Education and Neuroscience: Current funding developments

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Securing the evidence base in education
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Vision

• Build research and expertise at the interface between neuroscience and education

• Support the responsible transfer of technologies, resources or practices based upon neuroscience into education

• Ensure that educators can make informed choices based upon the best available evidence that will ultimately enhance educational outcomes
Improving our sector understanding

- Survey of current practice

- Literature review: examining evidence about education initiatives that are, or purport to be, based upon neuroscience

- Expert comments: examining the readiness of neuroscience to shape education and making judgements about which areas are most likely to yield testable and fruitful educational interventions
## Neuroscience and education: myths and messages

**Paul A. Howard-Jones**

Published online 15 October 2014

<table>
<thead>
<tr>
<th>Myth*</th>
<th>Percentage of teachers who “agree” (rather than “disagree” or “don’t know”)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>United Kingdom (n = 137)</td>
</tr>
<tr>
<td>We mostly only use 10% of our brain</td>
<td>48</td>
</tr>
<tr>
<td>Individuals learn better when they receive information in their preferred learning style (for example, visual, auditory or kinaesthetic)</td>
<td>93</td>
</tr>
<tr>
<td>Short bouts of co-ordination exercises can improve integration of left and right hemispheric brain function</td>
<td>88</td>
</tr>
<tr>
<td>Differences in hemispheric dominance (left brain or right brain) can help to explain individual differences amongst learners</td>
<td>91</td>
</tr>
<tr>
<td>Children are less attentive after sugary drinks and snacks</td>
<td>57</td>
</tr>
<tr>
<td>Drinking less than 6 to 8 glasses of water a day can cause the brain to shrink</td>
<td>29</td>
</tr>
<tr>
<td>Learning problems associated with developmental differences in brain function cannot be remediated by education</td>
<td>16</td>
</tr>
</tbody>
</table>

*The table shows some of the most popular myths reported in four different studies from the United Kingdom, The Netherlands, Turkey, Greece and China. In all studies, teachers were asked to indicate their levels of agreement with statements reflecting several popular myths, shown as “agree”, “don’t know” or “disagree”. The table shows the percentages of teachers within each sample who responded with “agree”.

wellcome trust
Ben Goldacre tweeted this table: 790 retweets – now been made open access
### Survey of current practice

Do you think knowledge of how the brain works should be included in teacher training? (1142 respondents)

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, in initial teacher training</td>
<td>8%</td>
</tr>
<tr>
<td>Yes, in both initial teacher training and as on-going CPD</td>
<td>77%</td>
</tr>
<tr>
<td>Yes, as on-going CPD</td>
<td>10%</td>
</tr>
<tr>
<td>No, it should not be included</td>
<td>1%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>3%</td>
</tr>
</tbody>
</table>
How neuroscience is affecting education

• More than nine out of ten teacher respondents said their understanding of neuroscience influences their practice.
• More than eight out of ten said they would collaborate with neuroscientists doing research in education.
• In general, teachers learn about interventions from schools and other teachers, rather than from scientific or academic sources.
What would encourage you to try out a new activity or technique linked to neuroscience?
Literature review: examining evidence about education initiatives that are, or purport to be, based upon neuroscience

Table 1: Criteria for rating the strength of evidence for the educational effectiveness of interventions and approaches informed by neuroscience

<table>
<thead>
<tr>
<th>Strength of evidence for educational effectiveness</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are either mixed experimental results or limited present evidence for the transfer to students’ educational learning outcomes.</td>
<td>Low</td>
</tr>
<tr>
<td>There are convergent experimental results for outcomes known to influence students’ educational learning outcomes, and/or some evidence for impact on students’ educational learning outcomes.</td>
<td>Medium</td>
</tr>
<tr>
<td>Multiple studies report convergent findings of positive impact on students’ educational learning outcomes.</td>
<td>High</td>
</tr>
</tbody>
</table>

Table 2: Criteria for rating the distance to application for educational interventions and approaches informed by neuroscience

<table>
<thead>
<tr>
<th>Distance to application</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant challenges exist in terms of the development of knowledge and understanding, and/or in terms of the design and production of state-of-the-art specialist resources, and/or in terms of ethical issues.</td>
<td>Distant</td>
</tr>
<tr>
<td>Application is likely to require some limited bridging studies, and/or limited specialist resourcing (e.g. specialist software) and/or training.</td>
<td>Moderate</td>
</tr>
<tr>
<td>The intervention could be applied immediately.</td>
<td>Near</td>
</tr>
</tbody>
</table>
ThInk blog: Exploring the link between Education and Neuroscience

http://thinkneuroscience.wordpress.com/
Education & Neuroscience Initiative

• Launched a funding round to test education interventions based on neuroscience in January 2016.
• Closed in April with 87 applicants.
• Projects needed to have promising evidence of impact, be scalable and affordable, and benefit disadvantaged students.
• Successful applicants are paired with independent evaluators – emphasis on randomised controlled trial design.
Six Funded Projects

Fit to study
A study to look at the effect of medium to high cardiovascular activity on academic attainment, using brain imaging to investigate the correlation between them.

Professor Heidi Johansen-Berg (University of Oxford)

Spaced learning
A trial on the effectiveness of repetition and spaced learning, a method of teaching that delivers a unit of work three times interspersed with alternative activities.

Alastair Gittner from the Hallam teaching School Alliance in partnership with Stocksbridge High School.
Learning counterintuitive concepts
This study aims to test the benefit of training pupils to suspend their pre-existing beliefs when it comes to solving mathematical or scientific questions, for example correcting the seemingly logical notion that a heavy object will fall faster than a light one.

Professor Denis Mareschal (Birkbeck, University of London and the Institute of Education)

GraphoGame Rime
A project that will look at how developing phonological awareness through ‘rhyme analogy’, using the GraphoGame Rime computer game, can affect how children learn to read.

Professor Usha Goswami (Director of the Centre for Neuroscience in Education)
Teensleep
A trial of later school start times, along with a sleep education programme, to assess their impact on teenagers’ educational achievement. Some participants will wear non-invasive biotelemetric devices to provide additional physiological data.

Professor Russell Foster (Oxford University)

Engaging the brain’s reward system
A project to examine the effect of uncertain reward on attainment - an element of chance in the anticipation of a reward is highly engaging and may help people learn – an interesting contrast to the traditional emphasis on consistency when using rewards and incentives in education.

Dr Paul Howard Jones (Bristol University)
Teenagers to start school at 10am in Oxford University sleep experiment

Thousands of GCSE students will start lessons an hour later to see if it improves their exam results

By Sarah Kingston, Science Correspondent

Tens of thousands of children will start school at 10am in a ground-breaking new experiment by Oxford University to see if later classes can improve exam results.

GCSE students from more than 100 schools across England will take part in the four-year project based on scientific evidence which suggests teenagers are out of sync with traditional school hours.

"Anti-dyslexia game could boost reading skills for pupils" - TES Connect

Can anti-dyslexia game boost poor pupils' reading?

Children from poor homes should learn to read using techniques developed to help dyslexia, rather than focusing exclusively on current programmes of synthetic phonics, according to a University of Cambridge professor.

Usha Goswami, director of the Centre for Neuroscience in Education, said that existing phonics programmes failed to take into account the difficulty that some children had distinguishing individual sounds.

Last week, she was awarded £250,000 to explore whether poor children could improve their reading skills more rapidly by using a computer game that tests awareness of longer sounds within words, which was originally developed to help dyslexic pupils.

The money from the Education Endowment Foundation (EEF) and the Wellcome Trust will fund a randomised controlled trial with 450-600 and seven-year-olds, to see if playing the game for 10 minutes a day significantly improves their reading skills.

Current phonics programmes encourage children to identify phonemes, the smallest units of sound, which are put together to make up syllables. "A level of sound between phonemes and syllables - called onset and rime - is inserted in. This is what the game encourages children to focus on," Professor Goswami said.

"It's a scalable package of sounds." Professor Goswami added. "If you break the word into the smallest unit of sounds, call becomes on. But [placing onset and rime] it becomes off. Synthetic phonics, if you do it exactly by the book, doesn't teach this level."

She added "The computer game was developed for dyslexic children but [its use] suggests it also could be helpful for disadvantaged children generally, who typically have impaired language and reading skills. And indeed, the game should be helpful for all children in terms of teaching English phonics."

The government has pushed the use of synthetic phonics in primary schools by introducing a phonics check at age 6 and funding resources and training. Goswami has also sharpened her focus on phonics in routine inspections.
Next steps

• Finalise project details and support delivery and scalability testing if efficacy testing proves beneficial
• Engage with other funders
• Dissemination

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