The development of the adolescent or teenage brain as input for career learning (based on 4 core competences).

Partners in the project

Project involving 4 schools for secondary education. Each school has its own specific group of pupils. One school has pupils with SEN, another has pupils having been drop-outs. One school is for preparatory vocational education only. My school is for general secondary education on the mediate and higher level.These schools work together with community colleges and colleges for further education. Companies are also involved.

The project has two workgroups, one focusing on the educational side: how to make things work in the classroom. Another group is focusing on the HRM side: what do teachers need to learn in order to work with compentence based and brain centred learning?

Project goals

Aim of the project is to find out how the neurological insights and findings from neuroscience on the braindevelopment of adolescents can be used in education, especially in guidance of youngsters and in didactic use in the classroom.

Theoretical framework

For the last decade a lot of research has been done by psychologist, neurscientist and behaviourists into the development and working of the adolescent or teenage brain. Most of their findings show that the brain has a much longer developmentspan than was initially thought. We always assumed that the brain was mature at the age of 16 to 18, but this is not the case. Studies show that the brain matures up to the age of 23 (and in some cases even longer). Resonant imaging (MRI) also shows that the brain develops from the back to the front. In the front of the brain sits the prefrontal cortex (PFC) and this is the most important part of the brain for decision-making and impulse control, planning, reasoning, risk taking (having insight in cause , effect and consequences). So basically teenagers up to the age of 21+ are still learning these things. Furthermore, studies show that boys are slower than girls in the brain development department!

In education this often means that we're asking them to do things that they physically can't do. If you ask a young 13 year old pupil to plan his work ahead and make a schedule, chances are he won't even know where to start. So he'll decide to just muddle on not being able to imagine the consequences of his behaviour. He'll then be surprised that you (the teacher) will punish him for not having done the work as you asked. Depending on your reaction and feedback he'll either learn something or he'll undergo punishment and take nothing away from the experience. There is not much educational change based on these insights and researches.

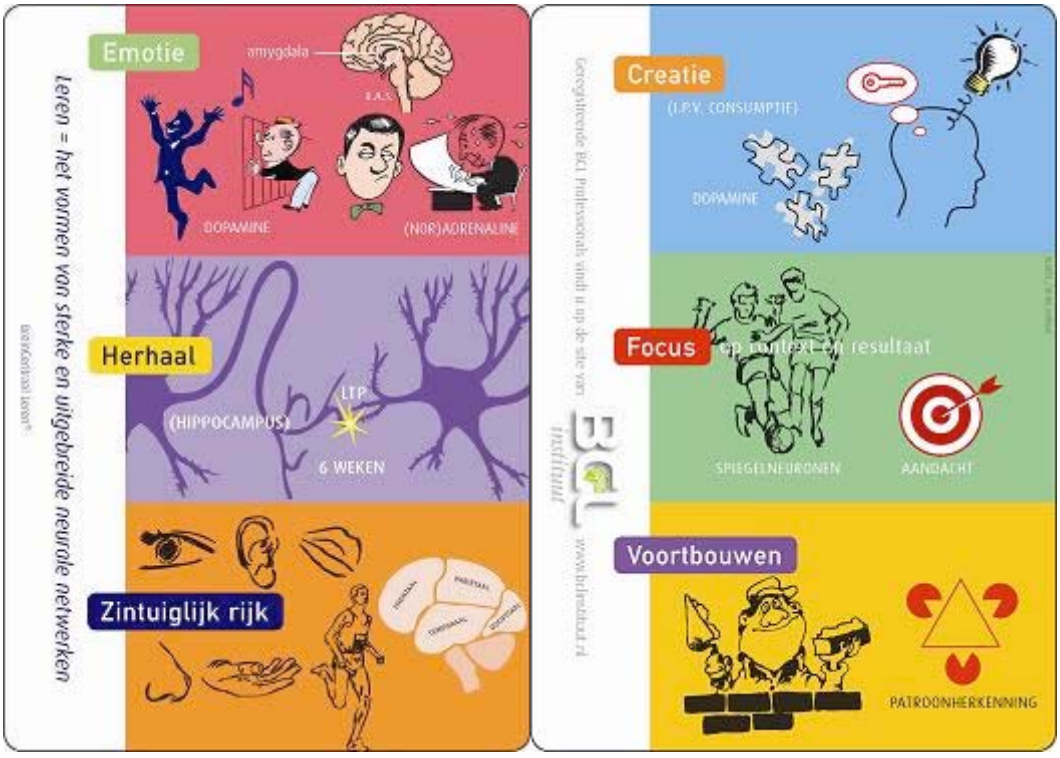
It's also evident that learning is about forming new neural networks in the brain. From the moment you're born you start to make these networks. It's a chemical process in the brain where synapses send out electrical signals with dopamine as an active agent, It's thus that neural pathways (dendrites) are formed. If a signal is repeated a lot of times the path becomes so wide that it will never disappear again.(Think about if you walk through some wet grass. If you do that only once, the traces you

made will fade after some time. If you do it often enough, you'll make a lasting impression and eventually the grass will disappear and a new path has been formed). Research in the brains of London taxi drivers also showed that during the time (6 years) they're studying for the Knowledge (exam) their hippocampus grew by 10%. The hippocampus is a part of the brain that has influence on remembering and learning new things. This actually means that a person can get smarter!

So teaching is about enabling our students to form these neural networks in their brains and facilitating this process in the brains of our pupils. Showing them they can get smarter. Using this concept in the classroom is called brain centred or brain based learning. In our project we use 6 didactic principles for brainbased learning.

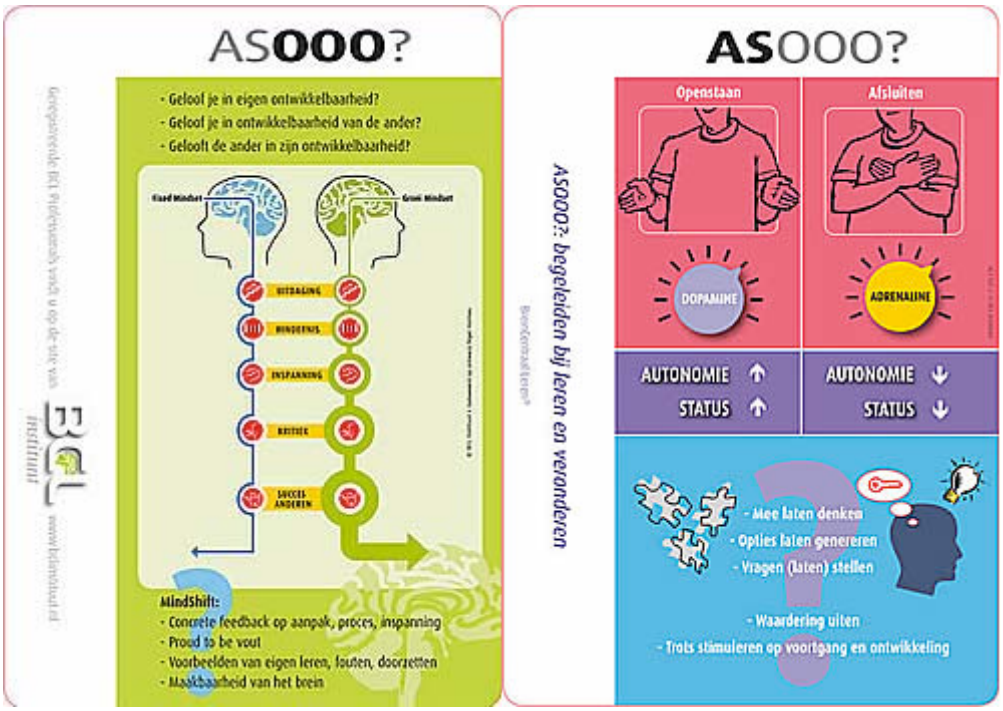
The 6 didactic principles (developed by an educational scientist) are:

- Focus: an adolescent needs a focus, a goal to reach (multitasking is a myth..)
- Creation: in order to learn an adolescent must be involved in the creation of the ideas, be challenged to think about the problems or questions presented
- Construction: a framework or foundation of the basics is needed to create a learning process (constructive approach)
- Repetition: important things need to be repeated, preferably in a new context each time (like the path in the grass)
- Emotion: if positive emotions are evoked before and during the learning process the subjectmatter will be remebered longer and deeper. This has to do with the production of dopamine.
- Senses: if possible use as many senses (sight, hearing,taste, smell, touch, but also movement) as possible in the learning process. This means involving more subjects in the approach of a problem, so the adolescent is challenged to look at it from different angles.



In the project we work closely together with the educational scientist who worked out these principles. In addition to these principles there's also the approach (attitude) needed by teachers and guiders, in order to get the results. The ideas about this needed attitude or approach are based on two main points:

1. Autonomy and status: in order to learn an individual needs to feel some form of autonomy and status (self esteem). If one feels threatened in any way, the mind closes off and it will be very hard to get a learner into a learning mood (negative emotions block the learning process). As a teacher /guidance counsellor you need to monitor the emotional setting and create a safe environment for learning. In a safe environment dopamine flows, in a threatening environment adrenaline is predominant. Dopamine helps in the formation of strong neural networks or synaptic circuits, adrenaline slows down this process.
2. Motivation and reflection: here the theories of Carol Dweck are used. The theory says that in order to be motivated to learn a person needs a growth mindset . She researched how motivation works in different groups of learners. Teenagers (but also adults) with a fixed mindset (I can't do this and I am what I am) are convinced they cannot learn certain things and develop themselves. People with growth mindsets believe they can achieve succes by hard work and reflection (learning from their experiences and be willing to experiment with learning). Teachers and guiders can strongly influence the mindset of youngsters by using the right ways to give feedback to them.



Based on these ideas we're developing new didactic approaches in the classroom as well as instruments for teachers and guidance workers to help them in their work with pupils. E.g instruments for reflection, new and innovative ways to present subject matter and develop projects for young learners. Here's the connection with the L4L project, as the instrument for 3 scene storyboarding is a strong instrument for reflection. We want to use it in this project.

Four core competences

We are preparing pupils for a the next step in further education and a working life beyond that. The pupils need to be prepared for competence based learning, thinking and working. The organisations and colleges for further education involved in this project help us to develop competence profiles. The 4 core competences we work with in the project are:

- Cooperation: how can we teach pupils to work together with very different kind of people and on different levels. What skills do they need?
- Planning and organising work: how can we get them to look ahead (their brain is still developing that ability), plan their work, have an idea of consequences of actions etc.?
- Reflection: how can we get them to reflect on results and experiences, developing a growth mindset, give proper feedback and learn them how to use feedback, enabling the mto make decisions and stimulating them to take appropriate actions (futuring)?
- Flexibility: although this seems more of a personality trait than a competence it can in certain ways be developed and taught. How can we teach youngsters to be flexible and adapt quickly to new circumstances? (Can we also do that ourselves?)

The HRM side of Brain Centred Learning

Like the L4L project this project also has the teachers'side in mind. You can't develop new approaches without taking into account the development of the people in the classroom. This project also takes into account all the professionals working with adolescents: what do they need to use the new ideas in their work? What do managers need to do in order to develop their personnel. Do teachers have a fixed mindset and what does that mean for their approach of learners? What schooling is needed to get teachers and guiders to change their own mindset and work in a different way with young people? Teachers also need to develop the 4 competences in order to be better teachers. What does this mean in an (educational) organisation?

How do other companies and organisations work with competences in management. What kind of competences have they described as core competences for their workers. How many of these competences are specifically work related? Etc.

Breda, 070511

Els van Osch

Want to know more about brain development research and teenage brains?

http://www.youtube.com/watch?v=N8zrKaE_dzw&NR=1&feature=fvwp

http://www.youtube.com/watch?v=GPMP68QP698

http://www.walrusmagazine.com/articles/2006.11-science-the-teenage-brain/ (5 page article)