

The Second Chance: The Teenage Brain

It is now accepted that the brain develops from the back to the frontal lobes. This process has two beginnings: the first at birth and the second at the onset of puberty. It is this second period that has importance for teachers and parents, as the awkward behaviour of teenagers is not their fault but part of them becoming independent adults.

Psychiatrists and neurologists have long known the importance of the first years of development in the make-up of a person's characteristics, behaviour, intelligence, and resilience. Many impressive experiments have demonstrated this, with perhaps the most remarkable being the Abecedarian Project. This research, conducted by the University of North Carolina, focused on a group of children whose mothers came from a low socioeconomic background.

Divided into two randomly selected groups, the children were provided with different outside supports. Group A received an intensive five-year project with supportive childcare and programmed activities that commenced soon after birth. Group B received free nappies and baby food. At the end of the program, the research showed that the children in Group A had an average IQ of 105, while group B's average was 85. The impact of this and similar research captured the public's imagination, and soon politicians responded, focusing on early intervention as the only effective intervention.

As technology advanced, research on the early development of the brain became more sophisticated. It was soon established that there was a biological explosion of grey matter and myelin soon after birth. The grey-matter neurons are capable of as many as 15,000 connections, so that when combined, literally trillions of connections could take place. These connections are the foundations of learning, be it special, kinetic, social, emotional, musical, etc. They are created as a result of the brain's response to the electrical and chemical input from receptors that interface with the external world. Through trial and error, connections that result in the optimal response to stimulus are reused and become stronger. When established, the myelin forms a sheath around the neural pathway, increasing its efficiency.

It is easy to take the logical step that the more stimuli a child receives, the more connections are established, and a higher IQ is achieved. It was assumed that this Pandora's Box was the way to overcoming social problems. Unfortunately, nothing is as easy as we would like it to be. More recent work by Perry, van der Kolk, and others has revealed subtle complexities to the broad theory that have a significant impact.

For some brain functions, it is imperative that the child receive the stimulus at the right time. The brain appears to select times to develop certain behaviour functions by having the grey matter and myelin available in the areas in which the behaviours will be situated. It is crucial that the brain receive the stimulus at the right time. If

there is no stimulus, then the function to be developed will not be cultivated. For example, if a child is born with cataracts and they are not removed before about the eighth month, the child will not be able to successfully interpret sight even if the cataracts are removed. Sight is the most spectacular example and the easiest to demonstrate, but functions like communication and attachment also seem to need stimulus at specific developmental times to reach their full potential.

A second factor that must be considered is that the brain does not make value judgments, nor does it see into the future. As a result, it develops behaviours that best suit the environment it finds itself in. This is fine if the child grows up in a family whose values and behaviours reflect that which is considered functional by society in general. However, many children grow up in families whose behaviours are considered dysfunctional to their contemporaries but consistent within the immediate relatives. Children will develop behaviours that function in the family, but when they move out to situations like school that reflect societies' standards, they are unable to make their behaviours work.

Finally, it has been found that if children are subjected to continued elevated stress, usually associated with trauma following neglect or abuse, this will retard the development of the brain. It is suspected that the existence of cortisol, the chemical that assists the brain to return to a calm state, is the cause of the impairment. When a child is continually stressed, cortisol continues to wash over the brain, causing damage. Children who are exposed to continual trauma have a real disability. To compound this, it is more often than not that these high- stress environments are those in which the child learns dysfunctional behaviours.

For educators at the upper primary/secondary school level, this knowledge has a demoralizing impact. The logical premise has been that if the damage is done, there is little or nothing significant that can be achieved by interventions in later years. As a result, support facilities like itinerant behaviour teams, adolescent psychiatric facilities, and learning support teams have had their focus firmly adjusted to lower primary. The only intervention available for secondary-aged children has been dumping them in behaviour-focused schools and units. There may well be an outcry that these units are not dumps, but close examination shows that an underpinning approach for dealing with these children does not exist, and there is no special qualification or prescribed pre- training in place. The majority of teachers are willing and dedicated practitioners who learn as they go along.

With the aid of new technologies, a team led by Dr. Judith Rapoport of the US National Institute of Mental Health has recognized a new, second wave of brain growth. By following a group of 145 children over many years, her team identified another period of overproduction of grey matter and an accompanying increase in myelin. That is, there is a second period of brain growth that coincides with puberty.

This second growth commences at about age eleven or twelve; boys generally lag behind girls, as they do for puberty. The growth is located in the frontal lobes, which

are generally described as the executive of our brain, our CEO. It is in this area that we can decide on or initiate activities. We more easily plan goals, as we have the insight and judgment to anticipate consequences of our actions. The development of the frontal lobe in early adolescents is a second chance for our students to make a change in their behaviour.

Slywester puts forward the view that there are two ten-year periods of behaviour development for children. The first is when the child focuses on being a human. In this period, children master movement, communication, and basic social skills. The first four years are generally marked by clumsy attempts to imitate the skill. For instance, you see a baby first attempt to stand, then to take a step, and then to move on to toddling. This phase is littered with falls and skinned knees. After a few years, you see the child refine the skill, going on to run, jump, and dance.

The second ten-year development sees the child focus on becoming a productive, reproductive human. During this phase, children explore and acquire emotional commitment. They mature sexually and learn how they will express this, and they discover activities they enjoy, leading to a vocational choice.

As with the first four years in early childhood, from age eleven to fifteen children's attempts to master the skills associated with their phase of development are clumsy. In any secondary co-educational school, you can watch the junior years make their first attempts at forming relationships. Mistakes are made and pain is suffered. Mostly this pain is psychological, but mistakes in this phase can be much more serious. Teenage pregnancy is not such a rare event, and the consequences can be life-long.

Management of the implications during this time are critical for schools if we are to offer long-term benefits in learning. Prepubescent children are commonly impulsive, with a desire for immediate gratification. In a social context, any activity that carries with it a sense of intimacy has its response through a rapid reflex process driven through the subcortical regions. Teachers of students in this age group maximize their teaching through direct instruction, short-duration tasks, and immediate rewards.

Post-pubescent education should be characterized by self-directed learning, a sense of independence (with the self-responsibility that goes with it), and a focus on pursuing subject matter of their choice that leads into vocational preparation. This is the age at which the frontal lobe is fully developed, and decisions related to behaviour should be considered and productive. A well developed, functioning frontal lobe carries out decisions on goal-setting, planning, judgment, and insight that counter the childish impulsiveness that leads to so many regrets.

The changeover from child to adult has a clumsy, awkward period during which the centre of control for emotional and social behaviour moves from the limbic system to the frontal lobe. Yurgelum-Todd, through studies of brain scans of adolescents

and adults, not only showed that the part of the brain used to identify emotions moves from the amygdala to the frontal lobe, but also that during this transfer the ability to recognize others' emotions drops profoundly. Her study showed that at about age eleven, the ability to accurately recognize emotions drops by 20 per cent. When 93 per cent of the emotional content of any conversation relies on cues like facial expression, body language, and tone of voice, this loss has a dramatic impact on teenagers—and, of course, those who raise or teach them.

Anyone who has taught or raised a teenager will understand the associated frustrations. Teenagers frequently look at you with confusion or no obvious remorse when you display your displeasure at something they have done. It may simply be because they just don't get the message.

Another finding around this awkward period is a profound vagueness that sets in. A parent may tell a child to drop dirty clothes into the washing basket. The child will agree to do so, but it's never done. The request is repeated, and the parent's temperature rises. The child has heard the request, but details like when you want it done and which clothes—things that are so obvious to us—may well be missed by the teenager. When teachers set an assignment, we make it clear, set it out in detail, and repeat the process. We are professionals; we know how to give instructions. Yet thirty students will have very different interpretations of the task. It is frustrating, and it is easy to take our frustration out on the students.

The implications for teaching in what it is tempting to call the dark ages from eleven to fifteen are considerable. During this time, social interactions are the dominant influence on behaviour. It is important that curriculum activities provide for the development of autonomous decision-making. The school environment should allow students to explore emotions in a non-threatening play-like manner, where students can be confronted by adult problems without the potentially dangerous consequences. Activities like games, arts, and the humanities are important because, unlike the concrete subjects of science and maths, issues can be explored. Through discussions and experience, emotional attention can be developed without the stress.

For schools, the challenge is to develop a greater flexibility in organization, increasing the sophistication of lessons' discussions and exposing students to a rich diverse milieu of texts and guest speakers. A perhaps more important task for the school is to control the external demands on measurable learning outcomes. Politicians and their upper-level managers are comfortable with improved short-term outcomes. However, driving a teenager to regurgitate for the benefit of test scores is short-sighted.

Geidd perhaps best sums up the challenge for teachers. The advice the scientists can give is just that which grandmothers have always known: "Spend loving quality time with our children." For the teacher, recognize that one size does not fit all; in any class, there is a four-year gap in developmental age regardless of chronological age.

So cater to differences.

Teachers should move from a reliance on direct instruction to a more inclusive approach in which a variety of alternative methods are explored. They should support students who are learning to access their frontal lobes. Don't say, "this will happen" but ask what they think will happen. Then, with them, explore possible outcomes. They need your help in learning to connect present activity with future outcomes. As they grow, your contributions should diminish. Isn't that our goal as educators?

Conclusion

Behaviour management is always a challenge for teachers in early secondary schools. As mentioned earlier, children who have suffered early neglect or persistent trauma and/or have been raised in environments that are dysfunctional by the school's standards present difficulties for all teachers. The second phase of brain development may well present another chance to help these unfortunate kids take control of their behaviour. With the shift of the emotional centre from the direct stimulus of the amygdala to the frontal lobes acting as a dampener to the immediate impact of threatening situations, there is an opportunity to regain some of the early childhood losses.