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Squeeze a bit more from this sponge

Universities will need to understand how the brain really learns before they can truly educate students, argues **Jamshed Bharucha**

Not so long ago, a former student of mine came up to me at a reception to say hello. "I really enjoyed your course on cognition," he exclaimed, "particularly all that stuff about how memory works." Much to his dismay, I then asked him what he remembered from the course. He recalled the grade he received and some broad topics, but he couldn't articulate cogently a single idea that he had learnt.

Long-term retention of learning is shockingly poor. The information is probably still in the brain, but unless you have previously retrieved it or recently exercised that mental skill you are likely to have difficulty doing so. "Use it or lose it" is as much a principle of the brain as it is of the muscle. In university, we examine students at the end of a course and certify mastery based on their performance. We do not assess how much of this learning stays with them.

It is clear from research in cognitive psychology and brain science that some of our educational practices do not mesh with how the brain actually works. Society has structured the process so that a student is said to have "completed" his or her education based on performance at a defined point in time. We provide our stamp of approval and deliver our students to the next course or into the world as one might deliver a product through a production line. Yet mastery is fleeting.

We are finding many mismatches between how universities teach and how the brain learns. For example, one principle of memory function is that we remember something best in the context in which we learnt it. As educators we have an abiding faith that the general principles of reasoning that we teach will become part of our students' mental lives, and that they will apply these principles to novel situations in the future. Yet, because of the context-specific nature of memory, this is likely to happen only if students learn and practise principles with a broad range of examples and situations.

Furthermore, most universities persist in overusing one of the most passive educational formats ever invented: the lecture. Yet we know that active learning – in which the learner poses questions and discovers potential answers at the risk of making mistakes, as in a tutorial or supervised research – is much more powerful.

But perhaps the most consequential scientific finding pertinent to understanding education is that we have no conscious access to most of what is in our brains. Most of our knowledge is implicit; we are not aware of it and cannot verbalise it any more than we can explain how we are able to ride a bicycle. Implicit knowledge is acquired through exposure and interaction with the environment so extensive that it becomes automatic. While some forms of professional training, such as surgery or musical performance, successfully impart non-verbal motor skills, the coin of the realm in most higher education is the written and spoken word. Too often, we fall victim to the fallacy that we can impart knowledge and cognitive skill by simply describing or explaining things.

Nowhere is implicit knowledge more consequential than in culture. We can learn some things about another culture by reading books or listening to lectures but not enough to function within it in even a rudimentary way. As the world becomes more interconnected, the opportunities for global enterprise and co-operation grow. But so

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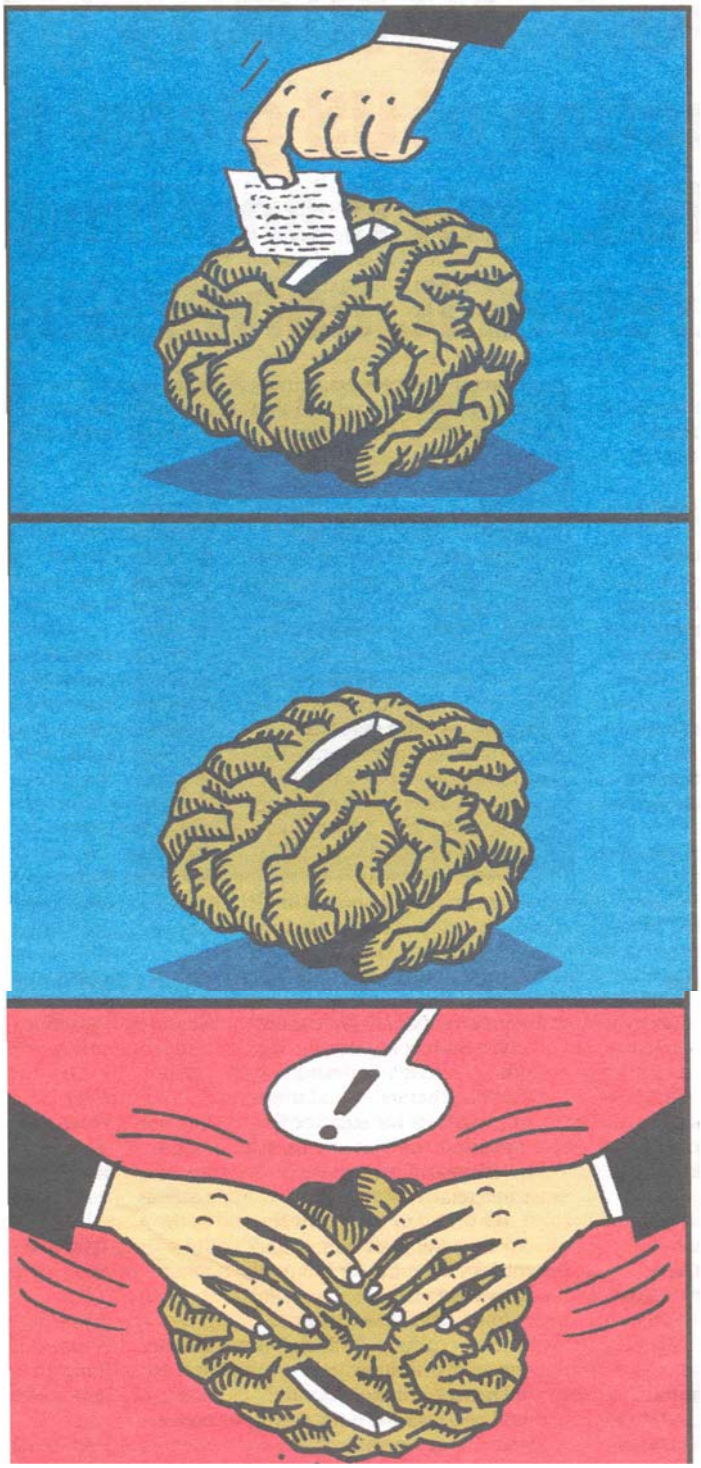

do the risks of disastrous cultural misunderstanding. More than ever, the mark of a highly educated person must include the ability to interact effectively in a culture other than one's own. Higher education will need to adapt substantially if this is to be achieved.

Social neuroscience is starting to explore implicit knowledge of culture. Its findings are startling. For instance, a group of US college students were shown photographs of faces while their brains were scanned. When they were shown black faces, under certain conditions, part of the brain called the amygdala became more highly activated than when they were shown white faces. This suggested a vigilance or fear response, the product of implicit knowledge. Furthermore, this result was true for both black and white viewers.

So it would seem that racial and other stereotypes are encoded quite independently of our formal education, through the messages and expectations communicated by our society. The brain is a potent cultural sponge. Explicit knowledge might give us some tools to compensate for or mask such implicit knowledge, but we are only just beginning to understand its persistence.

Fortunately, recent research suggests that automatic stereotype activation may be moderated by the way in which situations are framed. As our understanding increases, we must figure out how best to educate our students in light of the automatic societal programming to which we all are subject.

Science is revealing many new insights into the learning process. So we must continually adapt our educational systems, including the way our universities function, as we advance our understanding of how the brain acquires knowledge.

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