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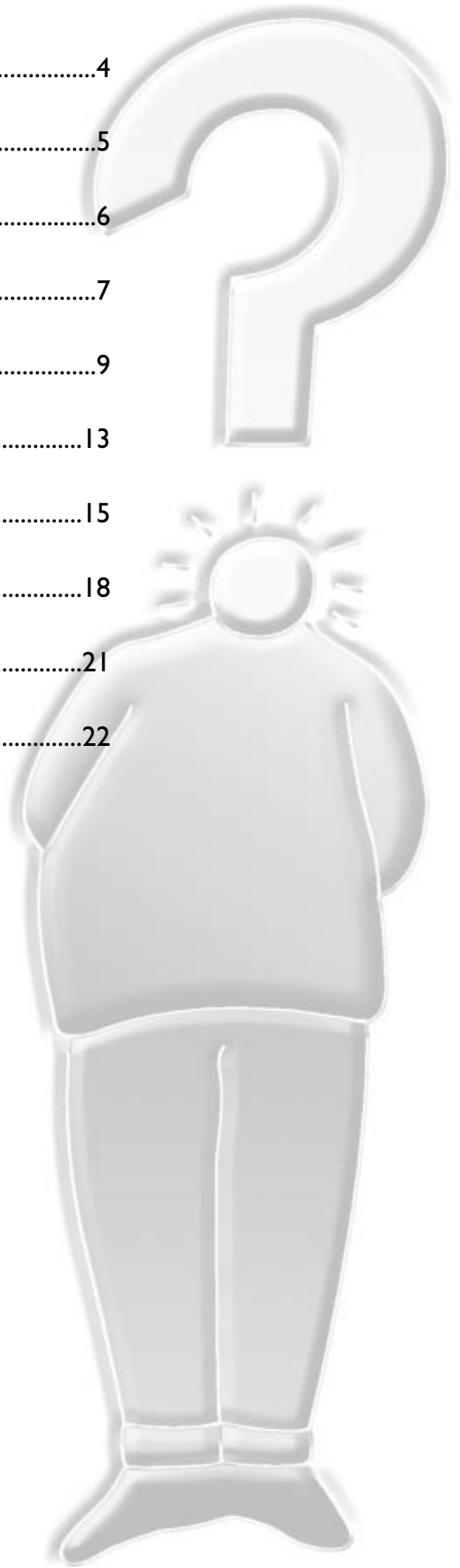
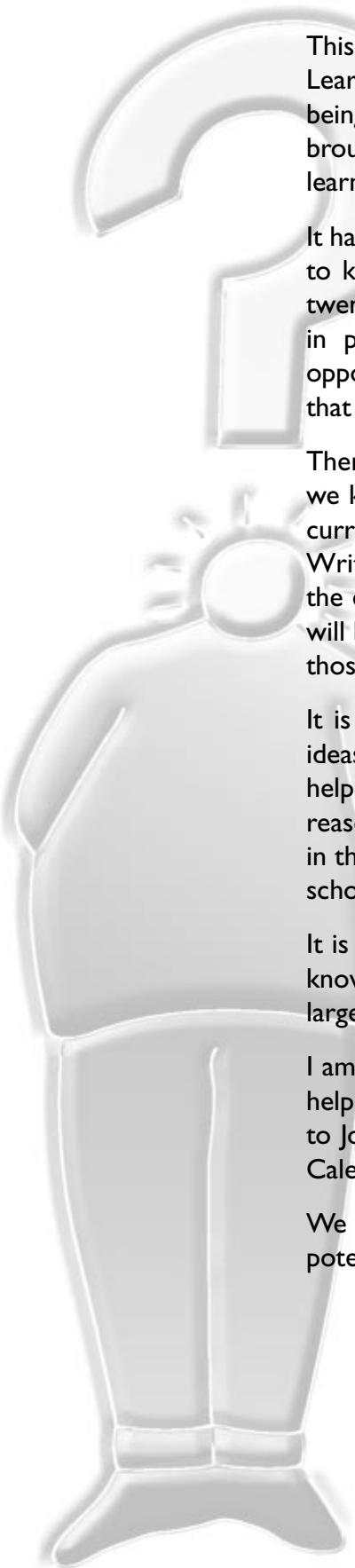


Foreword



This is the first in a series of occasional papers being published by Learning Unlimited and Hawker Brownlow Education. These papers are being produced in response to a growing demand from teachers to be brought up to date with our current understandings about how children learn and how good teachers teach.

It has been pointed out that you would not go to a doctor who had failed to keep up to date with what we know about medicine over the past twenty years. Yet a large percentage of the teachers in Scotland have been in post for more than twenty years, and many have not had the opportunity to update their knowledge about learning and teaching in that time.

There will be two kinds of occasional papers. Some will focus on what we know. They will draw on a wide body of research to summarise our current understandings about a key aspect of learning and teaching. Written on the assumption that most teachers do not have the time or the energy to read lengthy academic texts at the end of a busy day, they will be short and, we hope, readable. Further references will be given for those who feel inclined to explore further.

It is clear, however, that teachers not only need help to reflect on the ideas that underpin what they do in the classroom, they need practical help and support to put them into practice in the classroom. For this reason some of the papers will focus on ideas and techniques which work in the classroom, and some will describe case studies of good practice in schools.

It is appropriate that the first paper in the series looks at what we now know about the brain and how it learns. Neurology is the source of a large amount of the new information we have about learning.

I am grateful to Robin Lloyd Jones and Bob Bissell for their support and help in putting this paper together; to Liz Callaghan for proof reading; and to Joan Black, Centre for Education and Training Development, Glasgow Caledonian University, for desk-top publishing and publication.

We are happy to consider suggestions for future titles in the series from potential authors, whether classroom practitioners or academics.

Ian Smith, January 2001

Brain power

'The brain is the most exciting entity in the universe'

Susan Greenfield

'The brain is my second favourite organ'

Woody Allen

The Americans have called the 1990s the 'decade of the brain' and it is claimed that 90% of what we know about the brain and how it learns has been learned in the last five years. Yet we still don't have definitive answers to fundamental questions such as 'What is intelligence?' 'What is memory?' 'What is consciousness?' 'How do we actually see?' and yes, 'How do we actually learn?'

The human brain may never understand itself. But as our knowledge increases we are coming to realise just how immensely powerful, incredibly flexible and dynamic the brain is. It is constantly changing and developing throughout our lives, continually reinventing itself day by day, hour by hour, as it responds to its environment. It is no wonder it is being hyped so strongly. It is good to have Woody Allen give us a sense of perspective about it. Even so, consider some of the following brain facts:

- A fruit fly has 100,000 brain cells, a mouse 5 million, a monkey 10 billion. Our brains consist of about 100 billion brain cells or neurones.
- Each one of these brain cells is capable of communicating with any other. This means that the brain is capable of making trillions of connections. It is reckoned by the age of ten our brains will have made around one thousand trillion connections (most of them will also have been unmade).
- Although the body of a neurone is tiny (30,000 will fit on the head of a pin) each neurone has a fibre which can (in extreme cases) be up to a metre long to allow this kind of communication to happen.
- Communications can be sent back and forward between neurones via a sophisticated combination of electricity and chemistry at a speed of 850 kilometres an hour. Each neurone is capable of making up to 1000 simultaneous connections.
- When in the womb our brains grow by around 250,000 neurones a minute. By the time we are born our brain weighs around 500 grams. It doubles in weight in the first year of life and triples in weight by late adolescence. It then stops growing in overall weight or volume.
- Although other cells in our bodies regenerate throughout our lives (our skin every month, the lining of our stomachs every four days), we tend not to grow new neurones after birth.
- The growth spurt in the first year is accounted for by the existing neurones growing in size and by other kinds of brain cells being formed. But mostly the increase in weight is accounted for by the making of connections between neurones.