

DOES EDUCATION TAP ONLY HALF OUR BRAIN POWER? UNRAVELLING CONCERNS ABOUT STANDARDS

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The brain is an enchanted loom where millions of flashing shuttles weave a dissolving pattern, always a meaningful pattern though never an abiding one'. (Sir Charles Sharrington)

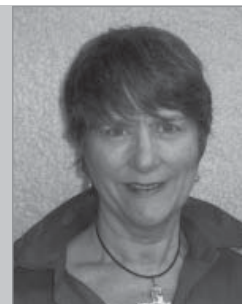
Professor Rosemary Sage's inaugural lecture was held at Portcullis House, the House of Commons, London, on Monday 16 November 2009.

We all have two brains - a verbal and a non-verbal one - with two ways of thinking. However, we exist on less than half our brain power and this important issue is unpacked, unravelled and better understood to raise standards of performance.

On the right side of our brain, we have one way of knowing. In this mode we 'see' things that are imaginary (mind's eye) or recall those that are real. Imagine your favourite food – its colour, shape, taste and smell. We 'see' how things exist in space, understand metaphors, dream, fill in information/opinion gaps in talk or text, combine ideas to make new ones and assemble meaning (synthesise events). If something is too complicated to speak about we gesture. Try to describe a spiral pole without using your hands! Images ('seeing' within) are personal, idiosyncratic, non-verbal ways of thinking intuitively, holistically and metaphorically (Edwards, 1979). We call this the 'seeing/feeling' brain, using it to communicate with ourselves and understand whole things or events.

The left side works in an opposite way. It analyses, abstracts, counts, marks time, plans in steps and makes logical statements with words expressing thoughts. So, if apples are bigger than plums and plums bigger than currants, we say that apples are necessarily bigger than currants. This illustrates the left brain mode: analytic, sequential, symbolic, linear, objective and verbal. It is the 'saying/hearing' brain communicating thoughts to others in a conventional way (Edwards, 1979).

This review illustrates how both brains complement each other, suggesting that educational practice favours left brain development at the expense of the right. It leaves us full of facts but without ability to apply them judiciously. Quite small changes in the way we learn, however, can produce big results. The future is bright if we are brave enough to alter our ways. The reward is akin to having a 'tiger in our tank' as suggested in an old petrol advert! Brain power is unleashed so that nothing seems impossible. Learning to use both brains more effectively may shoot us up the educational rankings and result in a double blessing!



Introduction: setting the scene

Imagine a class of 7-year-olds in primary school. Their heads are bent over hands busily colouring a picture of a tiger, whose stripes resemble Joseph's multi-colour dream coat.

Mrs Beasley (Mrs B.), the teacher, is walking the aisles between neat rows of desks, keeping a beady eye on those off task. She spies a little blonde staring into space:

"Lissa, where's your crayon?" She replies: "Ain't got none, Miss". Mrs B. sighs: "I've told you over and over again

not to say that. Listen carefully - I do not have a crayon; you do not have a crayon; she does not have a crayon; he does not have a crayon". Lissa looks puzzled: "Miss ... who's got all the crayons, then?"

What a perfect example of two people with different ways of thinking! Lissa (using her right brain) fixes on the whole context whilst Mrs B. (using the left one) targets its components. So, why is there no meeting of minds here? At seven years old, Lissa's right brain is busy getting the gist of things with her left one developing later to cope with the

detail of events (Sage, 2000a).

This talk between teacher and pupil considers what they say, but is this similar to events we see? Glance at Figure 1: Miller's (1986) puzzle. What is it? A mess? Islands in the sea? Look carefully at the whole shape. Can you pick out a Mexican on a horse? Start with the middle top shape (looking like a brimmed hat) and work downwards. Unifying parts into a meaningful picture is the right brain role whilst the left one analyzes components (the Mexican hat, male torso, horse's body, head, legs and tail, etc).



Figure 1: Miller's puzzle picture (1986)

So, we all have a double brain with different ways of processing and knowing - seeing/feeling and saying/hearing. One side considers the whole and the other parts. By examining this phenomenon we show how education concentrates on left brain activities at the expense of the right, limiting thinking, understanding and judgement. Goldacre (2008) says the brain receives piecemeal information from many sources, but without a system to deal with it the whole 'picture' is never appreciated. Constructing understanding is like looking at the vast ceiling of Rome's Sistine Chapel through a long cardboard tube. With limited information and an inadequate right brain schema for making meaning, people are easily misled and incapable of interpreting evidence. This is just what must be avoided if we are to survive the hazards of a rapidly changing world. Four out of five pupils now starting school will enter jobs not yet existing and use technology not yet invented, so we need to carefully plan for their futures and develop all potential (Murphy, 2009). With 65,000 students daily playing truant, half a million 11-year-olds unable to reach the useful literacy level and six million working-age adults without jobs and on benefits, we have a massive challenge on our hands (Office for National Statistics, 2009).

Getting to know both sides of your brain

The brain is a crinkled mass resembling two halves of a walnut with unlimited power. It has an estimated 100 billion nerve cells and 500 trillion connections at the rate of 1 million per second. Knowing how this power is harnessed to process and produce information is crucial. Our brains are functionally asymmetrical with

the left controlling the right side of the body and vice versa. However, language and its associated capacities are located in the left hemisphere for most of us. Because speech and language express thinking and reasoning, scientists traditionally have regarded the left as the major hemisphere with the right as the minor one. Roger Sperry's split-brain experiments (Figure 2) changed this view. By cutting the corpus callosum, the nerve cable cross-connecting both hemispheres, Sperry isolated them to show their differing functions.

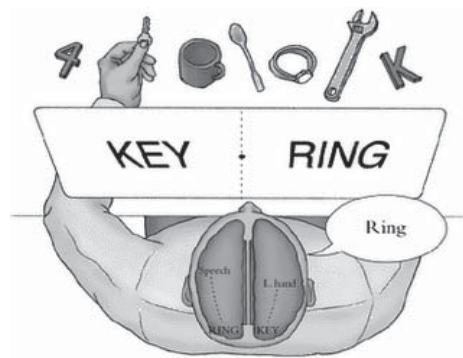


Figure 2: Sperry's split-brain test (1968)

In one test, two different pictures flashed on a screen, with the split-brain man's eyes fixed on a midpoint to prevent scanning of both images. Each hemisphere received different pictures. A picture of a key on the left went to his right brain and a ring on the right went to the left one, as above. When asked to name what flashed on the screen, he confidently said ring. However, when asked to reach behind a screen with his left hand (right hemisphere) and select what was seen, he picked up the key. The left brain says and the right one sees but you cannot say what you see or vice versa if both brains are disconnected. For tasks such as reading and writing you map what you see on to what you say so the two brains must cooperate. In other activities, like drawing, the hemispheres may work singly with the right brain on and the left more or less off.

Bias against the right brain in culture and tradition

Words expressing left and right concepts are frequent in language and thinking. The right hand (meaning also the left hemisphere) is strongly connected with

good, just and moral. The left hand (right hemisphere) is associated with concepts of bad, dangerous and immoral. Until recently, this bias against left hand/right hemisphere led parents and teachers of left-handed children to force them to use their right one for eating, writing and drawing which sometimes led to learning difficulties. My left-handed mother had to change to her right hand when starting school. In my case as a left-hander, I was allowed to develop naturally but learnt to use my right one after a serious accident.

In general, languages around the world show good connotations for the right hand/left hemisphere and bad ones for the left/right one. For example, the Latin for left is *sinister* meaning 'bad' and for right - *dexter* indicating 'skill' or 'adroitness'. In French, left is 'gauche' or 'awkward' whereas right is 'just' or 'proper'. In English, left comes from the Anglo-Saxon *lyft* meaning 'weak' or 'worthless', whereas the right - *riht*, is defined as 'right' or 'just'. In politics, right wingers endorse national power and resist change whilst the left value individual autonomy and radical initiatives. The right is fascist and the left is anarchist at its two extremes.

Regarding cultural customs, at a formal dinner the place of honour is on a host's right side. Also, a bridegroom stands on the right at a wedding with the bride on the left - signalling non-verbally their relative status. However, such references emerged when languages evolved in the left brains of humans - the left name-calling the right in derogatory terms. The right brain, dealing only in images, was without a language to respond.

The duality of human nature and thought has long been debated by philosophers, scientists and teachers from many different cultures. Divisions have traditionally been made between thinking and feeling, intellect and intuition, objective analysis and subjective insight (Edwards, 1979, Sage, 2000a). Writers, on matters of politics, say that people tend to analyse good and bad points of an issue but then vote from their guts demonstrating that feelings over-ride facts.

Science abounds with researcher anecdotes about trying to figure out a problem and the answer then presented metaphorically in a dream. The 19th century mathematician, Henri Poincare describes this: 'One evening I drank black coffee and could not sleep. Ideas rose in crowds. I felt them collide until pairs interlocked' (Edwards, 1979, page 35). So an intuitive solution was made to a puzzling problem. We experience this when suggesting about someone: 'the words they say seem okay, but something tells me not to trust them'. Such intuitive observation shows that both brain-sides are at work processing the same information differently.

On the right side, we have one way of knowing and understanding. We 'see' things in this mode that are imaginary (mind's eye) or recall those that are real. Can you image your favourite food – its colour, shape, smell and taste? We 'see' how things exist in space, dream, understand metaphors, fill in information and opinion gaps in talk or text, create new combinations of ideas and assemble the meaning of events. If something is too difficult to speak about we employ gestures. Describe a spiral pole without a hand gesture! Images ('seeing' in the mind) are personal, idiosyncratic, non-verbal ways of thinking intuitively, holistically and metaphorically. We call this the 'seeing/feeling' brain and use it to understand and communicate with ourselves before doing so with others (Edwards, 1979).

The left hemisphere has a contrasting role as it analyses, abstracts, counts, marks time, plans in steps and uses words to make logical statements. For example, if apples are bigger than plums and plums bigger than currants, we say that apples must be bigger than currants. This illustrates the left hemisphere mode: analytic, sequential, symbolic, linear, objective and verbal. It is the 'saying/hearing' brain that communicates with others. The impression this gives is that the right brain thinks in a free way, whereas the left one has a more fixed approach. This distinction becomes important when we consider how to solve a problem which is discussed in a later section.

Eureka: the 'ah ha' of understanding

In the right hemisphere mode of information processing we use intuition and leaps of insight without figuring things out logically. When this happens, we might exclaim: 'I've got it!' The classical example of this is the exultant shout, "Eureka!" (I've found it!) attributed to Archimedes and his flash of insight while taking a bath, enabling him to formulate the principle of using the weight of displaced water to determine that of solid objects. Thus, the right hemisphere mode is intuitive, subjective, relational, holistic and time-free. It is given short shrift in learning. Education has been designed to cultivate the verbal, rational, on-time left hemisphere, leaving half the brain of every student virtually neglected (Sperry, 1982).

A whole brain would be better than just half of one

With sequenced teaching based on words and numbers, schools are not equipped to develop the right hemisphere role. After all, this brain is without verbal control and so under suspicion. It cannot be reasoned with and begins processing where it likes, taking in everything at once in a holistic way. Fixing only on the outline of events and poor at categorising information, the right brain focuses on the 'thing' as it is, in the present moment. We are uncomfortable with this free-thinking brain and are more at ease with the left side's more disciplined approach. Today, educators acknowledge the importance of intuitive, creative thought but schools continue to be structured in left hemisphere mode. Teaching is sequenced; students progress through year grades 1-13 in linear direction. The main subjects studied are verbal and numerical. Strict time schedules are followed. Seats are in rows. Learners converge on answers which are judged right or wrong by teachers. Students are graded and must work to standard targets set by government. Many of us feel that things are not as they should be. The right brain (artist, artificer, dreamer and free spirit) is lost in our education system and mostly untaught. There are limited art, music and drama lessons but we are unlikely to find courses in imagination,

perception, intuition, inventiveness or communication. Yet educators and employers value these abilities but assume that students will develop them as a result of training in word analytic competences.

Such development does occur in spite of the school system because our survival depends on it. However, our culture so strongly rewards left brain performance that surely we are losing much of the potential of the other half? Jerre Levy (1968) has said that schools, colleges and universities may eventually destroy the right hemisphere with their prescriptive methods. He was speaking in an era with perhaps more creative school experiences and certainly less emphasis on targets than exist today.

We are aware of inadequate education of verbal abilities (narrowly interpreted by us as vocabulary and grammar) that handicap people for life. What happens to the non-verbal right brain (responsible for assembling meaning) which is hardly trained at all? Perhaps, now that neuroscientists provide evidence for right brain teaching we can develop an educational system that facilitates the whole brain, matched to its natural stages of development. Right brain processing has its growth spurt from 4-7 years with the left one kicking in after this. Studies show that learning problems arise from a limited right brain strategy because an early left brain analytic focus has hampered growth. The result is a strong grasp of facts but a weak grasp of meaning (Sage, 2000a 2003). It is surely significant that educationally high-achieving countries start formal learning after six years of age, so working with the brain's natural development and allowing the necessary freedom for right brain growth as well as more real experience.

Imaging is vital for understanding

There is considerable evidence to suggest that those of us who are poor at imaging (right brain activity) struggle with understanding (Sage, 2003). Take this short story verse that might be introduced to young children:

Algy met the bear.
The bear met Algy.
The bear was bulgy.
The bulge was Algy.

The words do not actually contain the main message: the bear ate Algy. This information gap is only filled if we can imagine what happened from the surrounding clues - the bear was Bulgy. The bulge was Algy. This response depends on past experience of hearing that bears are dangerous and might eat humans.

All connected talk or text has these information/opinion gaps which we have to deal with imaginatively in order to achieve meaning. Seldom do we introduce this imaging behaviour into classroom routines. So how could it be done? As example, we might have a lesson on Henry VIII, who became King of England 500 years ago in 1509. To encourage imaging we might introduce him like this: 'Can you tell your neighbour what you think King Henry looked like? Quickly sketch your ideas and present these to the class in ten minutes'. This introduction helps students use imaginations so that, when presented with facts about Henry VIII, they will have been encouraged to use both brains. After the facts, introduce a review. In pairs, ask students to talk through what they gained from the lesson and then share this with the class in a 30-second time-slot. Summarising experience develops understanding and a permanent mental record. Without this opportunity only superficial learning occurs. Nowadays, we are driven to fill student brains with knowledge so marginalising approaches that help understanding.

Coup d'oeil: the ability to 'thin-slice'

The phrase, coup d'oeil, translated from the French, means 'power of the glance'. It is said that brilliant generals possess this ability to immediately see and make sense of the battlefield. It is striking how many different professions and disciplines have a word to describe the gift of reading deeply into narrow slivers of experience. The basketball player, who takes in and comprehends everything that is happening in a game, is described

as having 'court sense'. The ornithologist, David Sibley, says that in Cape May (New Jersey), he spotted a flying bird from over 70 metres away and knew it was a ruff. He had never seen this rare sandpiper before but was able to capture what birdwatchers call the bird's giss – its essence (Gladwell, 2006). If we could not 'thin-slice' we would be unable to make sense of complex situations in a flash with everything appearing indecipherable. This right brain ability brings better understanding of events. 'Thin slicing' is worth cultivating and is facilitated by regular reviews and summaries of experiences.

How do we assemble information?

We have explored how the right brain provides insight and an outline of events leaving the left one to analyse and arrange the parts. The Greeks grasped this process in a technique called the Places Trick. Try the task below to see how it works:

With eyes closed to block out external stimuli, imagine the front door of your house/flat. Open the door and enter the hallway. Look around and see what is there. Now go into your kitchen and observe the space. Then walk to the stairs/corridor for the bathroom. Step in and view it. Finally move to your bedroom and enjoy gazing around this place of rest!

We have located six places: your front door, hallway, kitchen, stairs/corridor, bathroom and bedroom. Now I will tell a story and afterwards ask you to recall the objects mentioned. Shall we begin?

You have had a wonderful night out with friends. As you roll home in the early hours you find your front door ajar and propped open by a large, red apple, the size of a football. This is surprising because the door was firmly locked when you left for the restaurant date. Gingerly, you creep inside and there, on a table in the hall, is a glass slipper winking at you in the moonlight from outside. Amazing! It looks like the one you imagined Cinderella wearing for her trip to the Prince's ball! Switching on the light you troop into the kitchen and there on the work bench is a purple, sparkly pen, dancing an Irish

jig! Life is getting more curious by the minute! You rush out to the bottom of the stairs/corridor finding a large semi-precious stone, in your favourite colour, and the size of a large rock. You step over this carefully and race to the bathroom. As you enter, the smell of your favourite oil greets you and luxuriously bathing in the bubbles is a large wooden spoon, which turns and grins as your jaw drops wide open! Backing out, you find the bedroom and on your bed a velvet cushion, in the middle of which is a shiny, silver necklace curled like a snake! Is this by any chance 'Alice's 2009 Wonderland'?

Without looking back at the text, can you recall the items? How was this achieved? Did you remember the six different places already familiar to you and link these to the new information? It is the right brain that creates these associations. The descriptive words help you image the scene. Knowledge of language grammar, with its syntactic arrangements, assists the organisation of this detail. It is an example of how both brains work to carry out tasks effectively thinking both inductively and deductively. Putting together what you see, feel, say and hear is the essence of the process. Both brains complement rather than contradict each other to give us breadth and depth of understanding. This brings us to consider how students shift brain modes in order to cope with classroom learning using the communication system as the essential tool.

The shift from informal to formal talk or writing

Development depends on opportunities to structure thinking from formal talk. In informal talk, meaning depends on seeing, observing and feeling what is happening in the real context. In formal talk/text, descriptive words represent reality but with gaps in information that have to be thought through, using imagination to achieve understanding. In the table on the next page, we do not know the ages of Rosie and Helen so must make a guess. The mention of Helen as the daughter gives us some clue but we have no means of knowing whether she is a child or an adult.

<p><i>Informal talk is unplanned and unstructured. The meaning comes from the context.</i></p>	<p><i>Formal talk or writing is planned with a beginning, middle and end structure.</i></p> <p>The meaning comes from words and filling in information/opinion gaps.</p>
<p>Rosie: <i>'Jack's greedier than Russell'.</i> Helen: <i>'Um, because he's male'.</i></p>	<p><i>'Rosie and her daughter Helen are at the back door feeding their Indian Runner ducks, Jack and Russell. Jack dives in aggressively, devouring the bread before Russell, the female, gets a look in'.</i></p>

The fact that Russell (conventionally a male name) is female needs resolving as it depends on an underlying story which we know nothing about. Rosie's husband, Geoff, wanted a Jack Russell dog but as he travelled the world it meant that he was not around to be responsible. So, the compromise was two ducks, named Jack and Russell, which did not need daily walking. Most narratives have hidden information and the right brain resolves such issues, using lateral thinking and strategies of inference, reference and coherence to produce a meaning that is likely to be different for each one of us.

Teaching that is whole-brained

Thinking starts with the right brain creating a range of possibilities and selecting the best fit. The left brain then sequences the steps towards the goal. This is now considered in the following picture.

Bruner (1966) and Beilin (1975) emphasised that right brain thinking is the primary mode for problem solving but preoccupation with the fixed framework of logical development (left brain activity) often means that it receives less attention. Logic is important in reaching conclusions but not infallible. Take the following statements:

Birds fly. Penguins are birds so penguins fly.

However, penguins are exceptions to the rule and do not fly. Even flying birds find themselves in situations where they cannot fly such as if their legs are stuck in cement or wings are damaged. It is the right brain that thinks laterally and creatively to connect up a range of information from many sources for considering the whole event. It operates freely following any direction and begins problem solving.

Take Figure 3 (below): How to pick apples from the tree. You start by generating a range of ideas (listed on the right) and after selecting the 'best fit', you move to the left side to work out a set of logical steps to achieve the goal. Thinking becomes narrow, with less range of possibilities, if the right brain is inactive. Right brain thinking begins the process and brings together the whole experience. It is known as narrative thinking and is witnessed in young children when they 'story' real experiences in play, such as a visit to the doctor or the shops etc. This thinking is often ignored and not clinically tested.

Some years ago, I was asked by the Medical Research Council to look at a group of children who were thought to be bright but achieving poorly in school. Tests of thinking, understanding and expression rarely require participants to assemble quantities of information

so that narrative thinking and structure were not monitored in this cohort but presented as their major problem in learning (Sage, 2000a).

Narrative ability develops when children have to regularly recall and retell events, give instructions, explanations and reports. However, today television replaces formal talk in daily life. When you watch a programme, meaning is provided in ready-made images with talk only a secondary back-up. The viewer is passive and the two brains do not have to actively think and visualise for understanding. Modern life gives no time for talk that is the key to an imaginative development of ideas.

Children starting school are shocked because suddenly they are confronted with vast quantities of talk with no mental schema for dealing with this. Studies indicate that many begin education with thinking and language development well below that required to cope with formal class talk (Sage, 2000b). Cwenar (2005) showed that 80 per cent of students entering her senior school had cognitive-linguistic ages of around 5 years at age eleven. Early deficits had not been made good because no sustained attention was paid to them in primary schools. These are remedied by giving attention to formal

communication, focusing on how ideas are developed into narrative forms. Researchers attest to the success of the method (Cooper, 2004). The model for this is the Communication Opportunity Group Strategy (Sage, 2000a) summarised in Figure 4 on the next page.

The approach shows how ideas are generated and organised progressively.

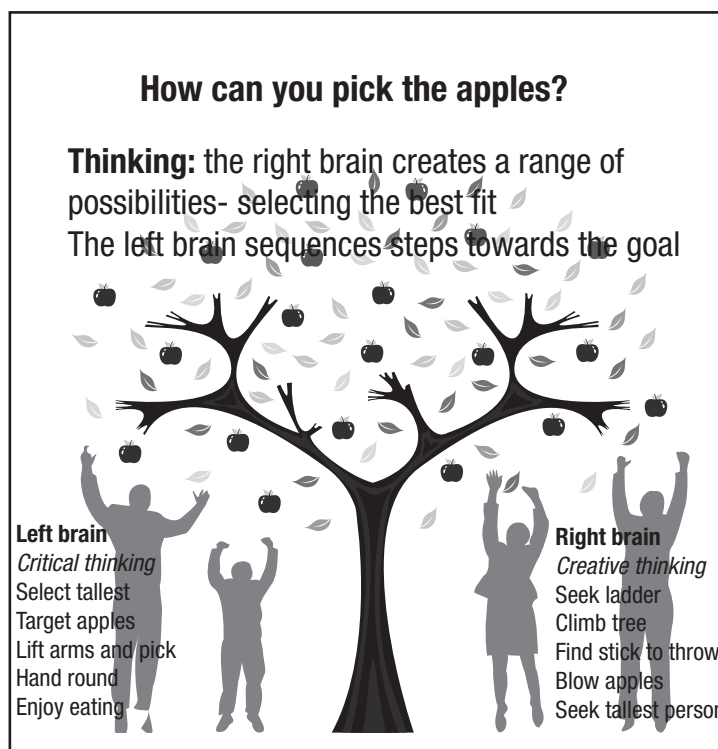


Figure 3: How to pick apples from the tree

So from producing a range of ideas at the first level, you can eventually locate the context, characters, events, results and reactions. However, there is evidence that students leave school without achieving the last three levels which limits thinking, reflections and judgments (Sage, 2000b, 2004). We cannot leave such development to chance and need to understand that formal talk enables both brains to function equally by giving opportunity for seeing, feeling, saying and hearing.

The Communication Opportunity Group Strategy works for small or large groups and focuses on narrative thinking and structure, along with making ideas clear (clarity), ensuring they are audience appropriate (content), whilst obeying social and linguistic rules (convention) and behaving in proper manner (conduct). Research evidence supports the efficacy of the approach across subjects, bringing both academic and social success (Sage, 2000a, 2000b,

The future

Institutions and individuals find it difficult to change. The academic body is likely to favour accepted doctrine and routine performance because of long traditions. It does not care for fireworks! There is constant clamour from the public for better academic standards against Government claims that they are rising? It is confusing, distressing and overwhelming! Dispute rages as to whether education matches present needs with the Association of Graduate Recruiters (2009) reporting employee problems with spoken and written communication that seriously affect performance. Sir Terry Leahy, Chief Executive of Tesco, recently bemoaned the 'woefully low' standards of education in the media saying, 'Employers like us are often left to pick up the pieces'. Others dispute this view suggesting the population has never been better educated. This might be so for knowledge but workplaces favour personal

an example. Twenty years ago their economic bubble burst and people could not cope. Experts agreed that a strong, traditional academic focus in education had been at the expense of transferable abilities that enable survival. Now, communication and relationships take priority in schools on the basis that talk is the technology for understanding. Conversing together achieves clarification and comprehension of basic ideas which Socrates, the Greek philosopher, called maieutics, or the process of intellectual midwifery. Effective communication not only brings about better understanding but forms social contact and develops cooperation and collaboration.

Japan has seen the benefits in being able to handle issues of globalisation more effectively than other nations when measured by international indicators. The Japanese concentrate on helping students to understand through talk, making them aware of the role of non-verbal aspects, such as voice, gesture and facial expression, as markers for meaning. Education for humanity and understanding is at the core of their philosophy.

The Dialogue, Innovation, Achievement & Learning (DIAL) projects, supported by the Great Britain Sasakawa Foundation, has enabled English and Japanese teams to share expertise in pursuit of the ideal global citizen (Sage, Rogers and Cwenar, 2004, 2006). Although the Japanese feel they lack creativity, I am not so sure! Professor Takashi Tsuji of Tokyo University has grown replacement teeth for mice so dentures should soon be a thing of the past. He thinks they will be developing fully-functioning bio-engineered organs to replace damaged ones just like the earthworm achieves. You cannot get more creative than that! Cuba is another nation at the top of UNESCO tables of achievement but cannot afford books. To Cubans, talk is the way to share, mediate and extend learning so abandoning students to book study prevents this, restricting thinking and understanding. Therefore, it can truly be said to know one's own country, one must know another one in order to compare performance and consider improvements.

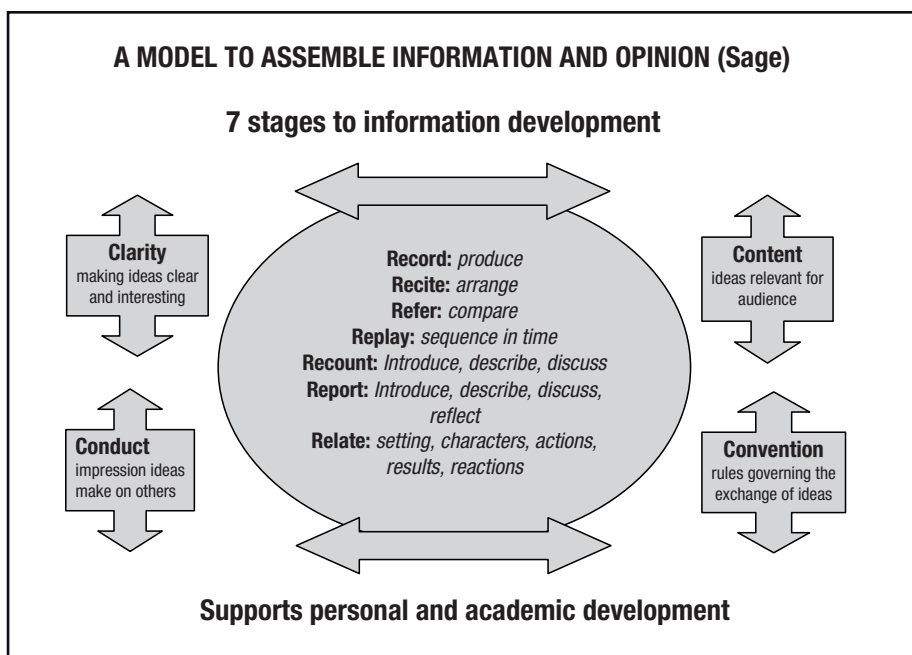


Figure 4: Communication Opportunity Group Strategy

2003, 2004, and 2006). However, 200 years ago, thinking was very different with Lancaster (1806) writing: 'Talk in school is very improper – children cannot talk and learn at the same time. In my school talking is considered an offence... and an appropriate punishment succeeds'. Does this view still linger in the minds of educational policy makers and practitioners?

competences, dependent on right brain development, with ability to apply what is learnt, size up events and respond appropriately accounting for the feelings and views of others. This situation may well be the reason for differences in viewpoint amongst various groups.

The 'Standards' debate is illuminated by others' experiences. Take Japan as

No consensus on educational goals

As a nation we have no clear consensus on what education should give us. What kind of human being do we want to be? A wish should be for us all to become educated in things that perfect our nature – humanity, knowledge and understanding. Most agree that our present system targets the middle attribute with humanity and understanding more debatable achievements. Education must be concerned with the real values of life, helping us to live wisely, agreeably and well. In an illuminating article, 'A talent for dishonesty' (2009), Farndale refers to a poll of students from a top university where 50 per cent admitted to cheating: 'I Google the essay title, copy and throw everything on to a blank Word document', said one student. Supporting this idea of toil reduction, the following appeared in my email box recently:

'To buy a degree is easy these days. Nevertheless most students just sit around in their boring University classes, wasting money. Why would you do that? These days buying a degree is a matter of personal motivation. But why should you buy a degree? The main reason is that buying an online degree is going to save you a lot of time, a lot of work and will make you a lot of money. It is the intelligent solution'.

How does one respond to that! The best selling book for young people is: 'The 48 Laws of Power' advising: 'Pose as a friend, work as a spy and crush your enemies totally' (Green and Elffes, 2000). The message is simple. It is okay to cheat because it is now okay to lie. 'Spinning' is the new word for 'lying' and common practice but a road to disaster. Audur Capital was the only institution to survive the recent Icelandic Bank catastrophe because of high moral principles: risk-awareness; profit with principles; emotional capital; straight talking and independence. It is a potent formula reflecting left and right thinking and a broad, deep understanding of humanity and respect for others.

The educational system

The phrase 'educational system' contradicts as the aim of learning is to develop human powers and not fit them to some standard framework. Education reflects what politicians want it to do and change will only happen if the community supports this. Some believe that the attempt to educate everyone must end in the education of nobody. They assert that the differences between us are so great and confusing that the dilution or dissolution of a common study programme is inevitable. There is truth in this and Cuba's Universal Policy has much to commend it. This respects the view that everyone should be educated, but in line with interests and ability and in accordance with society's needs for a skill range. Cubans observe that in the UK we have made an elite education, developed originally for those entering traditional professions, the destiny of all, when the bulk of us will have practical careers, dependent on a broader knowledge and skill base (Sage, 2009). Goldacre (2008) supports this saying that obsession 'with taking the message to everyone, rarely offers stimulating content to those who are interested' (page 321).

A new publication: Meeting the Needs of Students from Diverse Backgrounds (Sage et al, 2010) presents the views of different stakeholders in education to reflect on these issues. The unanimous conclusion of contributors is that effective education depends on us understanding and respecting one another with effective communication as the key to this. If it aims at understanding it will make the most impressive contribution to power and prosperity but if it targets just the latter, this ambition will fail. A brain is not a receptacle and education is what remains after facts are forgotten - the ideas, strategies and habits of mind that enable us to survive and cooperate with others. Learning does not happen unless teachers and students achieve a meeting of minds and can communicate together. As a learning society largely of our making and in turn making us, institutions have been designed to perpetuate existing principles and practices. With the speed of change ever accelerating, we are

forced to reconsider present values and the re-direction of education towards new ones. First steps are better understanding of the real facts of life, the potential of both brains, the new values to be attained, the communicative competences required amongst diverse cultures and the possibilities and limitations of education in achieving them.

Rene Dubos, the geneticist, in *Man, Medicine and Environment* (1968) demonstrated that we use less than 20 per cent of our brain potential. Four decades later, evidence suggests we may not have improved on this. There are people who and places where we can look to for help. Inspiring schools put communication and relationships at the core of their enquiring minds philosophy. By co-ordinating right and left brain activity through formal talk experiences we have the key to superior performances and the best chance of developing students' humanity and understanding as well as knowledge. Liverpool's Broughton Hall Community Technology College is an example of some dedicated staff and students working towards this ideal. Those of you reading this will know of other examples where power, passion and possibilities have been released. We must spread the word, helping everybody to have better understanding to assist students to be whole rather than half-brained. Next time you spot a wriggly worm in a garden cast a thought for these remarkable creatures and their extraordinary ability to regenerate, adapt and survive successfully. They have a message we cannot ignore.

Summarising

I am writing this at Kenmore, in the midst of the beauty, magnificence and inspiration of the Scottish Highlands. On a walk, winding through the forest to the magical Tayforth Castle, I met up with two Scottish lads (one six and the other nine) walking their chocolate brown spaniel. I stopped to admire the dog (complete with tartan collar) and fell into discussion. I asked about the multi-turreted castle, now abandoned and awaiting renovation. I was told it once belonged to a laird,

Andrew McTaggart, who was 6 feet 8 inches tall! We fell into imagining what it was like to live in such a spectacular place and the games that could be played in the turrets and on the ramparts. There were plenty of giggles about suggestions of jumping from turret to turret but eventually it was time to say: 'Goodbye'. Thanking the lads for talking with me, they responded that: 'It was great'.

Wandering back, I reflected on two lads who could think, imagine, talk and evaluate in a way that supported and revealed their humanity. They actually enjoyed conversing with someone much older than themselves and questioned me on why I was in Scotland. Here were two boys with four brilliant brains – all working well. Perhaps they should be in Parliament. However, the elder one wants to be a footballer and his younger brother a fireman. They did all their shopping on the Internet so were very modern little men. I felt the world would be safe in their capable hands and went away happy that for these lads education was doing them proud. For others, it is not the case and this review focuses on using our collective brains to make imaginative future plans for more enlightened learning.

Karl Friston's (2009) work on a mathematical law of the brain is attracting interest and may mean we will eventually have a brief, iconic equation such as Einstein's $E=mc^2$ - a flash on our T-shirts. It suggests a new metaphor of self-identity focusing down on the 'free energy' in the brain system and the meanings relevant to a particular situation. So, when walking along our senses inform us about surroundings to avoid falling over or bumping into things with brains working to help us avoid surprises like a hole in the ground. New theories will change our concepts of how brains work and help us understand even more the deeper mechanisms of mental performance. Meanwhile, children need 'guides by their sides' rather than 'sages on stages' with freedom to gather a pocket full of dreams and a focus to make them a reality.

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DOES EDUCATION TAP ONLY HALF OUR BRAIN POWER? - A RESPONSE

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Whenever I meet Rosie [Rosemary Sage] we always seem to end up having the most fascinating talks about how people communicate, share information and nurture knowledge. Once again, she has given a talk which extends my own knowledge about how young people learn and communicate and I am particularly interested in her international experience where important lessons can be learned from other cultures and educational systems. For instance, in Japan, there seems to be great emphasis on teams, groups and communities which provide the foundation for dialogue and co-operative learning – and I believe that this type of learning should be at the core of life-long learning philosophies.

In the UK, where we have a rather individualistic culture, there have been areas where we have learnt from this Japanese teamwork culture - the automotive sector, for instance - where automotive manufacturing has been transformed over the last ten years, thanks to the sector-adapting Japanese team cultures (and as Rosie puts it “valuing talk as the technology for understanding”).

My own work involves working with HE, FE and industry in programmes of change - to enhance teaching, learning and assessment - often with technology as the catalyst and building on many of the ideas Rosie has talked about such as:

- focusing much more on the student, not the system,
- fostering innovation and creativity in teaching and learning, promoting creative dialogue between students,

- tutors and others involved in learning (e.g. parents, employers, sector agencies) fostering understanding and application, not just knowledge,
- forming better relationships and partnerships
 - generally - a focus on quality enhancement rather than quality assurance

I would like to link some of my own experiences with Rosie’s talk - focusing on two aspects:

- The impact of the Internet on communications and learning.
- The barriers to enhancing quality and raising standards.

The impact of the Internet on communications and learning:

Communicating and learning these days encompasses a much broader set of media and tools as a result of the Internet and new low-cost ICT tools. Young people are being brought up in an age of social networks, pod and video casting (e.g. YouTube), wikis, blogs, discussion forums, video-conferencing, virtual worlds and a whole variety of online collaboration and social tools - where most young people are “digital natives”.

This new digital world presents a whole set of challenges for raising standards - but also, I believe, immense opportunities.

Challenges include:

- Universities and colleges have record numbers of students - mass-education - making it increasingly

challenging to personalise learning to individual learners.

- This new digital world is alien to many in the education fields - not just teachers and academics, but to those setting policy and senior management in institutions. If these people don’t understand the new communications channels and new learning opportunities, how can they do their jobs effectively? How can they take action and apply appropriate resources?
- There is so much information and access to knowledge out there - teaching is not now solely about providing knowledge - teachers and academics are no longer “the sage on the stage” but the “guide on the side”.
- We all have to learn how best to communicate effectively in these new media and communications channels and understand how best to use them for teaching ... within a landscape of new tools emerging on a regular basis such as Twitter.
- In universities - an increasing proportion of learners are going to be in the work-place - where employers want education programmes to align with their needs as well as the needs of the learners.

Despite these challenges, one could argue that this new digital age is an opportunity for educators to go back to basics on what they are trying to achieve - and totally re-think their teaching and learning methods and tools. I certainly believe this to be the case - though it is not without its barriers!

I particularly believe that we all have to learn to communicate effectively in the

new digital age. This is paramount if we are to be able to communicate with the young in media with which they are so comfortable.

I also believe that the teaching community passionately wants to give students the best experience they can - but is often stifled by organisations, committees and a myriad of institutional and education sector barriers. Many teachers have benefited from the support and funding of education sector agencies, such as HEFCE, HEA, JISC and Becta which all encourage, support and fund innovative practice through enhancement programmes e.g. the JISC Curriculum Design & Delivery Transformation programme and the Higher Education Academy's Pathfinder programme. However, a key issue is how to replicate, scale up and sustain innovative practice.

Let me give some examples of where teachers are adapting well to the digital age and enhancing learning and communications:

- Middlesex University - School of Engineering and Information Sciences and City University "Learning spaces to support creative conversations". This project addresses a recurrent problem in design education, that students are sometimes disengaged from key 'creative conversations'. The project deploys 'information spaces' with technology tools that enable learners to engage more flexibly and effectively in conversations characterised by innovation and reflective, critical thinking.
- National Star College – using technology adapted from the defence industry for tracking eye movements (allowing pilots to move a cursor around a PC screen) – in order to help disabled students to record their learning, make independent choices and communicate independently.
- The Open University – Department of Design, Development, Environment and Materials – a "virtual Atelier

(design studio)" for remote students. Atelier-D is a short title for Achieving Transformation, Enhanced Learning and Innovation through Educational Resources in Design. The project is developing a virtual design studio space to support students learning throughout the design programme using tools such as video-conferencing, social networking, knowledge mapping and a virtual design studio.

- In Scotland, schools across the county have been pioneering the use of computer games to improve maths abilities - a "brain-training" application, involving reading tests, problem-solving exercises and memory puzzles which have been successfully used to improve attainment, concentration and behaviour levels - apparently by 10%.
- Leeds Medical School found that medical students appreciated the importance of reflective learning for their personal and professional development but they did not engage in the process since it did not match their preferred learning styles. Digital story-telling for reflective practice was adopted - an approach to reflective learning that makes extensive use of multimedia. It is a collection of pictures, music and words that describes an event or story from an individual's point of view providing a highly motivating strategy that can make reflection concrete and visible and allows numerous opportunities for personal reflection and the sharing of the creative feedback from others, thereby providing further opportunities for reflection.
- The University of Hertfordshire Business School runs a scheme for students to mentor academics in the uptake of new digital technologies in teaching practice. Most importantly, this helps to develop new forms of relationships and partnerships between students and tutors.
- The Open University - Social Learn.

This is a new project from the Open University to "combine the best of the values and approaches found in the new social web technologies with those of higher education. This will create new modes of recognised and supported learning experiences for a wide clientele".

- The University of the West of England has developed an Integrated Professional Development programme for work-based learners using a "shell award framework" that features:
 - Curriculum based more on process than content.
 - A focus on developing analytical, intellectual, problem solving skills and developing independent and mature judgement
 - Negotiated personal learning plans and contracts for each student
 - Recognition of prior learning
 - Practice and project-based learning
 - Instilling of an enthusiasm for enquiry and learning
- Formula Student. This promotes excellence in engineering where students compete with those in other institutions to design, build, develop, market and compete as a team with a small single-seater racing car. The students undertake this as part of their final year undergraduate programme in automotive engineering. Most importantly it is predicated on true team working where success is based on highly effective communications, dialogue and nurturing and application of knowledge and skills.

The barriers to implementing such changes and some ideas on how to do it

Despite the will to change practice and enhance communications and learning to adapt to the new digital age, there are immense barriers in place – many created by educational institutions.

Over the last three years, the Higher Education Academy and JISC undertook a national benchmarking exercise focusing on how well e-learning and ICT is institutionally embedded in HE and FE institutions. The key conclusions were:

- Inspection and auditing regimes tend to promote only incremental improvements in teaching and learning (a “check-list” culture) and discourage true creativity and innovation in teaching and learning.
- Teachers and academics are not generally given sufficient time to develop new methods of teaching and learning and this means only the enthusiasts try new things out.
- Senior management (who make policy decisions and allocate resources) are often too remote from the changing teaching and learning digital landscape to make effective decisions.
- Insufficient resource is allocated to staff and student digital skills development. Many institutions provide ICT training, but do not teach how to communicate effectively and how to develop new models of learning (that are aided by digital techniques).
- Staff recognition schemes do not generally support staff who pioneer innovative practice.
- There is too much “silo working” and insufficient replication and scaling up of innovative and effective practice.
- Accessibility of ICT systems is commonly poor.

Given these immense challenges, I see some wonderful examples of educational institutions which are taking an institutional change management approach to enhancing teaching and learning, with a strong emphasis on meeting the demands of the digital age and supporting teachers in enhancing their teaching and learning programmes.

For example, the University of Hertfordshire has developed a change management programme called CABLE “Change Academy for Blended Learning Enhancement”. This programme aims to support HE faculties/schools in managing change with a view to improving the student learning experience.

Summary

I wholeheartedly agree with Rosie’s assertions for the need to loosen the framework and give teachers and learners more freedom.

I see plenty of examples of creative and innovative practice going on for enhancing the quality of learning and improving standards. However, education institutions and the sector place a range of barriers to replicating and embedding good practice. We need to rapidly reduce barriers and give freedom, opportunity, resources, skills and support to teachers and academics to enhance the student learning experience.

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