get up and present logically to a group of people and structure their presentation. It is really noticeable. We have that

problem more so than a mathematical problem with the graduates we recruit. They are technically smart, but they have no idea about how to present themselves properly. It goes back to the life skills that Rod was talking about.

Mr LYTHGOW — The program you saw them playing with was called Kahootz. It has been developed by the Australian Children's Television Foundation and is geared to have story boarding put with it. All were prep children and all were being taught how to use the program, so that when they go back to their school they will do the story boarding. They will start writing the story about what they are going to create in Kahootz, so it is tied in with their literacy. They come across to us to be super-skilled. They might have three or four computers in their classroom. They all learn how to use the program, and when they get back they use their other English language skills based around that program.

The CHAIR — I am not sure where we have got to with our answer. If you have any specific answers I would like to hear them.

Mr SCHUBERT — I am old enough to remember not just HSC but leaving and matriculation. I do not think we answered Nick's earlier question satisfactorily about our industry talking to the educators. You only have to pick up the paper to understand that people are well aware that there is an issue. From my limited exposure to the whole situation, I never thought the education system was broken when I went through it. I do not know why we had to fix it. We need to get back to the old three Rs as we used to refer to them — you hear people having psychological discussions and debates about all this. We need to get back to basics. We have new fangled ideas from socialists and goodness knows who else who want to do something different. I say, 'Get back to the good old-fashioned three Rs'. That is where we need to be, not where we are now. That is the answer. We are not getting the right people out into the industry that we need who have the necessary life skills, or whatever you want to call them. They are not in any way, shape or form work ready. And that is the real issue.

Ms TAYLOR — Perhaps when we have apprenticeships or a job there, we need to have training for people in specific maths or in the direction they need for that job rather than them having to learn a whole skill set and then only using it in one direction when they choose where they are going. Perhaps if they were to get a job first.

The CHAIR — And that is Peter's point. You cannot train everybody for every eventuality. Do not try.

Ms TAYLOR — No. Train them on the job later, but have some kind of system where it can work.

Ms HIPPISLEY — Without exception the industry people we have talked to would say what these people are saying, that life skills, work readiness and the aptitude are the most important things. We will train them in the specifics. That is what we want, but we are not getting it. However, the schools will say that industry has upped the ante and they have forgotten what kids are like. They are not that bad. The kids would say that they need to be taught the obvious. Maybe it is a coaching, mentoring kind of situation because it is a confidence and self-esteem thing for a lot of them. We are harking back to the good old days, but was it any better then? And if it was, what was the difference? Most kids did not go through to year 12.

Mr SCHUBERT — You might be right, Jennifer. My only test is — —

The CHAIR — In maths and science — —

Ms HIPPISLEY — I know, sorry.

Mr SCHUBERT — You might say that the kids are better, or they are smarter. I refute that. It is only a small survey, but we have lowered the standard for any apprentice that we employ in the business because they are not hitting those hurdle rates. So we have had to lower the standard. That is the only example I can bring forth as to why. You might think kids are smarter, and technically they might be, but when it comes to the basic skills of English and maths, they are not.

Mr LYTHGOW — Not in the work place.

The CHAIR — I am a pretty good writer. Over the years I have written more speeches than you could poke a stick out. I was an English teacher as well. I went back and had a look at some of my work in year 10. A lot of us are magpies and we put things into piles and 20, 30 or 40 years later you clean up and say, 'I am not going to keep these any more'. I was shocked at the poor quality of the work I had done. I am not denying that. However, I

do say that when I have been criticising my own children and saying, 'Come on, this is not much good, let's get this up to standard', I have had a view in my own mind that I wrote a lot better then than I actually did. Having said that, I also look at my maths-science and it was far more advanced than my daughter was doing in year 9; perhaps not year 11 because I think that is pretty tough. I think there is a lot in there. We will take one last comment, but I assume what we are really hearing here is that there is a tension between the diversity of what is happening in schools and the various things that kids are learning and what is happening on the basic core things that a lot of industry expects. Is that a fair summary?

Mr SCHUBERT — Yes.

Mr SHORT — I think perhaps there is a lot more expectation of apprentices these days as well. When I started my apprenticeship you started from the lower end of the job and you worked your way up. You see first-year apprentices out there now and they are electricians on a job, working on their own without having a tradesperson working with them. It is the same in the hospitality industry, which is my industry. You see apprentices who have been put on to learn a trade and they are actually in there cooking on their own in the kitchen, which is a lot more prevalent now than it ever used to be. I guess this is part of wage demands; I guess it is part of trying to train and save at the same time. There are issues on both sides. I do not think the schools are to blame.

Mr SCHUBERT — Just one other comment. You were poor — I am quoting your words — about writing speeches; is it a little bit of practice makes perfect?

The CHAIR — Yes. For years I forgot how bad I was at it back then.

Mr SCHUBERT — And now you are doing so much of it you have got very good at it.

The CHAIR — Practice does make perfect — and that is a good lesson for times tables. Thank you very much for attending. Good luck with your endeavours. A copy of today's Hansard transcript will be sent to you. Thank you.

Committee adjourned.