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

EDUCATION AND TRAINING COMMITTEE

Inquiry into pre-service teacher training courses

Melbourne — 15 November 2004

Members

Ms H. E. Buckingham	Mr N. Kotsiras
Ms A. L. Eckstein	Ms J. R. Munt
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Witness

Ms D. Bhagwandas, Neuro Network.

The CHAIR — I declare open this meeting of the Victorian parliamentary Education and Training Committee. The committee is an all-party joint investigative committee of the Parliament of Victoria. It is hearing evidence today in relation to the inquiry into the suitability of current pre-service teacher training courses in Victoria. I wish to advise all present at this hearing that all evidence taken by the committee, including submissions, is subject to parliamentary privilege and is granted immunity from judicial review pursuant to the Constitution Act and the Parliamentary Committees Act. We welcome to the first hearing today Daya Bhagwandas from the Neuro Network. The normal way we would proceed would be to ask you to give a statement for the record and then open it up to questions, if that is okay with you.

Ms BHAGWANDAS — Yes, I am happy to do that. My name is Daya Bhagwandas, and I am representing Neuro Network, which is a private business. Thank you very much for this opportunity to present to this committee. The terms of reference for the inquiry that I am relating to are item (a):

> future requirements of such courses to train teachers ...

and item (b)(iii):

> determine the skills and knowledge required ...

for the future training.

I am here on behalf of Neuro Network and a few parents, teachers, students and professionals who were hoping to be with me but who were not able to come. Previously I was the director of Movement for Learning, a not-for-profit organisation working for over 20 years with children with learning difficulties. I trained as a speech pathologist and audiologist and in my search for the root causes of speech problems and other issues like dyslexia, autism, ADD and ADHD. I discovered that incomplete neurological organisation — or wiring — or immature neurodevelopment in an individual contributed significantly to these symptoms.

To use an analogy from the computer environment, I am comparing learning to software and neurological development to hardware. We all know that the most sophisticated software is not going to function if hardware is dysfunctional. In my work now, I work as a trainer, a consultant and a facilitator in educating parents, teachers and professionals. I think you have the agenda with you, and I am talking to the agenda. I am focusing my presentation on two aspects of the importance of this knowledge of neurodevelopment in teaching and learning for the 21st century. First, why is this knowledge–skill, tool, of understanding neurological function important for teacher training; and second, how does every child benefit when they have proper neuro-organisation to achieve their potential?

To illustrate this in the time allocated, I have chosen two case studies. In term 3 this year I did a pilot project at a secondary school with a group of 11 students. These students were struggling in the school system with a range of issues, and the AIM test scores showed poor results for all of them. The second case study I am referring to is a five-year-old preschooler who is currently on the program. This boy has problems which we describe as 'just noticeable differences'. If he were in this room you would take him for a normal and beautiful boy, and he would be running around and looking at everything and engaging. But this boy has presented with problems inhibiting his social behaviour and learning capabilities in keeping with his peers. In the handouts you will see the mother's testimony. It is the one that starts, 'We are excited at the possibilities'.

The CHAIR — Can I interrupt you for one moment, as I want to double-check something: I do not want to air my ignorance too much here, but by neurological development do you mean the physical and mental development stages that people go through from learning to crawl, to learning spatial differential, to — —

Ms BHAGWANDAS — The spatial differential will come later, but the neurological development is the foundation of the senses and how they develop.

The CHAIR — So it is the basic physical and mental developmental stages that most people go through to adolescence or beyond, is that correct?

Ms BHAGWANDAS — That which happens in the first six years of life.

The CHAIR — So it is the first six years of life?

Ms BHAGWANDAS — Yes. It is sequential, and it is the ages and stages that help the brain to develop so that by six years you are ready to be out there in the world.

The CHAIR — I just wanted to double-check that that is what we are talking about. Before you go on, I have not read all of your information, but if you have the basic stages that people go through in neurological development in a simple easy-to-see chart, it would be useful for us to have.

Ms BHAGWANDAS — I have put that in a chart on the second-last page in the proposal.

The CHAIR — Thank you. We may need to get a better copy of that at some point.

Ms BHAGWANDAS — I just put it there as a reference. It is one reference.

The CHAIR — Thank you. I just wanted to check that.

Ms BHAGWANDAS — Not a problem. This is what I do — I explain all the details, because otherwise it is just a profile, and it is understanding that and applying that in life which is what this discussion is about. We took the 11 students and the five-year-old and put them through a home program which we call a catch-up program. What is interesting for me is that the 11 teenagers with whom I worked at the school last term presented with the same incomplete neurological organisation, which means that the foundations in them still had not matured and integrated to make them able to comfortably see themselves through school life.

The details of the findings of that program are also with you. It is a confidential report because I have taken out the names. There are no names of the schools or the students. The results of that program inspired all of us — myself, the teachers, the parents and the students. I have highlighted some of the responses from the students. I wanted a copy of the change in handwriting of one of the students who knew I was coming here. After three days of the program he went up to the teacher and said, 'Miss, I can read my own handwriting!'. That is an indication of the wiring that came together for him to be comfortable and to be able to deliver. I have a sample here of his handwriting, and I will send it around. I have marked the page before and the page after.

A father's feedback at the end of the eight weeks was that for the first time he was able to sit down and have a conversation consistently with his son and work out what had happened over a particular situation and arrive at a proper conclusion. A teacher's feedback was that 'noticeable improvement to attention and performance in class was happening with a couple of the students in his care'.

The mother of the five-year-old child is very excited about the changes after one month of program. What I am highlighting here is that the work with the five-year-old of catching up on what was stopping him from being happy in the classroom environment is a preventive vaccination in terms of preparing him for his later learning. If you read the mother's report you will see she was really concerned about his going into prep next year, and now they are looking forward to his being in school because they are aware that he will be able to hold his own.

With the secondary school students, for eight weeks we offered a long-overdue treatment program of catching up with the same foundational needs. The most fascinating thing about that study for me was when all the parents sat in the room together and talked about what it had done for the students and listened to the students speaking up for themselves, each parent was aware that their journey had been the same as the journey of the others in the search for answers to understand the blocks that were stopping their children from learning.

I know the word neurological sounds very big and confusing, but it is a word that means understanding how the brain develops — how the brain pulls itself together. All the students were given the explanation, and they understood that the program they were doing was helping their wiring and that therefore they could reach out to achieve their potential.

Why is this information important as part of a teacher training program? From my experience there has to be a shift in understanding the total picture: that development is connected to learning; that all human learning is an extension of the wiring of the first few years of life; that when neurological organisation is complete and fully functional — when there is learning readiness — all the teaching techniques and learning methodologies or programs available to the students will deliver successfully; and that learning is fun and exciting when developmental neurology is supportive and working for the individual. It is easier to treat the cause of all learning difficulties and allow the child to get on with life than to cope with all the symptomatic treatment for the rest of their life. Teachers equipped

with this knowledge and skill can help a whole generation of children enter the school system learning and living to their fullest potential.

To support this I also have another letter sent by a mother who was not able to be present, but who is happy for the committee to use this information and to talk to anyone if they want to follow up with her. That is the letter that commences, 'I now know'. He is a young man who has been on the program for about two years, and he is ready to graduate off the program and enter school life next year. That is it from me.

The CHAIR — I know a little bit about neurology — only in that I recently went to a neurologist to get my voice fixed, and he stuck needles in my throat. Maybe I should have gone back through some of the stages that I missed.

Ms BHAGWANDAS — Yes. They always say that at the end of the presentation.

The CHAIR — I will open it up to questions.

Ms ECKSTEIN — Daya, I have had a quick look at your submission. I have to admit that I have not read it in detail, but I have scanned some of the paperwork you have provided to us and I see a number of testimonials. They are very positive and all of that — and it might be my hard wiring that is a bit defective here — but I cannot quickly glean what the program is. I want to know what you actually do with children. Is it the same for everyone? Is it the same for the five-year-old as for the 11-year-old? How long does if go for? What precisely do you do?

Ms BHAGWANDAS — The programs go back to areas that cover coordination, balance, tracking, visual activities.

Ms ECKSTEIN — Give me some examples.

Ms BHAGWANDAS — Crawling, rolling, commander crawling. For the school we call it the 'special forces training for life'. We just got them back on the floor, they did commander crawling and they did some strength exercises like you would do when you are trying to build your muscles, strengthen, endurance — push-ups, sit-ups.

Ms ECKSTEIN — Balancing on a beam — that sort of thing?

Ms BHAGWANDAS — No, it was all on the floor work so they would do log rolling, forward rolls.

Ms MUNT — Is that like the programs that are put together for people who suffer brain injuries and then have physical programs to re-engage their functions?

Ms ECKSTEIN — And you do the same thing for five-year olds?

Ms BHAGWANDAS — Yes.

Ms MUNT — So similar for little ones?

Ms ECKSTEIN — As you do for the older kids?

Ms BHAGWANDAS — Yes. The understanding — I suppose that is what is missing here — is that the brain strengthens and develops itself from the foundation upwards from day one of life with reflexes that fire and develop muscles. Many of these children for various reasons have health issues and have therefore missed out on opportunities on the floor. Consequently the muscle tone that was responsible for neck control did not kick in when it should have. While they were trying to cope with that, they let go of muscle control for their eyes so when they looked at a book there were weaknesses there. Now this is the interesting thing: because it is the same brain that runs all of this — for the five-year-old it is catching up on what he missed and for the 13-year-old it is catching up on what he missed in the first five years of life.

Ms MUNT — You say that neuro-education is easy to understand and incorporate in the training programs. How long, if it were incorporated into a teacher training program, would this component take?

Ms BHAGWANDAS — I do workshops and some in-services for teachers and that takes about two days. Every parent who comes to me gets a presentation that takes about 2 hours for them to understand how the brain

evolves. They understand it because their child lives into it for them. It makes a lot of sense when I explain it in detail. The parents take it home and use that as part of their support for their child — working with the child at home. When it comes to a teacher training program — I have been thinking about that, too — I do not know. It depends on how much we want to incorporate it. I would say it could be spread out for the whole year as a subject.

Ms MUNT — So a subject that goes across a year?

Ms BHAGWANDAS — Across a year. One section of it is understanding the foundational needs of every individual — why my eyes work the way they do and what is coordination. Coordination that is important for me to read at my table or to look at the blackboard — the far point and the near point ability is in my coordination. That develops in the first three years of life, and to that I add on the higher functions of perceptual cognitive work, so I need to know that as well. At the other end of it is, if you understand my capacity, then the teacher can facilitate for my learning, if I am visual, on how to enhance that. I may have mentioned, for example, that reading is a neurological outcome of wiring, so it really is important to see through the whole subject.

Mr SCHEFFER — So the bottom line of what you are saying is that the approach that you are taking should be a component of pre-service training of teachers' is that your contention?

Ms BHAGWANDAS — Yes.

Mr SCHEFFER — Have you talked to teacher education and training institutions about the program?

Ms BHAGWANDAS — I have not to the institutions. I have talked to teachers — I mean, I am always talking to teachers — and they can see the relevance. The answer to your question is no, but I am always talking to teachers and I get a feedback from them saying they can see, especially the mother I mentioned who is a fantastic primary school teacher and who is now at home looking after her second baby. She was challenged with her son's situation. In her report she says she knows that he was not ready for school next year. I have only known her for a month, and it is interesting. Her insight was that she could see her son in so many students she saw in the classroom who were bright, who tried very hard and who were not able to deliver in different activities, whether it was reading or writing.

Mr SCHEFFER — I was going to ask you whether you have reviewed pre-service teacher training programs at all to see how they relate to the programs that that you are promoting.

Ms BHAGWANDAS — No, I have not.

The CHAIR — It is an important point which we have asked a number of questions on as we have gone through, perhaps not in as succinct a manner as we should, the issue being how much do they teach at teacher training courses and the neurological basis of learning. As you say it seems to me that in your days primary school teachers would say that a person was ready to read at prep if they could roll down the corridor in a straight line. The basis of that assumption was that was a sign of where they were in terms of their neurological development, and once they could do that they were ready to be able to read. I guess where I am coming from here is that if teachers are not taught the basis of neurological development for young people, then young people who are forced to try and learn to read who are not ready for it could find it to be damaging to their long-term development. Can you comment on that? Can you understand what I am saying?

Ms BHAGWANDAS — I think so, and please correct me if I am not. I will refer to the brain, the cortical brain, and I did not bring a picture of it with me. We have a huge cortical brain which reflects the intelligence that we have as a human being, and reading is a neurological function. I am a speech therapist by my basic training, and my search for answers has made me do what I am doing today, neuro-education. Speech therapy, for example, is the same as remedial reading. It is more of an intensive approach to treating a symptom because the foundation is not helping the wiring and the child has a problem organising the coordination to speak. Similarly when the foundation is having a problem, the eyes are not working. Many of these students in the secondary schools read, but there is no comprehension because the eye is delivering one level of the information while the second level that is processing and taking it home and then storing it so it can be retrieved to do writing and to answer questions is not happening. It is the same fundamental issue. The hardware, which is the foundation of the brain. But the software issues, which is the reading or the talking or the writing, are the packages are picked up. What happens is that if you put reading in front of a child who has underlying issues in reading recovery, remedial reading — I know this from teachers and parents I have talked to — they switch off. Am I answering the question?

The CHAIR — It is more the point, not whether you can recapture a person's ability, but whether there is a certain physical stage before young people can in fact read or do other things.

Ms BHAGWANDAS — A physical stage or — —

The CHAIR — A neurological stage. I make the point that when we were at Deakin University in Frankston we had a presentation that implied that children at a very young age can be taught to read by looking at pictures and that sort of thing. What you seem to be saying is that that is not the case.

Ms BHAGWANDAS — No, it is the same thing.

The CHAIR — Is there a neurological stage that young people have to reach before they can learn to read, or can it be simply taught outside of that developmental stage?

Ms BHAGWANDAS — Where I trained we had a clinical program and we also had what we called a better baby program. All the mothers who came for the better baby program would go home and take out words and put them in front of their one-month or two-months-old baby. Yes, this is the relevance of understanding the wiring — that the visual pathway can deliver the visual symbols of, say, a word or a picture way ahead of what is expected in terms of the norms of society today. It is a fact.

The CHAIR — So you can promote the neurological development?

Ms BHAGWANDAS — You can speed it up, you can slow it down, you can catch it up and retard it. This is the knowledge that every parent, teacher should have who is in that field. That is exactly what I do. That profile that I have shows it. I will show you the profile. It says here the stages. If you understand the stages then you can get in and fast track it so that a two-month-old baby can go through all this in the first two months of life and be — I will not call it reading, but have visual recognition of symbols and similarly for the auditory pathway.

Lots of parents are aware of the potential of developing this and they talk to their babies in utero. When the baby is born the baby knows that is the blender and that is the vacuum cleaner because the parent has already put that information in. That is the other potential of what we are presenting: that you can enhance the development, and it is a natural process for every individual. So the potential of every child is phenomenal, and as we only tap into the cortical brain at about one year of age in terms of neurodevelopment, what goes on before that is the wiring. The smart parents find this information, and I do that as part of my program too.

I talk to mothers with new-born babies so they understand that tummy time and all the other stages that can enhance visual development, auditory development, tactile development so that it all comes together; and then given the opportunity of tummy time, massage, balance. Stimulation and hand function – which is opportunity to feel, touch, pick up, shake – all that integrates. Sensory integration is the senses waking up and fulfilling their foundational role through stimulation so that they can mature. All the students I have looked at in the secondary schools — all the weaknesses were here; they were 13 years old in terms of age and size, but they had foundational — —

The CHAIR — 'Here' meaning the basic start?

Ms BHAGWANDAS — The brain stem, yes. The brain stem, which is the medullar, pons, mid-brain and the cerebellum. That runs us for the rest of life. To give you an analogy for instance, when you learn to drive a car — and we all do that when we are 18 — you sit in the car and your cortical brain is trying to work out what the right hand is trying to do, what the left hand is trying to do and what the leg is trying to do, and it is the mid-brain that is at the top of the brain stem that kicks in to hold it all together once you have had the practical experience.

When you have a good mid-brain it takes it home easily, and you can drive and talk very quickly; and those who do not have a good mid-brain take a longer time to take it home, and that is the individual difference. So what the flipside of this is every child at the time of birth has a fantastic potential waiting to be tapped if you know how to tap into it and enhance it. You can strengthen it so that your foundation is wide enough to take on two, three languages, instant maths and speed reading — all these are possibilities. But here, all we want is for every child going into the school system comfortable, happy and learning because the foundations are there, supporting that process. It is all neurological. Reading is a neurological function, speaking is a neurological function, and so is

writing. It is just a question of whether we are looking at the software outcomes or the supporting thoroughly the underlying systems.

The CHAIR — I thank you, Daya. Andrew or Nick may ring you at some point to get further clarification once we have digested what you have said and looked further at the material you have given us.

Ms BHAGWANDAS — Thank you very much.

Witness withdrew.

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Mr T. Mirabella, former teacher.

The CHAIR — Tim, it is a while since the Frankston hearing. We have looked at some of the world best practice and perhaps some of the worst in teacher training and been to other states and had a lot of hearings, so we are very pleased we could finally arrange some time to hear your evidence and what you have to tell us. We are looking forward to it so I will hand over to you for a 15-minute presentation and we will open up to questions.

Mr MIRABELLA — Thank you. Daya has really laid the foundations for what I have to say. Daya and I are working together on a research project, so it is very much the same. Perhaps I should identify myself for Hansard.

The CHAIR — And your background, Tim.

Mr MIRABELLA — Yes. My name is Timothy Mirabella. If you have that little document that I prepared — —

The CHAIR — Is this a document entitled 'A prepared statement for delivery at a public hearing'?

Mr MIRABELLA — Yes, that is the one. After a career as a primary school teacher and principal in the Victorian education department I am thankful that I am still able to contribute to society in the retirement phase of my life. I have elected to participate in this inquiry in the expectation that the knowledge underlying my publicly acclaimed success in teaching will aid this committee in its task of reviewing the suitability of current pre-service teacher training courses and in reporting its findings to the Parliament and the people of Victoria.

In the later years of my teaching career I discovered that the major thrust of primary education is seriously misdirected, and in the process of making that discovery I uncovered a line of reasoning that enabled me to facilitate unprecedented learning success among educationally disadvantaged children. That line of reasoning has implications for all teachers because all teachers work with underachievers. This knowledge is presented so that future pre-service teacher training courses might better prepare teachers for their work in schools. In light of my teaching experiences and the nature of the ongoing public debate, it is my contention that contemporary pre-service teacher training courses unwittingly perpetuate a serious gap in teachers' knowledge about the way learning is assimilated, stored and retrieved by children's brains. It is therefore my further contention that this knowledge gap severely inhibits the education of vast numbers of children in our schools leading to that unceasing public outcry.

The publicly acclaimed success of my whole school curriculum program was due to the implementation of a logical strategy which enabled me to guide teachers in such a way that they virtually eliminated underachieving from my school. This strategy evolved according to the line of reasoning to be found on page 31 of my submission. Of profound significance to this inquiry is the fact that the operative concepts in my logical strategy were not made available to me in my pre-service or in-service training. Insofar as I have been able to examine curriculum materials, policy documents, statements by academics and official media releases, these concepts are still nowhere to be seen. Therefore, with all the conviction that I can muster, I declare that the same logical strategy is urgently needed in schools for present and future generations of students. This is because unacceptable numbers of children continue to underachieve unnecessarily due to the fact that policy-makers, academics and teachers do not have an effective understanding of the dynamics of children's developmental readiness for learning, which of, course, is the subject that Daya has just addressed for you.

Learning readiness, or more precisely, the rate and success of the ongoing development of neurological connections in children's brains, is the major determinant of learning success for each and every child. It is a natural maturation process, which if sufficiently successful provides for increasingly efficient sensory receptiveness and motor responsiveness in learning. This process occurs in every child and is the basis of all learning.

The individual child's environment determines the success rate of neurological development, all of which means that teaching is a secondary determinant of learning success. That in turn means that teachers and their methods are at the mercy of their pupils' neurological and intellectual development. If the maturation process is not sufficiently advanced to allow academic learning to occur, the individual child underachieves — and, as you know, there are lots of underachieving individuals in our schools.

A working understanding of learning readiness will tell you that successful learners — that is, those who respond well to teaching — are those who are always physically, emotionally, neurologically and intellectually ready to benefit fully from any learning opportunity, including the opportunities provided by teachers.

Conversely, the same understanding will tell you that children who are lagging in their sensory motor development are unable to learn successfully according to their individual potential. Put that another way and it will tell you that the most severely affected children cannot be taught successfully. Depending on the severity of their developmental delays and/or deficiencies, such children either fail to learn or at best underachieve and then misbehave.

Those outcomes are inevitable, because I found in extremely difficult teaching situations that there is nothing teachers can do to prevent them happening, unless they learn to develop readiness-based curricula. That is what I did without any assistance from within the system, and that is why my school's exceptionally high rates of literacy attracted so much attention in the early 1980s.

Children can and must be brought to a state of readiness before they can be expected to benefit from any teaching. In reality this means that all efforts to raise the competence of teachers, especially in so-called underperforming schools, are futile — a waste of time, effort and resources. What we have at the moment is an education system wherein an official policy demands that teachers impose literacy teaching on all prep children, without consideration being given to the fact that there are many, many children whose brains have not developed sufficient neurological connections to allow them to undertake academic learning successfully.

Successful academic learning, like any other learning, produces permanent physical and chemical changes in the brain, whereas spurious learning is temporary and fades very quickly. Much of what passes for learning success in the early years is actually spurious learning. It fades because it is not built on the solid foundation of readiness. We have an education system wherein policy makers blithely expect at least 25 to 30 per cent of the student population to experience initial failure through premature literacy teaching, and who acknowledge that expectation by setting a one-on-one remedial teaching program in place and calling it reading recovery — that is, recovery from initial failure. This is a strategy that cannot possibly cope with the enormity of the problem the system itself has created and continues to create.

No child should ever be exposed to failure, yet to add to their injury and their misery repeated testing for benchmarks cruelly reinforces initial failure for tens of thousands of children. Even in its present form my original submission has the potential to place our entire education system on the right path to produce genuine education reform and optimum learning success for all students. Of course optimum success is the maximum learning success achievable by any individual. Teaching alone can never produce optimum learning success. Without credence being given, and urgently, to this work our education system will continue to flounder in the quagmire of its own making and children will continue to suffer as its victims.

Therefore on the strength of my enlightening experiences and the success of my particular curriculum approach, I have no hesitation in saying that if this work does not receive urgent and ongoing attention the current education revamp, like all its predecessors in attempted reform, will do little more than stir up the sediment in the quagmire, obscuring the true solution to the learning and literacy dilemma. In her president's message Nola Hambleton, president of the International Confederation of Principals, states:

> Travelling around the world in the past 18 months I have become fascinated, and not a little disturbed at times, by the 'sameness' of the problems, concerns and dilemmas facing educationalists and in particular, those who face the students in their schools.
>
> I say concerned because despite the rhetoric, despite the research and despite the expertise of educational theorists, the same problems are occurring around the world.

I will now conclude this statement by showing you a segment copied from the ABC's science program *Catalyst*, and point out that education's major problems could have been resolved 23 years ago, but they were not so our education system is now 23 years behind where it should be — that is 23 years and counting.

The *Catalyst* video segment presents Baroness Susan Greenfield, a leading neuroscientist and Oxford University professor, who with the aid of graphics explains how the connections between nerve cells can be stimulated to increase the learning efficiency of the brain. This was the basis of my work all those years ago, and it is the basis of my submission and it is the basis of the research study that I have developed in collaboration with Dr Gordon Young, Daya and her associate Margaret Sasse. This presentation of Susan Greenfield's was aimed at teachers, so it is highly pertinent to my presentation and the investigations of the committee.

The CHAIR — Tim, what is its duration?

Mr MIRABELLA — It is less than 8 minutes, so it is perfect timing for us.

Video shown.

Mr MIRABELLA — Powerful stuff, isn't it?

The CHAIR — Thank you, Tim. I might open up for questions on that.

Ms MUNT — Right back on the second page of your presentation, and you were talking about it too, is determining when children are actually ready to learn this, that or the other. How do you actually find that point?

Mr MIRABELLA — It is not a point because it is continuous. The readiness a child needs in prep year is nothing compared to the readiness the child needs in year 3 for instance.

Ms MUNT — But you say 'unless they learn to develop readiness-based curricula', so the curricula is based on when children are ready to learn particular things.

Mr MIRABELLA — No, the curriculum is based on the belief that children need constant help. Day after day without let-up they need help with their physical, sensory and speech development so that every day they increase in readiness. But you can certainly tell if a child is not ready first of all by the child's behaviour. If the child is misbehaving there are neurological connection problems. If the child has spidery handwriting, that is a certain sign. If the child has poor speech habits there is another sign. The signs are there, and people like Daya and Margaret Sasse can take children through simple little tests, like asking children to touch one finger top with the thumb after another. You would be surprised how many children cannot do that. That is a sign.

There are so many ways. I could probably ask Daya to come forward and give you an idea of those signs, but you will find those signs among prep children and among grade 6 children. It is these neurological delays and deficiencies that inhibit learning that destroy children's self-esteem, prevent them developing a genuine awareness of themselves and a genuine knowledge of themselves, so life is just full of confusion for them. And teaching makes it worse, so you get the bad behaviour.

On the other hand, as I discovered in practice in the middle school, in the year 4 area, and it happened quite accidentally in a way for me, that the more physical activity the children have the more they loved it and the better their behaviour became. In fact their bad behaviour just disappeared, their learning began to take hold and my teaching then began to take hold.

So catering for children's learning readiness is something that every teacher should do every day. In other words no child should be asked to undertake learning unless the teacher does some little thing to promote and enhance every child's readiness. It is an ongoing thing. You can go into secondary schools and you will see children that children in secondary schools have got these problems, as Daya has already told you. But it can be pre-empted — this is what I am saying — if teachers were trained from the very beginning of their pre-service training courses to realise that the most fundamental rule of teaching is that you must not attempt to teach children who are not ready.

Of course in the past there was no explanation with that. I was told that in 1954–55 in my teacher training. I said, 'But how do you know?' I was told, 'Oh well, you'll know', but unless teachers are told to watch for the signs they will not know. And we have a system where teachers are required to teach without considering whether children are ready. So it is not a matter of whether a child is ready in the middle of the prep year. It is a matter of children need enhanced readiness every day that they are in the school. That is what I did at Fairfield North.

Ms ECKSTEIN — Tim, you would be aware that there have been a range of programs over the years that, I believe, have been along the lines to address some of these things. Things like the do it daily program and the PMP program come to mind. What has been the problem with those things? Are the programs wrong? Did we not go far enough up the school? Did we stop them at some point? We have had those programs, and if they do what you and our previous speaker have said that they do, then we should have eliminated a lot of problems, but we still seem to have the same problems. What was wrong with those programs?

Mr MIRABELLA — Inconsistency, inadequate time frames. PMP was an abject failure because it was used once or twice a week in infant grades and never went beyond that. It was also so highly structured that it required a great deal of organisation. The sort of physical activity that I am talking about can be done at a moment's notice in the classroom without raising perspiration. It is very much a case of stimulating the movement coordination — the very fine movement coordination that you get in speech training. You train or finetune the

muscle control of the speech mechanisms — the mouth, the lips, the throat, the breathing especially. These only take a few moments every now and again.

My recommendation, as you will see in the research study, a copy of which you have in your folders somewhere, is for an accumulated 30 minutes a day — not 30 minutes in one hit but 30 minutes accumulated during the course of a day; a minute here, a minute there, 5 minutes here, 5 minutes there — involving breathing and speech training, singing, movement to music, creative movement. These are the things that can be done in the classroom, along with the old-fashioned idea of finger exercises, arm and wrist exercises before children are asked to write — and they should be doing writing and not typing their stories on a computer.

The CHAIR — Back to Janice's point, we have a debate in this country, which is about to be resolved, about standardised school starting dates. If I understand what you are saying, given that reading and writing are the basic starting points of primary schools — well, they tend to be in terms of how you determine what happens between preschool and primary school — and we have a fixed-age starting group, from what you are saying and if we cannot radically change the nature of curriculum and what happens in primary schools, then there is a question of whether students are ready to start primary. That is one question — whether they should do more preschool. The real question I am asking is, are you advocating that perhaps we do some testing of young people before they actually start being taught how to read and write?

Mr MIRABELLA — In my opinion, testing is not really necessary.

The CHAIR — I am saying that the neurological testing you described before — certainly you are saying there is a range of tests that can determine when a child can read or is ready to learn to read and that it is harmful if they are forced to try to read before they are neurologically ready. Is it not a logical extension to say that teachers should apply some neurological tests to young people and if they do not pass them, they are not ready and they should not be taught how to read, they should be taught other things? Would you not say that should be a universal thing which happens in primary schools or preschools?

Mr MIRABELLA — Yes, certainly in preschool. In terms of school-entry age, I personally would not refuse children at the old state of four-and-a-half years. To me it did not matter what age they came for prep — four and a half, five, five and a half — chances are regardless of what age they were at they would not be ready anyway.

The CHAIR — So in simplistic terms what you would say is probably when they are leaving preschool there should be a report done on their neurological stage. The teachers would then have almost two categories of kids: those who were ready to read or were continuing the reading they had started, and those who needed greater work on their neurological development to get them up to that stage. Would that be fair?

Mr MIRABELLA — It would not hurt — —

The CHAIR — I just say this because with 800 000 students you need some system in place.

Mr MIRABELLA — It certainly would not hurt but then again it depends on how you are going to approach the teaching of reading. I do not think children learn because they are taught to read, I think they learn when they are ready to get the connections between spoken words and written language. It is a matter of a language development program on top of a physical development program; the two flow on, one from the other. I would not recommend trying to teach children to read in prep grade. If they are ready, go for it. If they are ready, they will let you know — they will be reading very quickly, very smartly. It is not just a matter of the physical development. The physical development comes first of course but then you must be into language development.

There is a very important aspect in that a child with poor neurological development, poor auditory processing for instance, is not going to accurately perceive spoken language and therefore is going to have poor speech skills. Speech training becomes an extension of the physical program which then rolls into language. Music, singing especially — nursery rhymes and poems and all that sort of thing — then become an extension of that to build on language. On top of that comes a language experience approach.

In my school at Fairfield North it was not a case of launching straight into the teaching of reading, it was a case of helping children, facilitating their learning via their own language, and then topping that off with a reading program when they were showing they were ready. So much of the work was experience based — physical development,

language development, singing, music, all that sort of thing. It becomes a launching pad for a fully integrated curriculum.

Literacy is not a subject to be taught at school, literacy is a state of development. It is a dynamic state of development. It does not end the moment a child says, 'Oh, I can read', literacy is ongoing, it is ever blossoming. It requires that an almost endless number of physical changes should occur in the being of a child before and after that child becomes ready to learn to read. I cannot say that I taught children to read — I can say that I put them in a position where they could learn to read.

When I said at the beginning that primary education is misapplied or misdirected, in my mind I see there is the vast body of knowledge which education systems tend to summarise into a syllabus and teachers choose from that summarised body of knowledge to pile onto children. Whereas this way of taking the development of the child as the starting point means you promote the development and lead children to the body of knowledge and they will use their own energies and their own initiatives to get there.

The CHAIR — You said your school was highly successful in its approach. Presumably that is measured on some measurements of literacy or numeracy — undoubtedly, so I will put that as a point.

Mr MIRABELLA — Yes and no. There was certainly plenty of testing in the school. There was the normal weekly and monthly testing done by teachers. The only formal testing was done by the psychology department at Melbourne University; by the way, I was never supplied with the test results, just a summary. They came to the school and asked if they could test all the 6-year-olds, 8-year-olds and 10-year-olds who had English as a first language. With a school that was 55 per cent migrants that meant we finished up with a total — —

The CHAIR — Greek is the first language in Fairfield.

Mr MIRABELLA — Greek and Italian, yes. That meant we finished up with 50 children. There were 14 grade 1 children, the other 36 were grade 3 and grade 5. Every child in grade 1 was ahead of chronological age in reading fluency rate. Of the 36 eight and 10-year-olds, 28 of them had reading fluency rates that were off the scale — they could not measure them they were so good.

Ms ECKSTEIN — Do you know what tests they used? I take it it was pre-Achievement Improvement Monitor (AIM) and all of that?

Mr MIRABELLA — It was pre-AIM, this was 1981.

Ms ECKSTEIN — What tests did they use?

Mr MIRABELLA — The test was the Neal reading analysis program. Of course, as you can imagine with their language backgrounds and so on and their social backgrounds, the comprehension rates did not get up to the same dizzy heights but their reading skills and their written expression skills were just unbelievable. There was not one child in the school who could not read above grade 1, not one.

To cap off that, the assessment was made during a formal school review. A review panel reviewed the school and the report to the education department, of which there is a copy in my submission, said that considering the nature of the school population, and explained the disadvantaged side of it, the standard of literacy throughout the whole school was exceptionally high. You really did not need a test — you could just walk into any classroom and, 'Wow!', it was just magic.

The CHAIR — We have the job of recommending policy change which will affect literally hundreds of thousands of students — millions over the next decade probably. I guess the genesis of what you are saying is that while you would probably recognise that teacher training institutions are moving towards teaching teachers to more individualise their learning, there is a great lack of teaching of pre-service teachers about the neurological and physical development of young people and how that interacts with their learning capabilities and potentials, which is something we have discussed.

One of the questions I always ask institutes when they come up with a whole range of theories or ideas or approaches to teacher training — you will appreciate that they are many and varied — is what quantifiable research they can point us to in terms of impact on student outcomes. You have referred to some at your particular school

and I have not read your entire document but are there any major quantifiable studies which can backup what you are saying?

Mr MIRABELLA — No. That is why we — my team — have developed a study. You might appreciate that for many years I have been trying to explain to people that this is the way education should be going. I've spent a lot of time speaking to teachers. I've spent a lot of time and effort writing to education authorities and state and federal ministers of education. The first positive response I got was in 2001 from Dr Brendan Nelson who literally suggested that there should be a research study set up. I do not even have a basic degree so that was really beyond me.

However, he suggested that I could apply for funding and establish a program. Through a chain of events which I do not need to describe I linked up to a highly qualified academic named Dr Gordon Young, who I thought might have been here this afternoon. I have put together a practical project to take into schools with the aid of Daya and Margaret Sasse — Daya and Margaret have provided the physical activities, which are in my submission if you come to them, and Dr Young's task is to research that at a doctorate level. This, thanks to Dr Young's effort, is to be done under the auspices of Victoria University.

The CHAIR — He is at Victoria University?

Mr MIRABELLA — No, he is not, he is independent.

The CHAIR — We are visiting Victoria University very soon.

Mr MIRABELLA — You are? Brenda Cherednichenko is now officially listed as the principal investigator of the project. Because there are no such tests available, we have to go into schools and prove it.

The CHAIR — I would not be too disillusioned: there does not appear to be a huge amount of research in terms of educational outcomes at a student level with most of what happens in teacher training. You are not alone on that score — —

Mr MIRABELLA — No, but here is a chance to really get a handle on it.

The CHAIR — Was that funded by the federal government or was it internal Victoria University?

Mr MIRABELLA — No, it has not been funded at all. I think you might have a copy of a letter from Dr Nelson indicating that he was going to announce the funding and that I was eligible to apply for it again but that announcement has not been made. I would say perhaps in view of his more recent announcement that it may not happen. I was actually going to suggest you might be able to arrange some funding for me.

The CHAIR — I do not know about that, we are a non-partisan arm of the Parliament. Are there any more questions? Thank you very much, it has certainly been quite an interesting presentation you have made, very stimulating. We have a few things to think about. There is more to think about than what has been said. Thank you very much for your presentation.

Mr MIRABELLA — I might add that that tape, which I will leave with you, has two more very important segments on it — another *Catalyst* one and *A Current Affair* one. The other *Catalyst* one depicts a 40-something guy in America who went blind at age 3, his sight was restored through stem cell technology and the scientists are finding that his perceptual development is non-existent. The other segment involves a school up in Queensland called Glenleighden which works with autistic-type children using these neurological speech things.

The CHAIR — We will have a look at that during the committee's internal deliberations. Thank you very much.

Witness withdrew.

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

EDUCATION AND TRAINING COMMITTEE

Inquiry into pre-service teacher training courses

Melbourne — 15 November 2004

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Ms J. Thomas, executive officer, Australian Mathematical Sciences Institute;

Associate Professor G. Prince, deputy director, Australian Mathematical Sciences Institute and head of School of Mathematical and Statistical Sciences, La Trobe University; and

Dr Nancy Lane, interim director and manager, International Centre of Excellence for Education in Mathematics.

The CHAIR — I welcome the Australian Mathematical Sciences Institute (AMSI) to the inquiry.

Ms THOMAS — I am Jan Thomas, the executive officer for the Australian Mathematical Sciences Institute. I also do a bit of work for the Australian Mathematical Society.

Assoc. Prof. PRINCE — I am Geoff Prince, the deputy director of the Australian Mathematical Sciences Institute.

Dr LANE — I am Nancy Lane, the manager and interim director of the International Centre of Excellence for Education in Mathematics (ICE-EM), which is managed by the Australian Mathematical Sciences Institute.

The CHAIR — Welcome to the committee hearing. We are looking forward to hearing what you have to say. As you aware, we have a second reference, on maths and science teaching and learning in schools, which we will be kicking off in the first quarter of next year and which we will undoubtedly spend a bit more time with you on. I understand you now want to talk about the general issue of teacher training, and we look forward to what you have to say. So I will hand it over to you and we will ask you questions when you have concluded.

Ms THOMAS — Thank you very much. I will say a few words and then the committee might like to ask direct individual questions to some of the others. Some people are a bit confused about the Australian Mathematical Sciences Institute, which is a national institute based at the University of Melbourne. So I have handed around a piece of paper that explains the three national centres that have recently been established at the University of Melbourne and their interconnections.

Probably the one that is of most interest to this committee is the International Centre of Excellence for Education in Mathematics, which has been funded by the federal government by about $8 million over four years. The focus of ICE-EM, as we abbreviate it to, will be very much on the educational content of mathematics education. Much work has been done on the use of technology and on pedagogy in the last few years, but there is clearly a major need, both within teacher education courses and also within professional development programs, to concentrate on the mathematics that teachers need to actually be good teachers of mathematics.

Enormous impetus for this sort of work at the primary level was developed in the United States a few years ago, when a woman called Liping Ma did a comparative study between what the Chinese teachers knew and what American teachers knew — and having spent a lot of time there, I can tell you that American teachers equal Australian teachers in terms of training and content. What came out of that was that the Chinese teachers had a very deep understanding of the foundation maths that they were teaching. So it was the maths that they were actually teaching, but they understood that in a very deep sense and they were therefore able to create wonderful examples relating to rice paddies and other things relevant to the children they were teaching. The American teachers used examples like cutting up pizzas and invariably got the maths wrong.

This really created a lot of interest in the US, not about giving primary teachers and teachers' education necessarily more mathematics of calculous and other sorts, but making sure that they really understood the mathematics that was relevant to them teaching at particular year levels.

We have taken on board a lot of the work that has been developed in the US. There was a preliminary document which looked at what sort of mathematics teachers needed to teach at the lower, middle and senior years. That for the senior years is less useful to us because senior years in America are quite different to senior years in Australia, particularly in Victoria. But the other two bands and the sort of content knowledge that teachers need in those areas is now pretty well defined. We are running workshops nationally looking at where that US material needs refining for Australian conditions, and we are hoping that instead of dropping mathematics more and more out of teacher education, we will get more mathematics back into it but it will be relevant to what the teachers will then be required to teach. So primary teachers will not be learning about calculus but they will be learning in depth about the number systems, fractions and ratios and the sorts of things that are taught at those particular levels.

We also hope to develop professional development for existing teachers. We have identified quite a demand for content courses for teachers who have missed out. Again, this is a real issue in the middle years. I am sure the committee has heard endlessly about the number of teachers teaching at years 7 and 8 without appropriate qualifications. Again, the teacher education needs of those teachers is quite specific. If they only want to be teaching at years 7 and 8, then we do not want them to be doing university courses as they currently exist on the

shelves, necessarily. We think there could be specific courses developed for them that would make them extremely good teachers in the middle years but would perhaps not be suitable for them to be able to teach at years 11 and 12.

One of the other issues I know the committee is interested in is where the secondary teachers will come from. I was in teacher education until a year or so ago. Nearly all of our Dip. Ed. maths people were mature-age people, particularly people changing careers. That is undoubtedly the biggest pool of potential secondary mathematics teachers. You will not get them out of the universities with mathematics degrees. University numbers are up a little bit, but the actual number of students studying tertiary mathematics is down, and the demand from industry for maths graduates, offering much higher salaries, is way up. So it is getting increasingly difficult to get mathematics graduates to even think about teaching as a career.

However, you do get — and this is borne out by our experience with Dip. Ed. courses — a lot of people who, 5, 10 years down the track, decide that the business world really was not what they wanted or they do not really want to work there, and they will even consider a drop in salary because they have decided that they really want to be teachers. I have particularly worked with John Vines from the Association of Professional Engineers, Scientists and Managers Australia (APESMA), Jane Stephens, when she was at the Institute of Engineers; and Richard Hogg from the Australian Computer Society.

Those people and I have had a number of meetings. We are quite convinced that there is a very big pool of potential secondary teachers who would largely meet the needs for maths and physics, in particular, some of them chemical engineers and from IT and those sorts of areas. A lot of those already apply for Dip. Ed. courses but others need the financial backing and some money behind them. But if creative ways of getting them into the work force could be considered, I think it would go a long way to meeting the need for senior physical sciences and mathematics teachers. We put before you a proposal by which we think they can actually be trained in a year; it is a very intensive year, and we think that is possible.

I will stop there and let the committee ask us questions. I will just say that Geoff is the deputy director of AMSI and is very much involved with what is happening in the universities in the mathematics side of things. He has also been doing a lot of work for us on looking at a new form of remote delivery called access grid rooms. We are doing a lot of work on how we might deliver courses for both research and postgraduate students, but also on the potential for the professional development of teachers in remote areas which is much more interactive than most of what is currently available.

We would consider that as a possibility for both content and upgrading of skills, and possibly for teachers retraining in rural areas who found it difficult to get to a centre city campus. Nancy Lane, who is the interim director of and is managing our ICE-EM project can probably answer questions better than I can about what we have on our proposals for that program.

The CHAIR — In England one of the focuses of the British government has been on assessing content knowledge of teachers before they get certified for teaching. You indicate to the committee that you believe teachers do not necessarily need a full breadth of knowledge of mathematics, but more so blocks for where they are likely to teach — which for me in a practical sense says that you can check the content knowledge suitable for primary school, the middle years and the VCE. Is that pretty correct?

Ms THOMAS — Yes; I think one of the things we have to get away from is the idea that the mathematics that primary teachers need is simple mathematics. It is foundation mathematics but it is actually quite deep mathematics, and to really understand it is not understanding simple mathematics; it is understanding what appears to be simple mathematics in considerable depth.

Ms THOMAS — Therefore it is not necessarily simple but — yes, I do. I think that many of us think that there should be some sort of exit standard for beginning primary teachers, and it has become increasingly popular within the universities not to have this sort of testing. In fact, I was talking to a colleague in another state only on Friday, and she was involved in a primary program. She still is, but the one she was involved in no longer exists. She had a mastery test within her program. It was not just about passing. She actually had a mastery test of the mathematics she thought her primary teachers really must know before they left with the degree and they had to pass it. She was telling me that within that particular state now it is practically impossible to have that sort of testing.

You are not allowed to fail people because they do not understand the content that they are expected to teach — if they are getting good marks from classroom teachers then their maths is obviously okay. That is the way the argument goes, but she was saying, 'No'. However the sort of mastery test they were having in the United Kingdom — the basic numeracy test — was not really a mastery test about mathematics.

I saw the original one they did and it was really the mathematics primary teachers needed to know, to interpret the stuff coming from the government. It was not about the sort of mathematics I am talking about, the mathematics they have to teach.

The CHAIR — But you would say you support more rigorous evaluation of a student teacher's knowledge of mathematics before they teach, as a condition of being a teacher?

Ms THOMAS — I would say it is essential; and not just for mathematics. Two subjects are absolutely crucial to kids' chances: one is a decent access to English language, so I would have teachers tested in their understanding of English language and their ability to read and write; and mathematics is the other one. Those two subjects are so crucial that we should not be graduating primary teachers who cannot meet the requirements in those areas and show that they understand the content of what they are teaching.

Assoc. Prof. PRINCE — Also, you really have to distinguish the primary and secondary areas. In primary teacher training it seems to me clear that students in general are not undertaking some major stream of study in mathematics so they definitely will be learning mathematics as part of some teacher preparation and they clearly cannot afford to be getting maths right half the time — getting it wrong half the time, in other words. That is clearly not acceptable. It is not acceptable in medicine for doctors to only get it right half the time and clearly it should not be in primary teaching either.

In secondary teaching it is a different matter, and at the moment there is a sub-major requirement in place — —

The CHAIR — Is that an enforced requirement? I do not know that I have heard that that is the case.

Assoc. Prof. PRINCE — It is in theory.

The CHAIR — It is a recommendation?

Assoc. Prof. PRINCE — Well, it is a little stronger than that. It is advice passed on to students taking secondary dip. ed through the universities. So for example, in order to teach VCE mathematics potential maths teachers should have a quarter of their first year in mathematics and a quarter of their second year in mathematics; and in fact they do not even have to have maths methods in dip ed. So long as they have a dip. ed and have that sub-major stream then in theory they can teach mathematics. That condition is certainly not applied in any rigorous way towards the middle school.

We have a problem with this straightaway because we do not believe that a half a year's study in a whole three-year degree program, especially when it stops at second year and is only a quarter of second year, is enough preparation to teach VCE mathematics.

There are no metropolitan university mathematicians in maths departments who believe that is true. We would much rather see graduates with a major stream of study in mathematics teaching through to VCE. This is our preference. But let us concentrate on the middle year high school mathematics teaching. The teachers there have a degree and a dip. ed or some double degree in science and science education. They have a university degree and a teaching qualification.

If they have no mathematics at all but you want them to teach mathematics I believe it is sensible to teach them the sort of maths in depth that they will be teaching themselves. This is the sort of thing that you definitely need to do at primary level; but at secondary level we would see it as a necessary condition of teaching any mathematics at secondary school — that they have some study of maths at university.

We seriously believe that. To do otherwise would be a significant mistake because once students get to secondary school and start in years 7, 8 and 9 they are building a foundation upon which years 11 and 12 study of mathematics is based, and if that foundation is not properly set by teachers who understand what is coming within the next few years for these students, then the quality control is insufficient.

The CHAIR — Having said that, there are mature age entrants coming in and the capacity to accelerate bachelor of education courses through accelerated learning streams is happening. Would you then say that perhaps for the senior years of maths in particular — although I take your point on all the middle years running through — that there should be some sort of accreditation for teaching senior mathematics?

I am thinking of the old days. With the shortage of maths science we hear lots of stories of physical education teachers who have done a bit of maths in their undergraduate education degree and then they find themselves teaching a few periods of maths in years 7 and 8 in one year, then the next year they are rocketed into VCE; and given your opinion about the underlying depth of knowledge, that is a problem. Would you see that there could be a system of accrediting teachers?

Assoc. Prof. PRINCE — First of all those extreme examples are few and far between. Most of the metropolitan maths departments have pretty regular inquiries from existing teachers teaching in the public and private sectors who are teaching junior secondary school mathematics, who do not have maths at university or who have a first–year subject as part of biological sciences, and who want to come back and study more mathematics. It is not a significant number but every year every department probably has three or four such inquiries. So the situation is probably better than that extreme example; but nonetheless it is not what it might be.

But so far as engineering graduates or medical or physics graduates coming and retraining as teachers, the sub-major requirements of the disciplines are already in place. They are coming in with a university degree; and as far as mathematics is concerned, engineering graduates in general, especially the degrees of mature age entrants into the teaching profession, will have far more mathematics than the sub-major requirement itself anyway.

A typical engineering student will have anything between a quarter and a third of their first year in mathematics, and between a quarter and a third of their second year in mathematics, and usually one or two maths subjects in third year. That is standard for engineers. Then anybody else with mathematics in their degree who needs a sub-major requirement may require some refresher, depending on their recent employment history, but I do not believe there is so much of a problem with mature age entrants who have a university degree already. It is really just a matter of giving them credit for their disciplines in the degree they have done.

Ms THOMAS — There is a major problem with the way the qualification for teaching in secondary schools is defined at the moment in that it is defined as this sub–major or minor in mathematics, as Geoff has described. That problem is that that level is not enough to teach at the senior levels. Somebody teaching at VCE level should understand their subject, but more importantly they should connect with the discipline. They should be majoring in mathematics if they are teaching at that level.

So the current requirement that they have this minor in mathematics is really too low at that end of the school. At the other end of the school you run into real problems as somebody coordinating a dip. ed program, in that you get somebody coming into your dip. ed course with a year of maths and you know jolly well that the minute they walk into a school they will be given year 7 and 8 mathematics just because they have some mathematics in their degree; but technically we are not meant to offer them the maths method, so they get the double whammy of not really having a strong maths background and then being asked to teach it without having any introduction to the syllabus in maths — without some experience of teaching it as part of their classroom experience. So there is a big issue around an appropriate qualification for people who want to teach some maths but do not want to teach it at the senior level.

The CHAIR — This is my point about making a distinction.

Ms THOMAS — Yes. We really argued strongly when there was an inquiry a year or so ago about the qualifications required to teach mathematics and the subject tagging, as it is called. We really argued for a differentiation between a senior tag and a junior tag. This is something that really does need to be addressed because at the moment we just know that anyone with any maths at all in their qualifications or any inkling of maths in their qualifications will get year 7 maths classes.

It is the year where you really want them to understand something about teaching year 7 mathematics, being able to pick up on what has been happening in primary school, being able to pick up on the problems that they might be having and giving them a fresh start. So if anything, if this committee can come up with something that says, 'Can we please look at a junior and senior tag for maths and then what is appropriate in terms of the maths knowledge of those teachers teaching at the different year levels?' I think it would be one great way forward.

The CHAIR — Just on your concerns about content knowledge, has AMSI taken up this issue with teacher education faculties across universities and what sort of response are you getting in terms of being more rigorous?

Ms THOMAS — We have not yet, but we have been working with groups of teachers, maths educators, and mathematicians in workshops, and we will have a report finished at the beginning of next year, but we did not want to go to teacher training people before we had a product. It is not much good telling people you have problems unless you can start saying, 'Here is another way around it'. Nancy might like to comment a little more on that.

The CHAIR — It seems to me to be a simple thing. If you are training or educating teachers, you should be able to say they know the content of what they are going to deliver no matter what the paedological approach they take or how they do it. There should be a basic guarantee that they know it.

Ms THOMAS — There was an extensive review on the preparation of maths and science teachers in 1989. That said a whole lot of exactly the sorts of things that are being said now. The deans of education did not take a whole lot of notice of it and that had the force of the federal government behind it.

The CHAIR — It was a federal government inquiry?

Ms THOMAS — Yes. It was largely coming out of the Department of Education and Training. I think it might have been funded by them, but it was a very extensive review into what sought of education there should be for mathematics and science teachers — both primary and secondary.

It had a little bit of impetus for a while, where a number of things started to happen, but then a lot of the universities started running into problems and there is nothing like university problems to stop things in their tracks!

Assoc. Prof. PRINCE — With primary teacher training it is definitely in the hands of education faculties, in the main. With secondary, as far as content knowledge for secondary teachers, it is mainly in the hands of the science faculties in mathematics cases. But at the moment they are disassociated from each other. It is up to individual students how much they take and then they apply to get into the dip. ed and so on.

With the advent of some double degrees — science–education degrees, and with the federal Backing Australia's Ability program, which has operated quite widely around the metropolitan area, there is much more control now over the amount of content in the science majors that the students do and so on.

There is more specific training there, and you can be sure that somebody coming out of that program as a maths teacher will have done maths through to third year, so this is a better way of doing things. But it would be good if there was some way of differentiating at secondary school between junior and senior secondary school teachers and having the senior secondary school teachers required to have a major genuine study in mathematics, and for the junior secondary school teachers who are teaching mathematics, not to lock them out of the pedagogy part of the dip. ed in maths, for example, and to ensure that over a couple of years of them beginning this process of secondary maths teaching that they are getting the sort of support they need with their content knowledge and with the pedagogy.

So that is a real problem in secondary at the moment and it would be good if we moved to a situation where there was a stiffening of the content requirement at the senior level and a lot more support to existing teachers of maths at the junior level.

Ms THOMAS — I will give you a little hope in this in that the Australian Council of Deans of Science and the Australian Council of Deans of Education are in a collaborative approach to the federal government at the moment. I think they will get support to look at what is happening and the various models for teachers' education — the bachelor of education, the double degree, the end–on diploma of education structures — in terms of producing maths and science teachers.

That could easily be followed up by some money that will come out of a collaboration fund to help them implement it. So there is that sort of collaboration going on with the two groups of deans at the national level at the moment, and there could be some federal money to support some work in that area which would be good for all of us.

The CHAIR — I am going to have to head off to a delegation of Chinese education ministers. I might hand over to Anne to take over. It is interesting what you just said. It has been our experience that it is hard to get reform happening in universities unless you start talking about money. Everything seems to come down to that basis. I wonder whether perhaps there needs to be a little bit more discussion about that. That is why I asked whether you had taken this up with them. Some of this is not necessarily about funding issues but rather it is about the approach taken. Do you necessarily have to have increases in funding? Should you have to have those sorts of increases in funding or in funded programs?

Ms THOMAS — One of the things that has happened is that, as you realise, universities are currently funded for bums on seats, which is the crude way of putting it.

The CHAIR — I understand that.

Ms THOMAS — Under that model the funding for mathematics and statistics is very low. So in regard to getting more students into mathematics, it is very much about the relative funding model at the moment.

The CHAIR — I understand that, but I am talking about course content and how you get a bit of rigour into ensuring content knowledge and that sort of thing.

Ms THOMAS — What is happening in the US is that, to ensure rigour in the content, a lot of the teaching of mathematics, particularly for the would-be primary teachers, is being taken out of schools of education and put back into mathematics departments, where some serious mathematicians have taken very seriously what these courses should look like. In fact we have a draft copy of one of the reports there. We did not bring 10 copies. Some serious work is going on about serious maths courses that would almost invariably have to involve their moving into maths departments and out of education faculties.

The CHAIR — I do not have any other questions, but that is probably a fairly decent line of discussion for our next inquiry. We would very much like to spend a fair bit of time going through those sorts of issues with you as opposed to now, if that is okay with you. That is a detailed issue, and we would like to have a bit more time to look at the detail of that.

Dr LANE — What I might just mention is that what we hope to have available soon is an Australian version of what was basically put together by the Conference Board of Mathematical Sciences, which is the professional association of the mathematical, statistical and operations research associations in the US. That lays out in the first three chapters the content knowledge that they deem useful essentially for the K to 4 area, the 5 to 8 area and then the 9 to 12 area. This report here is a much more thorough version of it, and that is what we are going to be having the people working with us trying to put together over the next four to five months. So we should have an Australian version by the time we talk to you next.

Ms THOMAS — This has taken us years. The fact that this has taken off in America and we have this to build on and adapt to Australian conditions is — —

Ms ECKSTEIN — Can I clarify something before we wind this up? You are going to be organising that around the stages of schooling rather than the traditional primary–secondary divide?

Ms THOMAS — Yes.

Ms THOMAS — Because we do not think there is a lot of difference between the mathematics that is needed at the upper primary and the junior secondary levels. There is a lot of overlap there. Also because of the way schooling is arranged in Australia at the moment we still have some states where secondary schooling starts at year 8. Here in Victoria we have just about the youngest year 7s in the country. When Nelson gets his common schooling age that might change, but right at the moment you do not find many 11 and a half year olds in secondary schools anywhere, but you can still find them in Victoria.

The CHAIR — I think your timing of that and our timing of the first few hearings in our next reference will be perfect. We would like to get you along at the start of those hearings rather than at the end of this one. Thank you very much. If you have that ARC report you outlined — the research council one — we would appreciate it.

Ms THOMAS — Yes. It was certainly federally funded. I cannot remember if it was ARC, but it was known as the Speedy review.

Ms ECKSTEIN — Perhaps you could help us locate that.

Assoc. Prof. PRINCE — Just before you go, just in case there is something you want to continue to ask us about now, at the moment the Victorian education department has a rural retraining program, of which mathematics is one issue. I understand that in this first round there are only very few mathematics teachers who have their names down for this first round, and they are spread out across the state. There is difficulty about finding courses for them, because in general they will not be able to go during the day.

The funding is not there for them to get day-relief, so they will have to do things in the evening and so on. At the moment AMSI — as opposed to the International Centre of Excellence for Education in Mathematics (ICE-EM) — is trying to get the metropolitan maths departments to work together on producing a post-graduate diploma so that students can take a subject from this university, one from this and one from this, and the delivery would be a mix. There would be some distance education, some online education and some face-to-face education. There is quite a lot of work involved in doing such a thing because we have to fix prerequisite structures and also have some sort of roster, if you like, of putting these subjects on. But there would be considerable economies of scale in doing this, and it may solve a problem for the education department with this rural retraining thing in mathematics in particular.

At the moment there is this idea simply that it is put out to tender, and teachers have to approach various universities. But no university will put on night classes for six students, and there is no chance that all six will go to the same place.

The CHAIR — The point is pretty clear: you need a bit more flexibility in delivery for mature-age or retraining students if you are really going to make it possible to upgrade the number of teachers in maths in the rural area.

Assoc. Prof. PRINCE — It cuts across both — the mature-age entry plus the retraining of existing teachers.

Ms ECKSTEIN — Is Open Learning an option?

Ms THOMAS — Yes, to some.

Ms ECKSTEIN — It seems to me they do that sort of thing you have been talking about.

The CHAIR — I take your point, and that is a very relevant point and something we will think about, but I will adjourn the hearing at this point. These are discussions that can happen outside of the parliamentary committee. You may want to continue a discussion on these issues which we can talk with the government about outside of these particular terms of reference.

Thank you very much. We look forward to seeing you next year as well.

Committee adjourned.