

The Neuroscience of Education



*Recent work in neuroscience and learning suggests that the most effective adult educators may be unwitting neuroscientists, who use interpersonal skills to enhance brain development in a positive learning environment. This was the message given at a STARTTS seminar by LOUIS COZOLINO, a professor of psychology at the Pepperdine University, California, and author of *The Neuroscience of Education*.*

Interview by **Mariano Coello & Max Schneider**

You mentioned the brain is a social organism. What do you mean by that?

For years the brain was perceived as a relatively static organ, determined by a combination of genetic programming and early childhood experience. However, recent theories and technological advances in brain imaging have revealed that the brain is an organ continually built and rebuilt by one's experiences.

We are now beginning to learn that many forms of psychotherapy developed in the absence of any scientific understanding of the brain are supported by neuroscience findings. It could be argued that to be an effective psychotherapist these days it is essential to have some basic understanding of neuroscience.

We tend to think the brain is like any other organ, but the brain connects with other brains so the fact that the brain is a social organ gives us an understanding of why we are all connected, so that when people feel something we feel it too. And that happens by the brain creating an internal model

of the experience of the other.

The brain evolved to be connected with, be regulated by, and learn from other brains. Our brains are more like the ants in a colony than autonomously functioning structures.

I think the brain is so complicated, and its functioning in so many ways is so mysterious, that we are still just at the very beginning. But of course the more technologically advanced we get and the more windows we have to the brain, the more we can understand what is going on in there.

You have written about education, why is education so important for personal development?

Education is life. The brain is designed to keep learning. We need to be stimulated. Education does not need to be in a classroom. Education is a state of mind where you are open to exploration. If you look at animal research, exploratory behaviour is a measure of the absence of anxiety and fear.

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PHOTO: MICHAEL PHILLIPS

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you are activating the chemistry of neuroplasticity and connectivity to other people, so education is life. If you can be involved in formal education, that is like a catapult to get you involved in life, in the community and the world. There is nothing better. I would say that education is the conduit of accumulated culture, without it, each individual has to start from scratch – what a waste of time.

You have mentioned that there are many ways of learning and one of them is through personal narratives. Could you expand on that?

It is easy to learn a whole bunch of information for a test and not remember anything two weeks after the test, so memory has to be incorporated, it has to be internalised and the way to do that is through experience and having emotional connections to the information and putting it into stories. Our factual memory banks are not very large.

Our memory banks for narrative and stories on the other hand are limitless, so, if you can learn things in interpersonal narratives and interpersonal context and put those things in stories you can learn and remember an infinite number of things because that is where our brain evolved.

Before written history, over the last thousand years, all our learning was accumulated in oral traditions and in many cultures that was subtle because our singing memory, our soul memory are even greater. All I need to hear is the first few notes

of an old song that I haven't heard for the last 30 years and I can pretty much sing the whole thing. So we have multiple memory systems. They store information in different ways and the more we can put things into narratives or songs, the more we are going to learn, and the more songs and narratives connect us with other people, because they are social constructions.

According to the current literature, our brains are highly vulnerable to dysregulation and dissociation. Why is this so?

The human brain has evolved into a complex government of highly complex systems responsible for behaviours, emotions, sensations, and conscious awareness. Keeping these systems coordinated and integrated is an ongoing challenge that becomes impaired in the face of trauma.

Freud said that shock and extreme trauma surpasses our stimulus barrier, which I take to mean our ability to use cortical processes to sort, organise, and integrate the various neural networks responsible for optimal integration.

In your presentation today, you said that our brains are designed to learn at moderate states of arousal, and that at high levels of arousal the fight-flight response is triggered. For many students from refugee backgrounds – who complain that schoolwork is too complex – the implication is that the high academic expectations are hindering learning.



Young refugees studying in Malala village, where their teachers are also refugees. PHOTO: UNHCR / F.NOY / MARCH 2010

One possible way to address this is to consider a new model of teaching, one that integrates psychotherapeutic interventions in the context of the classroom. In other words, to pair the learning with biofeedback, or with stress reduction activities.

We need to consider alternative teaching models that help students get into a frame of mind whereby the biochemistry of learning becomes activated, so that we facilitate the learning process instead of pushing learning on them. When we push learning, we risk re-traumatizing. It can be painful and difficult and create a negative set of expectations. So in other words, what hinders learning is primarily anxiety in the form of physical threat, emotional danger (shame), and the absence of secure attachments to regulate autonomic arousal.

Perhaps some sort of a hybrid model – education and counselling in the same context – might be a possibility worth exploring. For example, teaching for five to 10 minutes, then taking a five-to-10-minute break where students lower their arousal through a biofeedback activity, then go back to teaching again. And so on, back and forth. The great thing about this process is that it teaches students to monitor and gauge their arousal states, to find the sweet spot where learning will take place.

I think good teachers challenge and excite students but don't push them too far and don't scare them. They develop a kind of scaffolding where they keep students brains in the sweet spot of neuroplasticity, which is in a moderate state of arousal, sort of enthusiastic. An

enthusiastic state and just a little bit of stress are best. That is what enhances plasticity and learning.

In The Neuroscience of Education, you make the case for a re-think of the traditional education system, and in particular the role of teachers within it.

Yes, I talk about heroic teachers in the book. These are teachers who attend to and put emphasis on the attachment and emotional connection between themselves and each student in their classroom – over and above the curriculum pressures. I think the most effective teachers are those who can manage to do this: to step away from the curriculum and make the attachment connection, or at least, to weave the curriculum almost as a side-step to the emotional connection.

This is not easy because it takes a special sort of spirit and a certain sort of person. These are individuals who are brave, almost warrior-like; these are teachers who at times have to tolerate criticism from their colleagues but always remain resolutely committed to their students. For many kids who are traumatized or marginalized in any way – who have brains which are quite literally switched off to learning – being that kind of teacher is essential.

Do you think that one of the reasons this does not always happen is that teachers may not feel supported or well-resourced to do this?

Yes, partly I do. At least in the United States, there doesn't seem to be sufficient emphasis on teacher education and self-growth, on on-going develop-

ment, on our own heroic journeys, or on becoming strong enough to do what we feel is right as opposed to succumbing to the system.

It takes a lot of ego strength not to succumb to peer pressure to conform, to abstain from getting involved in internal politics. But in order for the kids to benefit and not lose out, I think this is a must. Generally speaking the crisis is growing in education because there is more emphasis on tests with less emphasis on the individual students, the quality of the teacher-student relationship and the quality of the classroom environment. I think we are actually moving farther away, structurally.

When teaching a class of traumatised students, the caretaking involved starts affecting one as a person. What support structures are needed to ensure appropriate self-care?

It seems like the teachers whom I have studied have that support within their own families – they have their spouses, they have a very supportive father or mother... And some of them, for want of a better word, are just saints really. They are individuals who somehow have been able to find the strength within to be able to do the job, and to do it well. Now, I acknowledge that we can't have an education system where we hire people to teach based on their 'saintly' capabilities. But I think we can certainly use those principles to help guide and structure the system to give us a sense of what teachers need to be successful. In the United States, we rank 26th in educational compe-

tence but we are number one in the money that we're spending. Something is not working.

Your four take-home messages today were: there are no single human beings; the brain is a social organ; the cortex is shaped postnatally by social interaction; and the brain can be changed to regulate and heal through relationships. Can you elaborate briefly on those points?

In short, there are many ways in which we are individuals, but also

all of the relationships I've had and that I have experienced.

We thoroughly enjoyed reading another book written by you, *The Making of a Therapist*. One statement in particular stands out: the tendency to take care of other people comes from our need to regulate others and, in the process, heal ourselves. How do we ensure that our caretaking remains professional?

This is a lifelong challenge, as both younger and older therapists seem

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there are many ways in which we are not. There is so much evidence to support the concept that we are interwoven, that even when we are alone, our internal world has been constructed in relationships. And so, in a sense, our private selves are kind of like a private dinner from our childhood – other people see us and can't see anybody else, but we can see them. And so for me, my grandmother is looming around in the kitchen; my grandfather is lifting up the jug of water and pouring it; my mother and father are still doing their thing and running around...and it's all here, inside me – so that I am the accumulation of

to be vulnerable to drifting from their professional stance. A combination of activities works best – ongoing supervision by trusted professionals and a continual uncovering of inner emotional processes that emerge in the role of therapist. Specialists in trauma are especially vulnerable for three reasons. The first is that trauma therapists tend to have experienced trauma themselves, the second is that seeing clients with trauma is traumatizing in itself, and third is that clients with trauma are demanding and needy which taps into the therapist's own issues about shame.

You have written a book about ageing, *The Healthy Ageing Brain: Sustaining Attachment, Attaining Wisdom*, in which you say there are many myths about the inability of us to learn as we grow older, what do you think?

Based on our evolutionary history, brains were shaped to learn different things in different ways throughout life as a reflection of their contribution to tribal well-being. Younger people solve simple problems faster while older people solve complex problems better.

It would be interesting to see what would happen if you could live to 122, like the Frenchwoman madam Calment, whose life span is the oldest recorded. What would happen if we stopped thinking of ourselves as ageing and in decline? And instead, started to think of ourselves as chronologically advantaged?

We need a concrete understanding of how are bodies and our brain age and what we can do to work with this natural process to make life as long and as fulfilling as possible. This is what my book *The Healthy Ageing Brain* offers.

Research shows our brain ages and evolves overtime and that our individual health and longevity are inextricably linked to those around us. How we age is grounded on our human relationships. At the same time elderly people have a need to contribute to society and their brains need to be utilised to be healthy. Unfortunately ageing is perceived as something undesirable and to be avoided at all costs. What we need is a new and more balanced story of ageing to guide us into the decades ahead. R