Electrical brain stimulation to enhance learning

Can and should it help children with learning difficulties?

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Applying a non-invasive electric current to the brain shows some potential for improving learning. What does this mean for the school context?

Electrical brain stimulation involves the application of a mild electric current to the scalp. Recently, researchers have been trying out this technique, known as transcranial electrical stimulation, with children, to see if it can improve their ability to learn. The aim of this research is to provide a safe way in which methods derived from neuroscience enhance learning outcomes, ultimately improving life outcomes.

The technique was used recently in a pilot study involving 8- to 10-year-olds with mathematical learning disabilities. All pupils who took part underwent arithmetic training for two days per week for five weeks, while wearing a wireless brain stimulation headset. Half of the children received brain stimulation to a region at the front of the brain during the training, and the other half did not. Children who received the stimulation showed higher accuracy and faster learning during training than those who did not.

Although this was a very small study consisting of just 12 participants, the most promising aspect was that training gains appeared to transfer to a different maths task.

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This study shows a glimpse into what the future might hold for brain stimulation: providing treatment for those with learning difficulties. This is especially appealing under the consideration that there has been minimal success through behavioural treatments for children with particular learning struggles.
Nevertheless, there is still a lot that is unknown about brain stimulation. Though scientists have theories about how the technology affects the brain, they still don’t know the exact mechanisms of brain stimulation. There are additional questions, many of which align with those for any other kind of intervention. For example, what are the long-term effects of this stimulation? Who does the stimulation work for – just those who struggle, or is it for everyone? How often should the brain be stimulated for the maximum benefit? There is still a long way to go to answer these questions.

As well as scientific unknowns, there are numerous ethical issues

Understandably, the concept of applying an electric current to a child’s brain is often met with concern. This has not been ignored by the field and academics have engaged with these issues in peer-reviewed articles. A variety of topics have been examined by commentators. The key issue concerning brain stimulation used on children is an ethical one.

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It could be argued that as a society we should do everything we can to improve learning, and therefore, providing brain stimulation would be no different to using the best teaching techniques (assuming it is found to be beneficial without negative effects). Brain stimulation may be particularly welcome for those who struggle, to give them a fairer chance compared to their peers.

A counterargument is that there is no reason to use brain stimulation because we should accept that pupils naturally have strengths and weaknesses. On this view, using brain stimulation is a way of pushing the blame onto pupils, and forcing individuals to change so that they fit in with our own expectations. However, it is true that many interventions already exist for low performing children, and if brain stimulation is found to be more effective, it could be considered more ethical.

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An interesting review paper discusses in depth the various ethical issues that arise when considering brain stimulation in healthy individuals. The authors argue that it is important to open up the conversation about ethics before we reach scientific certainty about effectiveness of the technology. All stakeholders, including parents, policy makers, teachers, and pupils themselves, should be involved in these discussions, given the possible divergent views. The authors say that anticipating possible future scenarios would enable us to decide how best to react to certain situations that may arise.

The reality is that there are many unknowns when it comes to the science of using electrical brain stimulation in an attempt to improve learning. It is important that the science continues to examine the effects of brain stimulation, not least because concerning it is now possible to buy DIY brain stimulation kits online; an exploitative and potentially dangerous practice.
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At the moment it seems unlikely that schools will invest in stimulation headsets for their pupils. Yet it’s believable that this could become part of a treatment for those who have particular struggles at school. Perhaps now is the time to open up the debate, to decide what we as a society find to be acceptable when it comes to brain stimulation, and to move towards an environment of consensus within which research can flourish.

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