

# Meta Learning & Thinking Skills

Powerful learning  
A neuro cognitive approach  
Study of literature

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Are recent educational approaches confirmed by neurologic research?



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# Brain, mind & education

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## Increasing interest

- Big question: how do people learn? (and how can I as teacher facilitate that learning?)
- First focus: behaviourism: what to do to attain a certain behaviour ?
- Focus now: what are the cognitive processes behind?



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## Study of the brain

- Neuro science: study of aspects of the nerve system
- Categories:
  - Neuro physiology
  - Neuro anatomy
  - Neuro endocrinology
  - Neuro pharmacology
  - .....



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## Study of the mind

- New science domain: cognition science: mental processes and intelligence
- Focus on connection between neuro science and psychology
- Focus on how the brain functions



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### And education?

- Hypothesis: the more we know about thinking and the brain, the more we can optimise the pedagogical and didactical design of our learning environment.
- Educational neuroscience; the birth of a new science...



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### Challenges for a new domain of science

- Not every research is interesting for education ...
- Difference between 'classroom' and 'laboratory' and between 'human' and 'animal'
- Neuro myths as consequence of incorrect interpretation of research
- Exploitation by commerce



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### Focus 1 Personalised learning



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### Focus 2 Self regulated learning



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### Focus 3 Active learning



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EKHOUT  
KONINKLIJK HOGESCHOOL VAN ANTWERP

## Personalised learning

Unique brain means personalised education based on his/her unique brain?

Based on Lijne Vloeberghs (KHLeuven)

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### 1 Can we make groups of learners based on brain specifications?

- Groups based on anatomy of brain: left and right brain?
- Can we group learners based on learning styles?
- Can we group learners based on sexes?
  
- There is no neuroscience evidence to do so.

Pedagogical and didactical diversity is although a result.



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### 2 Unique brains > common learning principles?

- Principle 1: learning becomes easier when it is connected to already existing knowledge (David Ausubel, 2014)
  
- Consequence for education: take time to explore the already existing knowledge and connect the new learning content
- In cases of existing knowledge based on incorrect information, first focus on 'unlearn' before new learning.



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### 2 Unique brains > common learning principles?

- Principle 2: human brain looks for patterns within the information
  
- Consequence for education: teachers stimulate learners to develop patterns, heuristics. They can offer patterns to process information, they can challenge learners to explain patterns...



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## 2 Unique brains > common learning principles?

- Principle 3: human brain easily detect new information and is alert to receiving stimuli
- Consequence for education: offer new challenges and new pieces of information to feed curiosity and their eagerness to learn



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## Looking at learning potential

- Fixed mindset vs growth mindset (Carol Dweck, see video)
- The way you think about earning potential influences learning results.
- Study Blackwell, Trzesniewski, Dweck (2007)



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## Looking at learning potential

- A medical point of view vs functioning of learners
- When a teacher rather than monitoring by medical glasses (disorder) uses the ICF model that looks at the restrictions of students, the support can happen more tailored, learning potential can be used better .
- Teachers point of view towards learning disorders influences the learning outcomes: growth mindset and plasticity of the brain encourages the learning



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# Self regulated learning

Based on Tine Van Camp (KHLeuven)

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## Increasing lack of self regulation

- Research (Leong en Borova, 2009) shows serious lack of self regulation capacity (young children):
- Consequences:
  - Growing aggression and oppositional behaviour
  - Pre school teachers complain 'behaviour problems' are their biggest challenges
  - Pupils have to less skills for self regulating behaviour



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## Neurologic research



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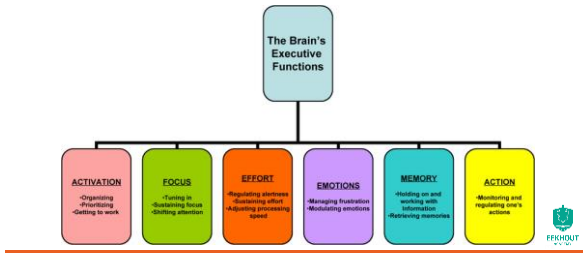
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## Executive functions




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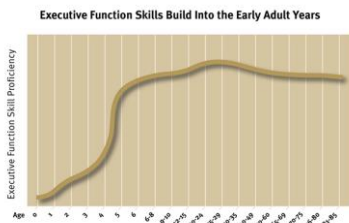
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## Evolution executive functions




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## Training executive functions in education?

- Recent research shows positive results after implementing a training program (Tools of the mind i.c.) (Blair&Raver, 2014)
- Effects:
  - Confirmation of 'plasticity' of the cognitive functions and structures
  - Stimulating executive functions leads to better learning outcomes (language and calculations, especially for children with disadvantaged backgrounds)




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### Take home messages for SRL

- Self regulating skills can be learned
- Executive functions can be learned till age of 'young adult'
- Self regulation can be stimulated at school



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**Active learning**

Based on Pieter Tijtgat (Odysee)

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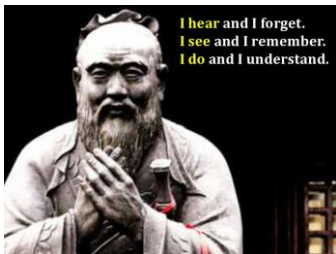
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## Cognitive constructivism and social constructivism

- Cognitive constructivism: focus on individual building a model of knowledge (Tynjala, 1999)

Social constructivism: focus on interaction with others to build the knowledge (Tynjala, 1999)



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## Take home messages about active learning

- Active learning activates more brain networks than passive learning formats
- For learning about procedural knowledge is learning by observation and imitation an added value
- Repeating basic skills, cognitive load reduces so more free space for complex thinking activities
- Well designed (ICT) tools can possibly stimulate interactive learning.



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## Discussions & questions



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