The science of learning

Lia Commissar
@WTeducation / @MissCommissar
About the Wellcome Trust

Wellcome exists to improve health for everyone by helping great ideas to thrive.

We’re a global charitable foundation, both politically and financially independent.

We support scientists and researchers, take on big problems, fuel imaginations and spark debate.
What is learning?

• How often do we talk about ‘learning’?
• Can we define what learning is?
• Does everyone define it the same? Researchers?
• What is needed to be able to ‘learn’ something?
• Is remembering the same thing?

Take 1 minute: Define learning…
What is meant by the ‘science’ in ‘science of learning’?

- Fields of: Neuroscience? Psychology? Others?

- Not all research from these fields is relevant or useful to education
- Some useful research has not been used in education – why not?
- Some is relevant but needs more translation (need teachers involved)
- Some fields are taking more of an interest in education
Is this research useful to teachers?

It might:

• give insight to new practices (even counter-intuitive ones)
• back up practices teachers already use
• show some practices are not as effective as others (or as we think)
• give us more accurate language to use when talking about learning (and make it less abstract?)
• help us to justify our choice of teaching methods
• help us understand and diagnose why certain pedagogies are not working so well and how to make them more effective
• excite us about the huge potential every child has (it did for me)
Recent progress in the research world

Educational neuroscience vs Mind, Brain and Education vs Science of learning

- Bringing scientific evidence to the classroom
- Neuroscience, psychology, education, genetics, computer science
- Researchers working with teachers
- Improving learning
Recent progress

Journals
• Trends in Neuroscience and Education
• Mind, Brain, and Education
• NPJ Science of Learning
• Educational Neuroscience

Blogs
• Science of Learning community
• BOLD

Trends in Neuroscience and Education

- Supports Open Access

Editors-in-Chief: Dr. Zrinka Sosic-Vasic, Prof. Dr. Manfred Spitzer

Trends in Neuroscience and Education aims to bridge the gap between our increasing basic cognitive and neuroscience understanding of learning and the application of this knowledge in educational settings. It provides a forum for original translational research on using systems neuroscience findings...

Read more

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The neuroscience of intelligence: Empirical support for the theory of multiple intelligences? C. Branton Shearer | Jessica M. Karanian

Skills underlying mathematics: The role of executive function in the development of mathematics proficiency Lucy Cregg | Camilla Gilmore

Mindfulness training with adolescents enhances metacognition and the inhibition of irrelevant stimuli: Evidence from event-related brain potentials Kevanne Louise Sanger | Dusana Dorjee

Abstract | Article | PDF (216K) | References | Request Permissions
Recent progress

Courses

EDUCATIONAL NEUROSCIENCE (MSC)

Year of entry  2018
Start date  October 2018
Location  Central London
Status  Fully Approved

Duration
One year full-time or two years part-time

Attendance
Two to three days a week full-time or one to two days a week part-time, plus some evening teaching

This Master's degree provides experience of both in-depth theory and hands-on research in the emerging area of educational neuroscience. It covers:

• the critical appreciation of existing research and research methods
• running a neuroimaging study
• the biological basis of learning and development in children and its implications for the classroom
• the relation between genes, brain and cognitive development
• managing and reporting on an extended research project

For more information, contact...
Recent progress

Societies

- International Mind, Brain, and Education Society
- EARLI SIG 22 Neuroscience and Education
- Flux

Recent progress

Funding

• IBRO/IBE-UNESCO Fellowships to learn about policymaking
• Wellcome Trust Education Endowment Foundation initiative
Recent progress

Critical discussion

• Bowers (2016)
• Howard-Jones et al.
Current research
Aims:
1) Build research and expertise at the interface between neuroscience and education

www.wellcome.ac.uk/edneuroscience
1) **Fit to Study**: examining the effect of exercise on academic achievement

2) **Spaced Learning**: an intensive teaching approach where information is repeated multiple times, with time passing between the repetitions

3) **Teensleep**: testing the impact of sleep education on academic achievement and wellbeing

4) **Learning Counterintuitive Concepts**: using techniques that improve pupils’ ability to ‘inhibit’ prior contradictory knowledge when learning new concepts in science and maths

5) **GraphoGame Rime**: improving pupils’ literacy through teaching phonics via rhyme analogy

6) **Engaging the Brain’s Reward System**: exploring the impact of uncertain rewards – the opportunity to double or lose points – in secondary school science classes

www.wellcome.ac.uk/edneuroscience
Aims:
1) Build research and expertise at the interface between neuroscience and education

2) Ensure that educators can make informed choices based upon the best available evidence

www.wellcome.ac.uk/edneuroscience
Ways to get involved
Facebook Live about Evidence in the Classroom – What Teachers Should Know

Wednesday 7 March 4pm | www.facebook/acethattest
The Science of Learning
Free online course for teachers
Explore the science of learning, discuss and reflect on your classroom practice
stem.org.uk/ne709
The Science of Learning

Educational neuroscience (also 'Neuromodulation' and 'Mind, Brain and Education') are growing disciplines. They bring together neuroscience, psychology and education with the aim to produce powerful school learning experiences.

As professionals facilitating learning on a daily basis, it is clear why teachers want to understand more about the brain and learning. However, the reality is that not all 'brain-based' resources and programmes are based on research.

Education is becoming more evidence informed. There is great interest to discover if this knowledge can improve education, and help us understand why things that work are successful.

Register to receive email reminder >>>

This zone provides an opportunity for teachers to have conversations with scientists about how young people learn.

We have neuroscientists and psychologists who carry out research on a broad range of topics, from maths and anxiety to memory and language. Each fortnight we will focus on a particular topic.

Whatever your question they are here to speak with you about the latest discoveries in the

learning.imascientist.org.uk
sleep  diet  attention
mindsets  mental health
classroom  learning  motivation
adolescence  early developments
exercise  metacognition
reward  remembering
evidence

learning.imascientist.org.uk
Neuroscience-Informed Teacher-Led Randomised Controlled Trials

Bridging the gap between evidence and classroom practice
Neuroscience-informed teacher-led randomised controlled trials

What we are doing and why?

A key challenge facing neuroscience and education is how to translate evidence from the laboratory into the classroom. Dommert and Domschke, (2013, Domschke et al., 2018, from the mid-nineteenth century, the medical profession as it stood to become a natural science grounded in laboratory research and interventions. Many neuroscientists, just as the biological development of the clinical practice of drug discovery with reliance on smaller, more direct, individual and fMRI-referenced as school centers will be necessary, timely, and most important, writers have pointed to the ‘seemingly scientific’ that exists in education research and its potential impact on attempts to establish what works (Ball, 2006). In contrast to medicine and healthcare where often a meaning of converging scientific studies on clinical practice, in education few practitioners study each, research, or get disseminated. Further, these practitioners study each, research, or get disseminated. Few practitioners study each, research, or get disseminated. The programme is led by Richard Churches, Education Development Trust, who previously led Closing the Gap Test and Learn— a Department for Education initiative in which support of the programme 45 teachers recruited across to complete practitioner led randomised controlled trials and other forms of experiential research.

Over the next four months, the teachers will work with neuroscience knowledge into controlled trials coming together again in February to an analysis, interpretation and with write-up day. They will then produce confidence questions to support the dissemination of their findings. Upon completion of their studies, teachers will use (XCE) based software to analyze their results. "StatisCan" automatically carries out assumptions testing with the teachers which influential net to use and produces the clearer picture of using...
Laura Maberly
Can the use of revision flashcards improve performance in GCSE end of topic assessments?

Caroline Creaby, Kate Mouncey, Karen Roskilly
Results

<table>
<thead>
<tr>
<th>Student group</th>
<th>Effect size</th>
<th>p-value</th>
<th>CI (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>d = 0.324</td>
<td>0.06</td>
<td>-0.04 to 0.36</td>
</tr>
<tr>
<td>High attainers</td>
<td>r = 0.3</td>
<td>0.026</td>
<td>0.01 to 0.54</td>
</tr>
<tr>
<td>Low attainers</td>
<td>r = 0.063</td>
<td>0.392</td>
<td>-0.23 to 0.35</td>
</tr>
</tbody>
</table>
The Chartered College of Teaching IMPACT journal themed on the ‘Science of Learning’

Usually a member benefit – this edition is being sponsored by Wellcome and we are sending a copy to every school in the UK (addressed to the teaching and learning lead)

Online: impact.chartered.college/category/open-access/
Questions
Thank you

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Session summary:
The Science of Learning

The brain is an amazing organ capable of incredible things. As we learn more about how it works we are finding interesting insights that can guide how we help young people learn and how we approach our teaching. This session will provide a brief overview of this emerging field and discuss how teachers can play a vital role in helping to translate and evaluate the research. In addition, find out about a range of free development opportunities so that you can further your knowledge and understanding of the 'science of learning' beyond this session.