

The mind's eye: visualisation and learning

Teachers and educators have long recognised the importance of visualisation in teaching and learning. More recently, both educational and neuroscientific research has validated the effectiveness of this learning strategy. Nicola Davies presents some of the research supporting the efficacy of visualisation in teaching and learning and encourages educators to embrace this valuable learning aid.

Deciphering learning styles

The literature is flooded with theories regarding different learning styles. While visual learners do best when they 'see' learning material, auditory-verbal learners acquire new information most efficiently by hearing or verbalising it. The less dominant learning styles are kinesthetic, which involves touching or feeling the material, and olfactory and gustatory, which refers to learning by smelling and tasting, respectively. Another theory is based on the VAK model, according to which some people work best with a combination of styles, namely the visual, auditory/verbal and kinaesthetic styles.

Although the theories on different learning styles have their place, they can also limit the concept and possibilities of visualisation. Visualisation goes beyond simply seeing the learning material and remembering it in images. The concept involves seeing, imagining and recreating or inventing a situation. During this process, all the senses are engaged to increase memorability – feeling, sensing, smelling and touching. This is why visualisation is so efficient as a learning tool.

Visualisation for educators

In educational sciences, the term 'visualising' can be used synonymously with imagining. When we visualise an event, we experience it in our minds, in its entirety. We imagine and relive the related sounds, smells and feelings. It's not enough to go through this process only once, since the best effects are achieved through repetition. '*Repetitio est mater studiorum*,' as the old saying goes. Through repetition the brain acquires new information and assimilates it. Soon, the information is stored and there is no more need to imagine, only to recall what is now ingrained in the mind.

It is important to emphasise that visualising doesn't only facilitate the acquisition of knowledge, such as that needed to pass an exam. Visualisation is conducive in learning physical skills, in self-development, or entering into the right state of mind for achieving success, which also aids learning. Elizabeth Wright, motivational

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speaker, uses visualisation when conducting career-oriented workshops to help students identify their future career paths. She believes the way visualisation is implemented determines its success. She says, "Visualisation can encompass many techniques, the most recent I have been exploring is storytelling and encouraging students to write their vision for their future."

A similar experience is shared by Mike Warwick, Senior Consultant at the City of London Therapy Centre and Founder of Exam Magic,¹ a course designed to reduce exam stress. He says, "I think it's useful to talk about expectations and visualisation together. Student expectations are one of three decisive influences on educational outcomes. If I am to expect success in exams then I must have some idea of what that looks, sounds and feels like. So, visualising success is an essential part of expecting success." A technique Warwick frequently uses is role playing – to give students an experience of exam success. He explains, "Once they've role played it, then visualising becomes remembering." The trick is to repeat the visualising action until it becomes natural – a habit of the mind.

Kevin Hewitson of Advocating Creativity in the Classroom (ace-d)², claims that learning through visualisation is a multisensory experience. He says, "To me, effective visualisation involves the use of predictive imagery, imagination linked to an ability to manipulate what is known or understood, and to take this forward in developing a visual exploration of what may be possible. To take an event or situation and apply imagery in order to create a visual representation of a possible outcome or future event; to see a possible future. This has implications in design, art, music, drama, English writing, History and many other creative subjects, as it does in managing

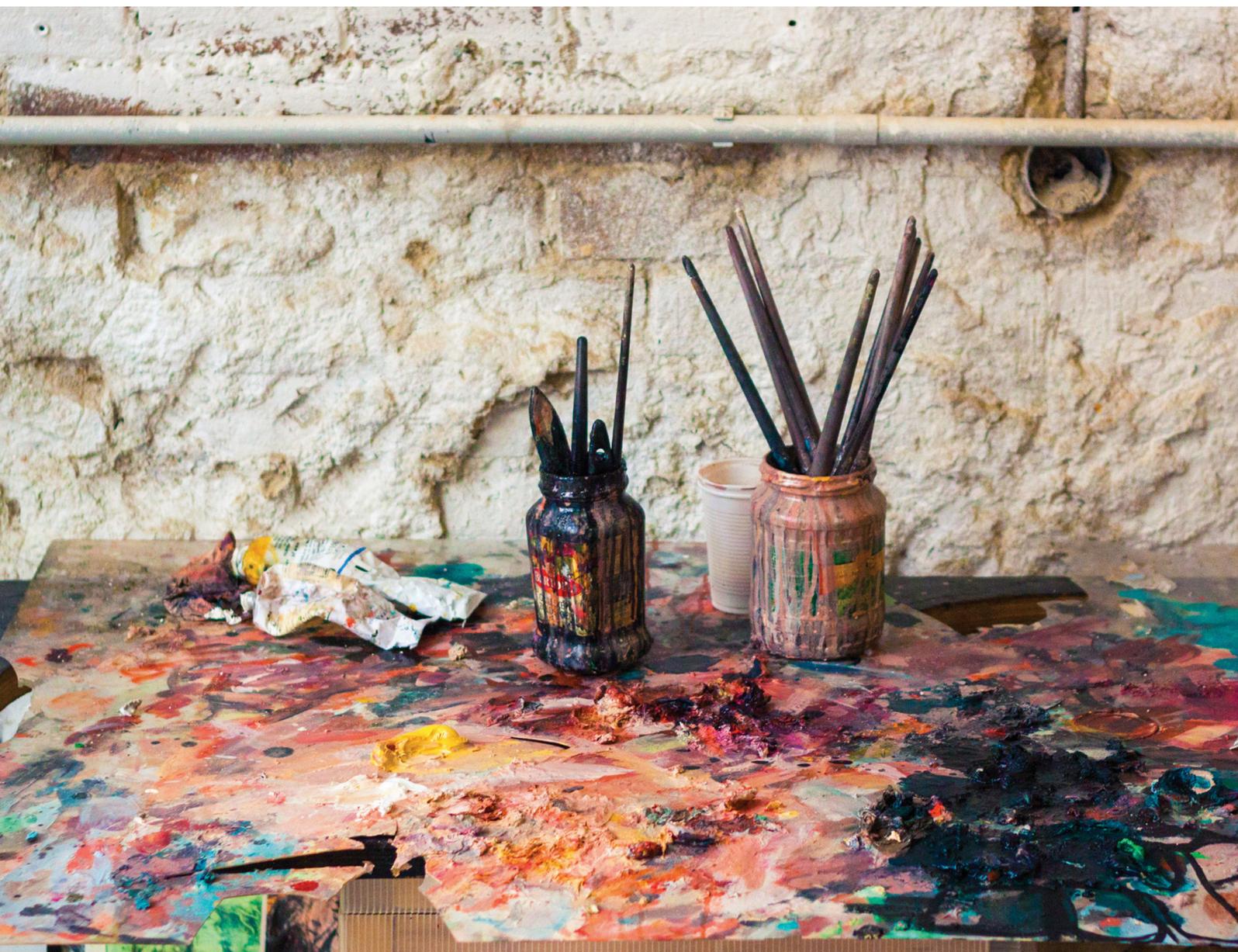
emotions, behaviours and social interactions."

Hewitson also points out that not all visualisation takes place in the mind. Playing, designing, drawing, and making things out of Plasticine are all visualisation activities. Nothing can be created unless the person has a clear picture of what it is that they want to make. It is during this act of creation that visual images are made and then stored for future reference. "Practical modelling helps us to develop our visual library in the same way as reading helps us develop our vocabulary," adds Hewitson.

In many ways, visualisation is the vehicle that transports us from knowing to understanding. It helps us think ahead and control our own emotional and cognitive responses. We need visualisation in order to be able to think laterally and to find alternative solutions to problems. "The trick is to activate as many memory lanes as possible," says Tatjana Glogovac, teacher of Research Paper Writing and mentor at the Regional Centre for Talents in Belgrade. "The more senses and intelligences you activate, the longer and more vividly the learned material stays with the learner. Plus, it can be applied to any topic."

Before performing any conscious action, an individual first needs to have a mental representation of it. Physical action is no exception – it needs to be executed in the mind first. This is why visualisation as a learning tool is widely used in sports, especially athletics. By mentally rehearsing, athletes can recreate physiological actions in their bodies, form muscle memory, and develop motor skills. A common strategy used by sportsmen is to imagine someone else doing the action first. That way they can see how it is correctly done from a third person perspective, without personal emotional involvement.

Once an athlete has envisioned someone else carrying out the action, then they can imagine themselves doing it. What is important here is to imagine every possible aspect of the action – the muscles twisting and stretching, the air blowing past, the sweating, the very *feeling* of performing the action – as vividly as possible. The last part of the strategy is to repeat the process until it



becomes deeply ingrained so that the brain and muscles start believing they have actually completed the action many times before. The more vivid the mental representation, the stronger the impact on learning outcomes.

Neuroscientific research on visualisation

Neuroscientists have shown increasing interest in the effects of visualisation on the brain. The first forays into the neural background of visualising date back as far as 1894, when Nobel prize winner and neuroanatomist, Santiago Ramon y Cajal, argued that the brain is changeable and can be perfected by mental exercise. He claimed that properly constructed and repeated thoughts can create and strengthen new synaptic connections in the brain. During this period, however, there were no existing tools to prove the hypothesis. Fortunately, we now have the capability to examine the brain and make more accurate assumptions about its functions.

Mental practice through visualisation can be as effective as actual practice if supplemented with minimal physical practice

Transcranial magnetic stimulation (TMS) is one such tool, pioneered by Alvaro Pascal Leone, a Professor of Neurology at Harvard Medical School, Boston, Massachusetts, USA. Pascal Leone demonstrated that visualisation and imagination can lead to physical changes in the brain. One of the first experiments in the sphere of visualisation and mental exercise was conducted by Pascal Leone with people who were learning to play the piano for the first time. Pascal Leone showed them the notes, which fingers to move, and let them hear the notes while they were played. He then divided them

into two groups; one group, the 'mental practice' group, would sit in front of a piano for two hours a day, five days in a row, and imagine playing the notes and hearing them. The other group, the 'physical practice' group, were involved in physical practice for the same period of time.

Both of Pascal Leone's groups had their brains mapped before and after each session. In the end, they were asked to play the notes they had practiced while a computer measured their performance. Both groups had learned to play the notes correctly and both showed similar physical changes in the brain and in the motor signals sent to the muscles. Although the physical practice group showed somewhat more progress than the mental practice group, when the latter was given a chance to take part in physical practice for two hours in total, they showed the same progress as the physical practice group. This demonstrates that mental practice through visualisation can be as effective

as actual practice if supplemented with minimal physical practice.

There are many similar known cases of the amazing powers of mental practice and visualisation. One such well-known case is that of the Soviet human rights activist, Anatoly Sharansky. He was sent to prison in 1977 for nine years on false accusations of spying on the United States. Of those nine years, almost a year and a half was spent in a dark, freezing, solitary cell. Prisoners in such conditions often lose their mental health because the brain needs outside stimuli to function. However, Sharansky found a way to survive the mentally challenging period – he played mental chess with himself, taking turns in playing both sides. After he was released and later became a cabinet minister in Israel, he had the opportunity to play against the world champion Garry Kasparov. Kasparov managed to defeat everyone in the cabinet except for Sharansky.

Another incredible example of the power of well-directed visualisation on the brain is that of the mathematical genius, Rudiger Gamm, who is able to do extraordinary calculations in his mind, such as calculating the n^{th} power of the n^{th} root of a number, in a matter of seconds. What is more impressive is that Gamm isn't a genius or savant; he is a young man of normal intelligence who acquired this skill while

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working in a bank where he was required to do four hours of calculating a day. An experimental psychologist, Nathalie Tzourio-Mazoyer, who studied Gamm's skill reported that the trick was that he learned to use his long-term memory while most people use short-term memory for these kinds of tasks.

Explaining the power of visualisation in learning

Why is visualisation so effective? From a neuroscientific perspective, visualising an action and doing it aren't so different. For example, imagining writing a letter and actually writing it activates the same part of the brain – the primary visual cortex. Further, it has been shown that the *faster* you can imagine performing an action, the faster you can perform it. A simple experiment that proved this was one by a French scientist, Jean Decety from Lyon, in 1994. Lyon tested how much time it took participants to imagine writing their names and actually writing them. It took similar amounts of time, but when participants imagined writing their name with their non-dominant hand it took

them significantly more time. This indicates that visualising and performing come from the same motor regions of the brain. In many ways, visualising is doing.

Where next?

Neuroeducation is a new field of neuroscience, which looks into the practical, applicable neuroscientific implications for improving the learning and educational experience. The potential for learning, be it studying, self-development, or acquiring practical skills, is limited only by the imagination. Whether you are an educator or a parent, it's time to welcome visualisation and the benefits it brings.

References

<http://www.exammagic.co.uk/>
<http://www.ace-d.co.uk/>

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