She's a diamond

If children enjoy their extracurricular activities, research has shown that it helps strengthen their 'Executive Functioning'.

Dr Adele Diamond is at the forefront of the study on core mental processes important for higher-order mental processing such as problem solving, negotiation, and reasoning.

By DAPHNE LING

IF one had to describe Prof (Dr) Adele Diamond in one word, it would probably be a "guru" in her field. After all, in a web interview published in 2002, the then chair of Developmental Neuropsychology at the University of Louisville, Dr Dennis Molfese, said: "Adele is literally the best in the world when it comes to frontal lobes and kids."

So, it was with quite a bit of trepidation that I walked in to meet her. This was, after all, a scientist who had garnered such a reputation for her work as a developmental cognitive neuroscientist that her peers preceded her name with a "wow". This was also someone who had gained a reputation for being "tough".

I should know. I asked a few scientists in different fields before arranging a meeting with her.

Diamond's CV includes a doctoral degree from Harvard, a post-doctoral fellowship at Yale, and teaching positions at the world-renowned Massachusetts Institute of Technology (MIT), Harvard, University of Pennsylvania, and as of 2004, the University of British Columbia (UBC).

If that wasn't impressive enough, Diamond was also named as one of "2000 Outstanding Women of the 20th century" by the International Biographical Centre (Cambridge, UK) in the year 2000. In 2009, she was awarded the YWCA Woman of Distinction Award and was elected Fellow of the Royal Society of Canada. She was also part of a handful of scientists in the world who have been invited to meet and speak with the Dalai Lama.

Diamond has also held a Tier 1 Canada Research Chair position at UBC since 2004, a position that brings in $200,000 from the Canadian government each year. Diamond has also brought in more than US$6.5mil (RM19.5mil) in US grant-funding to Canada since 2004, under which she currently employs three full-time staff and five part-time students.

Despite her larger than life presence in the field of research, the thing that intrigued me about Diamond was the almost child-like personality I caught a whiff off visiting her website, when reading her work, and listening to her talks. I was also fascinated by Diamond's use of accessible language in communicating information.

Walking into her office at UBC (the sign on the door says: "Come in. You are always welcome. No need to knock."), Vancouver, helped anchor that impression and left me in a much more relaxed state. The office and lab, spanning nearly 2000 square feet, are gaily painted with various bright colours, toys spill out from every imaginable nook and cranny, pictures of animals hang from various walls, and books and papers are scattered all over the tables and floors.

And sitting a little discordantly in the middle of Diamond's bright open-office (her students share her big space) is an exercise ball.

In fact, as Josh Howarth, a bright third-year year physiology-nutrition major work-study student with the lab says, "The walls are really bright and there are lots of toys! I had pictured a lab out of the movies but the DCN lab caught me by surprise!" Howarth plans to apply to medical school, possibly later specialising in paediatrics.

But colours and toys aside, there's a lot of serious work going on inside the lab.

Executive functioning

One of the forerunners of an emerging field known as "developmental cognitive neuroscience", Diamond's lab is actively working on understanding a part of the brain known as prefrontal cortex and the executive functions (EF) it performs.

"Executive functioning" is broadly defined as a set of cognitive functions that encompasses three basic skills we use in every day life, namely: Inhibition (the ability to exercise self-control, ignore irrelevant stimuli and focus on the task at hand and to remain disciplined), Working Memory (the ability to hold things in mind and actively play with it), and Cognitive Flexibility (the ability to mentally manipulate things and look at it from fresh perspectives).

These three core mental processes are important for higher-order mental processing such as problem solving, negotiation, and reasoning.

She has good news for Malaysian families: All those activities we send our kids to from young like piano, martial-arts, ballet, and the like actually help build EF, if done right…

Overscheduling our children and forcing them to attend activities is an almost guaranteed backfire. However, if children

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Helping children learn and develop

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go for these activities because they enjoy them, research has shown that it helps strengthen their EFs.

As Diamond, a mother of three, puts it: "Anything that allows children to focus and practice at focusing will improve EFs. Having fun also helps your EFs work better! So give them choices, and encourage them to try new things."

Diamond's lab personnel are every bit as diverse as the colours of the walls. She employs and mentors technicians and students from all walks of life. Her employees/students come from every part of the world, including North America, Asia, Europe, and the Middle East, just to name a few.

They also bring with them a variety of educational backgrounds, ranging from psychology/neuroscience to politics. Diamond, herself, is an American based in Canada, with a background in psychology, sociology, anthropology, neuroanatomy and philosophy.

Diamond, in person, has a larger than life personality; she is passionate, expressive, unconventional, detail-oriented, and seemingly indefatigable. Her expectations are also very high as "I expect only the best from my lab."

Diamond herself acknowledges she is tough, and even goes as far as to point out that anyone who is "intimidated by me should not work here".

Often employing deceptively simple tasks to test cognitive abilities, Diamond has succeeded in making waves in the world of research, medical/mental health diagnostics and education. Among the landmark changes that Diamond's team has made are changing international guidelines on phenylketonuria (PKU; a genetic disease that newborns in Malaysia are screened for) treatment protocols, the differentiation of ADHD (Attention Deficit Hyperactivity Disorder) from ADD-Inattentive Type, differentiating how males and females perform cognitively when under stress, how the world viewed cognition, as well as halving the age we often thought children started being capable of deducing abstract rules.

Useful Tool

Diamond is now in the process of bringing a project called Tools of the Mind into schools in Vancouver. Tools is the brainchild of psychologists Elena Bodrova and Deborah Leong; it is based on the groundwork laid by the late Russian psychologist, Lev Vygotsky, who pioneered the concept of tools as an extension of our abilities.

Vygotsky also pioneered the concept of the Zone of Proximal Development, which is based on the idea that children are capable of tasks independently, but with the assistance of more-skilled individuals, can accomplish more. This is the scaffolding we see today in education, which is the concept of tailoring support and guidance given to children as they become more skilled in a task.

She first heard (and saw the effectiveness with her own eyes) about the programme when visiting an elementary school in New Jersey, US. Diamond went on to empirically compare 21 schools using the programme with another 21 who did not, and her findings were instrumental in bringing the project into Canada.

She is of the opinion that education should fundamentally be fun, accessible, and if done right, will make children want to succeed in schools.

"If I were to ask you, who learns better, the driver or the passenger? Without a doubt you will say the driver. Because the driver has to actively use that information while the passenger is a passive participant. And yet, how do we teach children? The teacher is up there using all the information and the children just sit quietly and passively absorb all that the teacher says," Diamond says.

While we once focused on figuring out what to input in children's brains, she believes that the task for this age is how we input that information. And to do that, she thinks we should look back at our past.

"People think in order to progress, we have to be better than our parents, and them their parents. But I think we should look at what has been true of our human condition for thousands of years. And what is true is that for thousands of years, across every culture, there has been singing, dancing, story-telling, music-making, and playing. It wouldn't have survived so long if it wasn't important," Diamond, a keen dancer who was part of dance troupes to the former Soviet Union and Czechoslovakia, says.

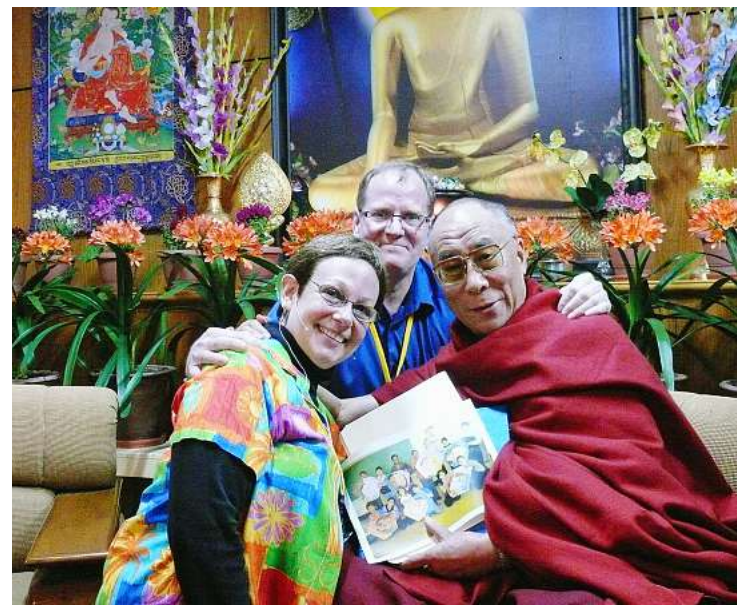
Diamond's husband, a "wonderful man", is a dancer himself.

"Our research actually shows that children actually do better in school if they play," she says.

Playing at work

But you would be disastrously wrong if you think her lab merely plays all day. Her lab is currently working on testing inhibition skills and abstract reasoning in very young children as well as looking at gender differences in stress and its effects on executive functioning.

Diamond has also recently applied for funding to study story-telling and story-reading in homes and schools,



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dancing in schools, and the benefits of circus training in youths.

Howarth points out that among other things he learned, he realised that "research is very time consuming". His colleague, New Zealander Andy Wright, is working on one such "time consuming" but necessary task: Validating a test (note: validity is extremely important in the field of research because a valid test is a mark that reflects what the test purportedly tests).

"I am working on validating one of the tests within our cognitive battery for our school-aged study called 'hearts-flowers'. Specifically, we conventionally run the hearts condition first followed by the flowers condition before combining them. There was some criticism that this caused a bias in the responding so I am switching the conditions and running 100 more children between the ages of six and 10 in order to test the validity," shares Wright.

Notorious for pushing and challenging her lab personnel, Diamond's lab has attracted some of the brightest and most ambitious minds. Many of her previous protégés go on to gain acceptance into medical school (note: Medical Schools in North America are notoriously hard to gain acceptance into and require a prior first-class Bachelors Degree), get accepted into competitive graduate school programmes and go on to land themselves positions as tenure-track faculty in universities all over North America.

And coincidence or otherwise, seven out of 11 of her lab personnel play at least one musical instrument proficiently.

"No one trains with me without being required to think and to write. I go to lengths to help trainees start to develop a line of research addressing a question that is theirs, not mine. I expect my trainees to do extremely well, and they rise to those expectations," she says.

It's also worthy to mention that out of the 19 mentees that Diamond has taken under her wing since 2005, 16 are women.

"I take pride in my record of mentoring young women," she says of her protégés.

One such young woman who is on the path to an academic career is Nicole Sanford, who majored in psychology and minored in music during her undergraduate career. Sanford is currently a masters candidate in UBC's Neuroscience programme and is working on looking at sociocognitive features in children six to 12 years with autism.

An accomplished violinist, Sanford was drawn to Diamond's lab because "I like working with children and I was fascinated with Adele's work with music and dance."

Another young woman, who has asked to remain anonymous, shares that "Adele never takes no for an answer and I've realised I can do much more than I thought I could because she pushes us."

One cheeky male in the lab, however, has a different opinion on why there are more ladies in the lab's history. He jokingly commented: "Ladies have a cuteness chromosome because of their longer X chromosome, and with these many toys, you have to be a female to appreciate it."

It is apparent that the friendly camaraderie in this lab has helped the lab produce some of their best work. As Sanford shares, "I like my lab buddies, which definitely helps!"

Diamond's lab is a fine example that innovation and research does not have to stay in ivory towers. The mark of a brilliant scientist is the ability to bring the findings to the lay people and the ability to train and mentor many more so that the work continues.

And if things continue the way they do, we can certainly continue to expect some amazing things from Diamond and her crew.

After all, as one of her lab personnel laughingly remarked, "Adele just keeps going and going and going, and we chug along with her."

For more information about the work of the Developmental Cognitive Neuroscience lab, visit www.devcogneuro.com

■ *Prof Adele Diamond is the organiser of a biennial conference on Brain Development and Learning in Vancouver; the 4th in the series will be happening July 24-28, 2013. The conference is unique in that it brings health professionals, educators, students, and researchers from across North America and the world together in a dynamic and educational setting. 99% of the participants in the 3rd conference in the series rated it as "outstanding" and participants have shared that the conference was "inspiring", "fantastic", "powerful", and "professionally rewarding". For more information about the upcoming conference, please visit http://braindevelopmentandlearning.com/BDL2013/.*