Ref: Freeman, J. (2008) 'Literacy, Flexible Thinking and Underachievement', in D. Montgomery (Ed.) *Gifted, Talented and Able Underachievers*. Chichester: Wiley.

LITERACY, FLEXIBLE THINKING AND UNDERACHIEVEMENT

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INTRODUCTION TO LITERACY

My concern here is the strong relationship between literacy and quality of thinking, particularly the flexible and creative kind of thinking which enables children of high potential to demonstrate excellence in a variety of situations. Using developmental evidence, I argue that without literacy even the brightest children must underachieve. Yet the very concept of literacy is rapidly changing as the new means of electronic communication, which I have called 'electronic literacy', affect the way youngsters think and express themselves.

Literacy is a relatively new skill for us human beings in our many millennia of existence: the earliest (Egyptian) script dates from only 6000 years ago and the move from handwriting to print by Gutenberg happened only in 1439. The church saw this as threatening to its absolute authority, but none of its draconian methods could stop the spread of universal literacy and independent thinking in Europe. Our learning curve has been steep, though only in a minority of languages. Of the 3000 spoken today, probably only about 80 have a written literature. The written word added vastly to the understanding of verbal concepts which include history, novel ideas, the reformation of existing ideas – and vitally, the ability to study. Oral expression, though, does become more complex in print-orientated societies, such as Shakespeare's solo invention of about 1700 words in the 16th century when most of the population of England could not read.

My term, 'electronic literacy', describes competence in electronic communication. Its explosion since the late 20th century is bringing immeasurable changes in communication and style of thinking to those who are electronically literate, greatly increasing new vistas of the world which are closed to those who are not (Ong, 2002; Kress, 2003). As the dominance of reading and writing shifts swiftly from page to screen, concern with literacy must include the electronic multimedia,

The electronic mode changes thinking because it reorders the conception and presentation of ideas. It cuts out the obligation to present an orderly progression of ideas in immoveable print, and by using words and display together, has massively increased the ease, cheapness, speed, and multidirectonality of even complex communications. Nor are ideas confined to one or a few thinkers; they can be exchanged between many as they are being formed. To paraphrase Marshall McLuhan, the medium is ever more the message. But unfortunately, electronic type thinking also increases the gap between the haves and have-nots, bringing greater social, financial and cultural power to the already haves. The extent to which such media are available differs widely. In some countries where the daily circulation of

newspapers may be less than one per thousand inhabitants, people may also lack a national broadcasting network or even a reliable telephone system. Electronic communication now helps illiterate people to bypass the printed word. They can now be reached in ways, such as radio and notably the mobile telephone.

The usefulness of basic literacy depends on how much people are obliged to read and write in their daily lives. In general, the more complex a society's economic and social structures, the more an individual must be literate to a higher and even a technical level. Basic literacy is considered as the ability to read and write to some extent, and numeracy is sometimes included in this. Most definitions place literacy firmly in the context of a particular society. In some areas of deprivation, it may simply mean being able to read written letters or make a mark to sign one's name. This is how it was for many in the developed world until the late 19th century, when education was expanded. Just as it was for the church four centuries earlier, spreading literacy seemed to some to be a dangerous idea because lower-class people might read seditious pamphlets and aim to improve their lot in life.

The definition of literacy therefore varies with context: while some may be deemed illiterate in one context, in another time and place, they may have been adequately literate (Street, 1990). In the context of the technically developed society of the United States, for example, a government report classed up to 44% of the population as having very low literacy; 25% of those were immigrants, 62% did not complete high school and 19% had visual difficulties (Kirsch, 1993). Yet in pre-literate societies, such as tribal Indians deep in the rain forests of Brazil, the same people would probably have been considered adequately literate.

The Council of European Communities (1988) states that the term, illiteracy, does not apply to people incapable of reading or writing because of physical or mental handicap. Rather it is people who "experience difficulties in, or are totally incapable of, for example, filling in official forms, reading public transport time-tables, understanding bills; all of which obviously restricts their access to information, excludes them from rewarding social function and confines them to the role of socially assisted persons." (p. 5).

Being literate not only implies the mechanics of reading, but it means being able to present ideas by using the written word, as well as understanding, storing and analysing words to react appropriately. The chances of becoming literate are affected at different levels of a society (Dubbeldam, 1991). At the family level, for example, a literate family encourages familiarity with the written word and improves a child's chances of going to school. However, compulsory schooling is not in itself sufficient to eliminate the problem of illiteracy. Disadvantaged or differently cultured children may come under the care of teachers who are not able to cater for their needs and who may mistakenly accept that some reading failure is inevitable.

For an infant, after the development of language, literacy is probably the most important foundation stone of lifelong learning. Yet millions of people all over the world are illiterate - a social and intellectual disablement which is unlikely to be due to any deficiency in themselves. Given enough time and suitable help, most normal children should be able to

read. But before any individual can reach the stage of reading and numeracy, he or she must first be aquainted with adequate language and numbers.

THE DEVELOPMENT OF LANGUAGE

Babies have to learn to make sense of what adults say, not only to understand intended direct meanings, but also the implications of their gestures and body movements (Freeman, 1996). Learning to speak correctly requires yet further effort. This begins with pronouncing individual sounds, then comprehending words (8-10 months of age) ordering them into grammatical sentences (20-36 months), and then sentences into groups of ideas. The aim is to manipulate language correctly for both understanding and production. Only then can children control and reflect upon their language exchanges. Conversation involves getting one's own meanings across, as well as interpreting what other people are saying, which means sharing some assumptions about the way in which language is used in the society. Sentences that do not express intended meanings will not be socially adaptive, even if their grammar and pronunciation are perfect. Part of the reason why children acquire language so quickly and with such apparent ease appears to be their inbuilt desire to communicate.

There is wide variation in language development - females, first-borns and high socio-economic infants are quicker and usually stay in advance of others. Babies cry first, then they coo, then they babble, and then they produce words. All languages reflect those first sounds by making them the names of caretakers - mama, papa, abba, ima, etc. - so that the first words and word-meanings of children throughout the world are similar. The first words refer to people, animals, toys, and other tangible objects that attract and interest children. By the end of the first year, language and thought become bound up together, each affecting the other's development (Mehler & Pupoux, 1994).

Research at California University at Fullerton has found that even by the age of one year, future intellectually gifted children were more advanced in their language development on both receptive and expressive language skills (Gottfried, Gottfried and Guerin, 2008). They describe this as “early cognitive acceleration” – a head-start in thinking skills. The parents of these children rated them as more advanced on intellectual and language skills compared with the ratings of comparison children’s parents. Freeman used a similar longitudinal comparison model in the UK and found similar results (Freeman, 2001; Freeman, 2006).

In the Fullerton study, independently from each other, hundreds of teachers in different schools provided assessments of the sample children. Analysis of their reports showed that when the early-speakers reached school, they were advanced in many subject areas, in classroom competence, and in different types of achievements which lasted across time. They were less likely to have their kindergarten entry delayed and were never held back in a grade. As gifted children, they were significantly more likely than their cohort comparison to obtain at least one extremely superior test score in the opening years of their education. The early lives of children who grew up to be of world-status have also been found to be highly verbal and interactive (Radford, 1990).

The highly intelligent child aged under five often demands and so receives more verbal interaction from the family, and in this sense, alters his or her own learning environment

(Freeman, 2000). Competent language development is helped considerably by this - not just what is exchanged in daily chatter - but when adults make a systematic effort to converse (Fowler, 1990). Language is developed with feedback - being heard, corrected, using words to demand - the rate and breadth of this process being clearly related to that of the adults who look after them. Under-privileged children can miss this necessary feedback from parents, and the gap in communication ability between them and better-off children widens inexorably over the years. Developing spontaneous complex speech in older children who are not used to conversing in this way is not easy, because children they are often also impoverished in the exercise of their intellectual abilities.

In most homes, conversation between adults and children is more evenly balanced than at school. Even in nursery schools, teachers tend to dominate children's thinking by constantly asking questions, with an answer already in mind, which can actually inhibit the child from thinking up questions (Tizard & Hughes, 1984). The teacher's well educated style of speech can also be confusing to young children from less favoured backgrounds. It is important for teachers to encourage children's questioning and to listen to them, allowing them to think out loud and use all their powers of imagination.

Learning to read

The interactive model of children's reading holds that it is a deliberate cognitive process pulling meaning from previous knowledge and ideas in the text. The reader controls and regulates comprehension, the actions of metacognitive processes. It is a high-level thinking skill which demands flexibility. In trying to understand what an author had in mind, the reader has to check the new ideas, and then organise and compare them with what she or he already knows. Even the newest of readers selects from the text, leaving out details that do not seem central to the message, while adding extra information from memory (and from the wider culture) that is needed to make it intelligible.

To develop a lively mind, the more one reads the better. A difference in the sheer *amount* of reading can show measurable differences in thinking. This includes vocabulary size, verbal fluency, general knowledge, and a variety of other verbal skills. It happens because reading increases knowledge which is the basis of thinking.

Strangely, children may have an advanced ability to pronounce the written words yet lag behind understanding the meaning of the text. Guided word play, a form of cognitive practice, can help to close this gap. Young children who get practice in word-play jokes, such as "How do you make an apple puff?" - Chase it round the garden! - can develop better reading comprehension than children who can only remember jokes with little linguistic ambiguity, such as "How do you get six elephants in a car" - Three in the front and three in the back! . By the time children can make up their own jokes they are already fluent concept manipulators (Yuill & Easton 1993).

Looking at 5600 Australian children, Rowe (1991) and his team found that their age, gender, and socio-economic levels had no effects on their reading levels: the significant differences were due to reading at home, which also had a positive effect on their general attentiveness and achievement. Indeed, parental involvement is consistently found to increase reading

skills, as shown in the study of London primary schoolchildren. Those whose parents listened to them learning to read were more advanced than others who only learned at school. Not only do little ones need to be taught specific reading skills, but they have to be given the chance and encouragement to practice them. This is considerably helped by the involvement of parents in their play and conversation, and the same appears to be true for learning to write (Blatchford, 1991).

Very highly intelligent children are sometimes said to teach themselves to read, but this depends on the materials they have to learn with and their language experience. Early apparently insatiable reading is one sign by which intellectually gifted children can be identified. Clearly though, however high a child's natural potential, without access to literature and permission to learn the child will not read.

Learning numbers

What is true for words is also true for numbers. Babies start to learn numbers by listening to parents counting things, such as fingers or steps, over and over again. Many children's rhymes have counting in them, and the language of mathematics can emerge quite naturally in a lively home. Seymour Papert (1980), the influential American mathematician, proposed that a home should be "mathematically literate", so that in the same way that children are expected to learn their letters, they should learn to use numbers. Papert views the child as a builder who needs materials to build with. Children who fail at mathematics usually come from environments which are poor in "maths-speaking" adults, meaning that they arrive at school lacking the basic learning essential for school mathematics.

Papert also refers to "cultural toxins". These are negative ideas which contaminate children's images of themselves as learners, so that they think of themselves as incompetent in any subject area. Their imagined deficiency becomes part of their identity - "I can't do maths". Learning ability then deteriorates from the young child's open exploration of the world to become a chore, limited by insecurities and self-imposed restrictions. Many children who grow up with a love and aptitude for mathematics owe this positive feeling, at least in part, to picking up to what he calls the "germs" of their "maths culture" from adults who know how to 'speak' mathematics. For such fortunate children, their preferred play is often puzzles, puns, and paradoxes, and they may be seen at school as mathematically advanced.

Maths phobia is a block which is endemic in Western culture, especially affecting girls. It prevents people from learning anything which they perceive as numerical, although if they don't recognise it as such, they may not have any trouble with it. In school, such children can be placed into learning situations which generate powerful negative feelings about numbers, which can generalise to all school learning. This sets up a downwards self-perpetuating cycle. When they become parents themselves, they will not only fail to pass on mathematical 'germs', but will certainly 'infect' their children with the intellectually destructive germs of "mathsophobia". Breaking this self-perpetuating cycle should be started at the earliest possible stage in a child's life, although it could also be done by a good teacher in the child's first school.

The verbal context within which school mathematical questions are presented has a big influence on children's ability to answer them. The tangled wording of many arithmetic problems is a burden on a child's memory, simply increasing the difficulty of the problems in a way which has nothing to do with the arithmetic. Even when the wording is not over-complex, unfamiliar contexts often strain children's competence, and prevent them from applying procedures that they use successfully in other contexts.

This is illustrated in a study of nine to fifteen year-old Brazilian street children, the sons and daughters of poor migrant workers who had moved to a large city (Nunes *et al*, 1993). The children contributed to the family financially by working as street vendors, selling coconuts, popcorn, corn-on-the-cob, and other foods. Their work required them to add, subtract, multiply, and occasionally, to divide in their heads. (One coconut costs x cruzeiros; five coconuts will cost...?). Despite little formal education, the children could tell customers how much purchases cost and how much change they should get. They were quick- witted and articulate in their own environment, with excellent fluidity in 'street' language.

In an experiment, the children were asked to solve three types of problems. Some were typical of buying and selling transactions, while others involved similar problem-solving situations, but without the goods the child was used to. Another type was arithmetically identical problems presented without a problem-solving context, such as how much is 85 + 63. The children were able to solve 98% of questions that could arise at their food stall, and 74% of the items that involved selling unfamiliar goods, but only 37% of those outside a problem-solving context. The children clearly knew how to add, but were not flexible enough in their thinking to transfer it to other situations.

These children did not, in fact, understand the fundamental laws of mathematics, but just a very limited selection of techniques. There was almost no insight or reflection involved in what they were doing, so that it was difficult if not impossible for them to transfer their techniques to other mathematical situations or subjects. What they were using were basic coping skills that made use of numbers, rather than any genuine competence in numeracy. Though, it was possible to get by with enough superficial information to live, without tuition and practice in cognitive skills, no child can reach the numerical ability and according flexibility of thinking of which they are capable.

FLEXIBLE THINKING

Flexible thinking can be seen in the ability to deal competently both with information and with other people. But no matter how high a child's potential, thinking does not develop to a high level without emotional support and a foundation of knowledge. It remains at the minimum needed for short-term everyday problem solving. The human potential for learning and flexible thinking has been seriously underestimated, since the decoding and learning of the spoken language is, of itself, a brilliant feat that is accomplished by just about everyone, including slow-learners.

But even with good education, it cannot be assumed that bright children are also capable of thinking flexibly and creatively. This was seen in the results of my British 33-year

comparative study of 210 gifted and non-gifted children (Freeman, 2001; Freeman, 2006). Some of the academic high-flyers, the ones who were keen to learn, left school flushed with examination successes, but with their curiosity dimmed and their outlooks narrowed. Successful academic achievement, which demands considerable learning and its reproduction, appeared in my study to be related to fear of experimenting with new ideas. Those who were able to show flexible creative thinking, had been brought up to think for themselves and had greater emotional security. This appeared to have provided them with the courage to explore intellectually and artistically, and it showed in the creativity of their thinking (Freeman, 2004).

Thinking is social. From birth, individuals adjust their behaviour according to the people they live amongst. Assessing the capacities and predicting the behaviour of other people is an important part of intellectual growth. The ways in which we behave can be seen as ongoing 'experiments', their results providing feedback from the environment which helps to determine future behaviour. One can see the effects of the social context in the ways an individual deals with any problem, which may change radically in different situations. For example, a child may think more creatively at home, but conform at school; or may fail examinations at school, but be pass all tests with honours in the challenges of the street gang.

Indeed, good performance in one place may be inappropriate in another. Flexible thinkers should be able to operate in a great variety of situations, especially when these are complex, to exploit their opportunities and adjust their own behaviour to others. As research findings from psychology, the social sciences, neurobiology, and medicine show, the way people think and behave is directly related both to their experiences and to the way they have learned to interpret them. Therefore, it would be a good idea to look at these origins.

The roots of thinking skills

Once a baby is in the world, every sense is active, though usually with a bias towards vision and hearing. From the first days of life, infants are curious and look around for what interests them, staring at some objects and events more than others. The refinement of their earliest perceptions is very rapid, and what they are learning then provides a very important foundation for their future mental life.

Even in babies, intellectual development can be thought of in terms of problem-solving skills (Mayer, 1992). By a few weeks old, they begin to use their own experiences for simple problem-solving, and so have begun to store them in memory - however fragile and unreliable. But the human brain is never passive; we always try to make sense of our experiences by transforming them into simplified, coded, versions, which become models to work from. Adults have thousands of codes and models in memory. The earliest coding starts with coordinating sensory impressions, such as feeling the way a ball is round and then watching it roll.

Culturally disadvantaged children find it difficult to practice and increase the complexity of their early perceptual learning. This lack can be seen in little children who are below average in recognising objects and situations and also less able to describe them. It is well recognised today that children's learning includes active as well as passive mechanisms, and qualitative

as well as quantitative changes (Siegler, 2005). For flexible thinking, the underlying learning must itself be flexible, allowing for changing strategies and timing.

Obedience is an emotional model, which may be useful in some childhood situations. But if it becomes fixed, because children are not allowed to practice making decisions for themselves, they are more likely to continue to accept others deciding for them. Independent questioning, thinking, and stepping out of line can then be difficult for the individual.

The strongest early indicator of a future lively mind is the ability to communicate, which is traceable from the age of three months (Lewis & Michelson, 1985). Vigotsky (1978), in his 'socio-historical' approach, described how while children are learning their language, they are also taking in 'ready made' parcels of culture to use in communicating and thinking. The system works, he wrote, because adults have learned it and share these cultural assumptions. Language thus mediates our perceptions, resulting in extremely complex mental operations - the analysis and synthesis of incoming information, the perceptual ordering of the world, and the encoding of impressions into systems and models. In this way, it serves as a basis for highly complex creative processes.

THE EFFECTS OF CONTEXT

Language and culture

Learning to speak, read and write is affected by a number of factors, such as the infant's emotional security and the need to communicate with words. Mothers normally provide a baby's introduction to the prevailing culture by mediating or filtering experiences of the world. The mother's own emotions play a role in this, which can significantly affect the intellectual life of the baby. Even infants of ten weeks can recognise the difference between happiness, sadness, or anger in their mothers (Collins & Gunnar, 1990). Her happiness encourages the infant to explore, her unhappiness produces sadness or anger, and her distress causes the infant to withdraw.

Any condition that causes stress to infants increases their need for their mothers, and decreases their urge to explore. What is more, the ill-effects of anxiety-arousing experiences (such as poverty) are cumulative. As a result, children raised in a stable, happy family are more likely to be curious and to persist with their own explorations, especially when the tasks become more complex. In a comparison study, three and a half year-olds, who had been classified as securely attached when they were babies, thought of new ideas and participated more in nursery activities, and they also attracted more friends than the less secure children. Their teachers rated them as more curious, eager to learn, self-directed, and effective (Waters *et al*, 1979).

Human beings are social by nature. They come together in groups which have their own particular cultural identity, made up of what their members have learned and how they behave. Cultural influences – e.g. historical interpretations and religions - legitimise this behaviour, seen in the division of labour or status. Culture filters downwards through generations, but it also spreads horizontally. In this way it affects other cultures; the most notable example being world-wide American influence. It can also move upwards, as when

new expressions in language, coined by the young, are absorbed into general speech. Changes also come from creative endeavour, for example the psychological ideas of Sigmund Freud or Pablo Picasso's concepts of art, which become absorbed by the cultural network. With any change in culture, the language changes accordingly: new words are introduced, and others become obsolete or disappear altogether. With all these currents and cross-currents, the culture that is inherited by a particular generation can never be the same as one that comes later.

To understand each other, people have to learn the specific codes, signs, and language of their culture. In almost all countries, people are marked as belonging to different subcultures by using different words and dialects within the common language. Their ideas about social values are equally varied. Non-verbal, physical expressions, such as the way people compliment or insult each other, are just as culture-based.

Deprived children

For millions of the world's children, schooling is almost an irrelevance in the daily battle for survival (Freeman, 1990; Freeman, 1992). Voluntary truanting happens when children find non-school activities more attractive than school activities. Working children lack choice, career goals, and hence any incentive to persevere with formal learning. Indeed, absenteeism from school, whether voluntary or not, has a poor prognosis in many respects. For example, longitudinal British research has found that truants are significantly more prone to breakdowns in marriage, health, and achievement (Hibbett & Fogelman, 1990). This individual human loss is enormously significant in world terms.

When children are obliged to earn money, it interferes both with the time they can spend at school and also with their inclination to acquire school-type knowledge. Non-school work is not necessarily bad. It can be a source of personal fulfilment at any age, and can provide a positive stimulus that enhances the quality of life. But it can also be mind-numbing for small reward - no more than a destructive drudgery.

At the beginning of the 21st century, a conservative estimate of the number of children worldwide under the age of 15 in full-time work is 52 million. For most, there is no alternative, because they are contributing to essential life support, and may even be the family breadwinner. Child soldiers are recruited in countries such as, Sri Lanka, Nicaragua and Peru; in Bangkok, girls and boys as young as 6 years-old swell the ranks of prostitutes, of whom about 30,000 are under the age of 16. By the end of the century, half the world's population will be under 25. Their chances of receiving the education they need in order to achieve their potential are minuscule.

Children who work from an early age can bypass some stages of development, resulting in stunted psychological maturation. This may affect the development of their intelligence for which a minimum input of mental stimulation is needed at any age. Although they may learn to cope with everyday obligations, they may have difficulty in thinking and planning beyond the present - and the younger they are when they start work, the worse the problem is likely to be. Child workers are often given the most menial and boring tasks, during which they

survive by `switching off' mentally, so damaging their developing ability to think and to acquire a feeling of control over their lives.

Deprived children's development is also dependent on the less tangible nourishment of the social environment. For example, in most parts of the world, the least attractive work is done by immigrants - and their children. In addition, they usually suffer from the major handicap of not speaking the host language as their native tongue. Consequently, when they do go to school, the children's lack of verbal fluency may appear as stupidity. Under-achievement by immigrant children, such as Gypsies in Hungary or Turks in Germany has been found in many schools. The majority language and literature of a country carries much of the outlook on which its culture is based, so that when children are brought-up without that language basis they are somewhat barred from those ways of thought. Effectively, they remain `foreigners' in the country of their birth.

This is not to say that all immigrant children succumb to such problems, as evidenced by the current brilliant performances of Vietnamese and Korean children in California, or of Jews in Western Europe and America. The essential difference seems to be in parental attitudes to education. Even in poor families where children do have to work and miss school, they may continue to develop intellectually if there is provision at home.

Literacy and women

In poor countries, education, especially basic literacy, is identified with status, self-esteem, and empowerment. This can be tragic for some, because not all members of the family may be seen as having the same rights to education (see Freeman, 2005). Women's' lives are often restricted to the home and they may be denied literacy: communications with the wider society is selected for them by their male relatives. In some countries, such as Pakistan, Nepal, Afghanistan and Yemen, more than three-quarters of young women have no education at all and cannot read, with all that that implies for their thinking and sense of self.

In truth, though, reading for women has proven value of better family health and nutrition, lower maternal and child death rates and lower birth rates. Important research in areas of high illiteracy, where one group of mothers were taught to read and a control group was not, found that women with even a little education produced healthier and intellectually brighter children (Hundeide, 1991). Such evidence suggests that where education is in short supply, that of females should take precedence over that of males, rather than the other way round as it is at present.

Newstyle thinking

A strange new phenomenon has been growing since about 1950, now called the 'Flynn Effect', describing an increasing gain in measured intelligence, the average rise in a population being about three IQ points per decade (Flynn, 2007). Rates are very varied, though, and while advanced countries are possibly reaching a plateau, developing countries have yet to see this rise at all. James Flynn's explanation is that environmental changes arising from modernisation - such as more intellectually demanding work, greater use of technology and smaller families - have meant that young people are far more used to

manipulating abstract concepts such as hypotheses and categories than a century ago. So, it is not so much native intelligence that is rising, but the way it is used.

Indeed, the increase can be seen most strikingly in tests measuring the ability to recognize abstract, non-verbal patterns, notably the Raven's Progressive Matrices. This implies that something is happening inside youngster's heads which is more profound than the old-style reproduction of data, still largely the kind of material taught for examinations. Thus, it is not an all-round general intelligence that is burgeoning but a more specific increasingly well practiced abstract problem-solving ability. Flynn gives as an example of the change in intellectual dynamics in answers to the question 'What do a dog and a rabbit have in common?'. Whereas a bright modern child would say they are both mammals - an abstract answer - a century ago they might say that you catch rabbits with dogs - a concrete answer. This new mode of more abstract thinking is important because it offers a greatly enhanced ability to see and think through problems than simpler adaptive behaviour used to deal with more concrete problems.

The generally accepted explanation is that bright children are able to function at an increasingly higher intellectual and abstract level because of improved education and a more interesting enviroment. The growing use of computers for education and even games at an early age may boost the curious child's knowledge, abstract reasoning and intellectual agility. Just using everyday appliances, such as VCRs, ipods, and mobile communications equipment, demands a more abstract type of perception and reasoning, which the older generations can find extremely difficult.

CONCLUSIONS

The major goals of good education have long been recognised as reaching beyond the accumulation of knowledge and basic literacy, the three Rs – reading, 'riting and arithmetic. They also encourage children to develop curiosity, problem-solving attitudes and a love of learning which will last them for the rest of their lives. In addition, people act most positively and creatively when they have enough self-confidence and courage to use experience in new ways. Although the promotion of versatile thinking must have a basis of acquired knowledge, this must be learned in a manner which is meaningful to the learner and the learner's wider world, and which can be used in many situations.

Ideas of what literacy is and its wider effects are in a state of rapid and measurable change. A hundred years ago, one was highly literate if one read great literature and could compose a rounded essay in response to it. Today, children's fresh, agile minds are grasping new approaches to knowledge and modes of action. They find old-style school exercises relatively meaningless in terms of the promise of their own lives. The new style of thinking is a richer and more complex dynamic mix, producing a higher level of abstract thinking along with a level of digital dexterity never before demanded of the literate. These recent changes in ideas of literacy and the means of exercising them have gone hand in hand. Those who have a natural ability to think in the new way and also have access to the means of practising it tend to want even more of it. But those with the same potential ability, but with little or no access

to practice, are effectively handicapped and underachieving in terms of current sophisticated thinking skills.

The bad news is that millions of underprivileged children are likely to become even more left behind as technology becomes increasingly more central in young people's lives. The good news is that intelligence and ways of thinking can change; genes are not in absolute control and there is hope for greater liberation from rigid to more creative thinking for everyone. Perhaps this is real democracy in action, when literacy and flexible thinking are no longer the domain of just a privileged few.

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