

Re-connecting the Brain to Living and Learning¹

Terry Ryan and John Abbott

So fast and so fundamental are the changes occurring within present society that each year brings a greater discontinuity with the past, and nowhere is this more the case than in education. Taken together these changes amount to an absolute disconnect between what was good practice for schools, and what we now know from research we should be doing. Disorienting change is not a new phenomenon: in 1927 Mercedes Benz produced 1700 cars, and management was so excited that they employed consultants to tell them what their growth potential over the next 50 years could be. Eventually the report came back: “By 1977 so fast will be the technological change that Mercedes could expect to produce 40,000 cars a year.” The Directors threw out the report and sacked the consultants. “This is totally irresponsible,” they reasoned. “There is no way schools could train 40,000 chauffeurs a year!” The point here is that technological, economic, scientific and social change at the beginning of the 21st century is moving at such a rapid speed, that what seemed reasonable in the very recent past no longer does today. This is a cautionary tale, for what may seem reasonable today can very well look as foolish to future generations, as the 1927 comments of the Mercedes Benz directors looks to us today.

THE DISCONNECTS

As people in various lands rethink education for the new century, at least four disconnects have to be considered. They are all interconnected in their implications. (See table on opposite page).

Industrial Age Assumptions	———versus———	Today's Realities
The Economy		
In the Industrial Age most work was organized hierarchically. Only relatively few people at the top needed to be creative, imaginative and enterprising. Most workers had to be good only at performing highly precise, structured and repetitious tasks necessitating a high degree of discipline but little personal initiative. Understanding of the total business process was unnecessary and discouraged.		Today's successful businesses tend to be highly decentralized and rely on continuous innovation at all levels. Almost all workers have now to be able to think for themselves, take personal responsibility, identify new opportunities and training needs, and understand the relationship of their business to that of others. Workers must be able to adapt rapidly without waiting for external direction.
Learning		
Learning was assumed to be largely an individual activity and a consequence of formal instruction. Differences in individual levels of intelligence were regarded as hereditary and immutable. Superior intellects were		Learning is a collaborative problem-solving activity that involves far more than instruction alone. It occurs through progressive construction of individual knowledge, not simply through information transfer.

relatively few. Learning tasks were strictly gradated, because it was assumed that only a few youngsters as they got older were capable of "real, meaningful learning." This tiny minority itself had to be "tutored by professionals." Real learning occurred only in schools, so children were removed from the "negative influences" of the community.	Intelligence is at least partially learnable. Learning is multi-tasked and involves the use of multiple forms of intelligences. Adolescents thrive when they are given the skills in primary education that enable them progressively to take responsibility for their own learning. Individual learning is driven by the need "to make sense," and by the strength of intrinsic motivation.
The Brain	
Because so little was known at a technical level about the structure and operation of the brain, philosophers assumed that it was "an empty vessel waiting to be filled." The early experiences of very young children were seen to be of little significance; learning began at school. In the late 1960's the metaphor shifted to that of a linear computer waiting to be programmed, and so external inputs not motivation were seen to drive learning. Emotions were extraneous to formal education.	Brain research now describes "predispositions" inherited from our evolutionary past, which are best described as a collection of "successful adaptation skills." Critical to the brain's healthy development are prenatal health, a challenging, stimulating and reassuring environment in the first four or five years of life followed by plenty of opportunity to develop practical involvement in the growth years, and personal responsibility during adolescence.
Learning Technologies	
Valid learning was dependent on close association with an expert who utilized 'chalk and talk' to convey information. Learning depended upon verbal assimilation and memorization, checked by tests, all at a specific time, in a specific place, and in a stepped relationship to other learning.	New information communication technologies expand enormously opportunities for individual and group learning. They offer multi-sensory, reflective, and collaborative learning environments unconstrained by time, place and formal structures. These encourage exploration and discovery thus supporting students in the construction of new understandings.

When these four disconnects are considered as interrelated pieces it becomes apparent that a successful learning community in the 21st century will see learning as going well beyond that which takes place just in the school. The reason for this becomes even clearer when one looks at the learning needs of young people from a constructivist perspective. The premise of constructivism is that the brain of each child structures his or her own knowledge of the world into a unique pattern, connecting each new fact, experience, or

understanding in a subjective way that binds the child's thinking into rational and meaningful relationships to the wider world. Constructivist learning is the dynamic interaction between the environment and the individual brain. Learning is open-ended, as is the neural structure of the brain. This is an important fact because in most countries students spend less than 20 percent of their waking hours in a classroom (see "Teaching Time"). Because of the constructivist nature of the brain the learning of children does not stop at the schoolhouse door, and in fact may rarely even begin there.

Lauren Resnick, one of America's foremost educational researchers, noted more than a decade ago in a speech to her colleagues in the international research community that, "the process of schooling seems to encourage the idea that the 'game of school' is to learn symbolic rules of various kinds, that there is not supposed to be much continuity between what one knows outside school and what one learns in school. There is growing evidence; then, that not only may schooling not contribute in a direct and obvious way to performance outside school, but also that knowledge acquired outside school is not always used to support in-school learning. Schooling is coming to look increasingly isolated from the rest of what we do" (Resnick, 1987). If we continue to operate under Industrial Age assumptions about learning, children will increasingly see that what they do in school has little relevance to the opportunities and problems they encounter in the real world.

This evidence dictates that learning arrangements move well beyond what occurs just in a classroom — it requires a whole new understanding of a learning community — and that involves everyone, not just teachers. The education system of the future will need to actively respect and permeate learning opportunities throughout the entire culture. This form of open dynamic learning will in fact not be seen as a system, but rather as a way of life. Learning will be something that we all recognize, encourage and actively support through community participation and the power of the connected world of information communication technology.

It is not that the age of the school is dead, but rather we are entering an age where what needs to be learnt and unlearnt is shifting faster than the slow moving institution of schools alone can cope with. Schools are only part of the equation for those interested in trying to determine how to best prepare young people for the opportunities and challenges of the 21st century. Thus, for those who pin their hopes on issues of school effectiveness and the mantras of high standards, improving test scores, and accountability we argue that you're missing many of the central issues that must inform learning policy. Or more simply put, education reform is only a subcomponent of the more significant issue of how we go about creating a learning society.

A SWEEPING SHIFT IN ORIENTATION?

An awareness is growing in many places that a one-size-fits-all education system does not work very well, and that this fact might somehow be related to the disconnect between the way education systems operate, the natural workings of the brain, and the economic needs of democratic societies in the Information Age. It is for this reason that various groups around the world are beginning to "call for a sweeping shift in orientation,

from institution, schools and programs to learners and learning.” (The OECD, 1998). However, despite the calls for such a shift the problem, as with many good policy ideas, is that focusing on learning and learners rather than schools, institutions and teachers collides head on with the three **I**'s.

First, there is **Ignorance**, or more accurately, lack of awareness and confusion. At a very basic level the general public, policy people, and politicians do not know very much about brain science, the science of learning, the history of education, or even innovative educational practice. The problem of this lack of awareness is compounded by the speed at which new findings about the brain and learning are emerging from the world's laboratories, universities and research centers. With the ever-growing number of PhDs from universities, and the ever increasing power of new technologies, the rate of occurrence of new and stunning facts about the brain and learning are almost impossible for even the most avid reader to keep up with. Added to this difficulty is that scientists employ language, techniques, and ways of thinking that are powerful and effective in their field, but that are hard to articulate for non-specialists. This means most people, including policymakers, who read about new findings in science get their information through the filters of the mass media. We are showered almost daily with articles in newspapers and magazines about scientific discoveries relevant to the workings of the mind and human learning. Even more frustrating than trying to keep pace with all the new understandings is the fact that it often seems to thoughtful lay people that what they think they know as true can quickly become passé.

Second, there is **Interests**. Those people in positions of influence over current systems of education see their role as managing the current system, not challenging it. This means it is in their interest to defend the system from those who advocate changes that would seek to disperse power away from institutions and their control towards learners and community groups. It is in the interest of those in positions of authority to manage rather than lead for the simple fact there is far less risk and exposure to controversy by not rocking the boat. Managers work within the rules of the system and to the needs of the system. They tell subordinates what to do in order to make the system, as it is currently structured, more efficient. Besides, why challenge a system that has been good to you personally?

Finally, there is **Ideology**. The political Left has traditionally argued that education is about helping young people function as independent thinkers committed to universal values and rights, while the Right has traditionally argued that education is about inducting young people into the values of the state and industrial workplace. Subsequently, discussion around education has been stuck between competing political ideologies that argue learning is either flexible, experiential and progressive, or strictly formal, disciplined and logical. The former has been deemed to belong to the Political Left, while the Right has owned the latter. Despite the political difficulties, from the perspective of successful learning, what seems clear from all the evidence accumulated is that both sides of the ideological divide have had it partly right and partly wrong. Without a greater sense of the relationship between the two traditional ideological extremes then policymakers and educationalists will simply oscillate from one to the other, always

claiming they are trying to equip their young people to face the challenge of change, without really changing.

RE-INTEGRATING THE GENERATIONS AROUND LEARNING

The evidence presented here calls for an organized middle way. To repeat - constructivism is not only an open-ended form of learning; it is essentially about reality, connectivity, and the search for purpose. It is about all those things that motivate a young person to excel and take responsibility for his own learning and future. A constructivist form of learning matches the brain's natural learning patterns. We argue further that if we can develop learning arrangements that honor the principles of constructivism then young people will thrive in an open and rapidly changing technological, social and economic environment. Constructivist learning dictates that learning arrangements move beyond what occurs in a classroom; it requires a whole new understanding of a learning community - and the involvement of everyone, not just teachers. The arguments raised here can provide the starting point for those seeking effective long-term educational change and those committed to the revitalization of communities by re-integrating the generations.

Akilu Habte, former Chancellor of the University of Addis Ababa in Ethiopia, captured the significance of re-integrating the generations around the learning of young people when he asked a conference of policymakers in 1995, "Have you ever stopped to think what the over-emphasis on western education has done to my country, and countries like it?" Habte noted the unintended consequences of a singular focus on schooling when he said, "You came to Africa and told us that our traditional way of learning (apprenticeship) was 'out-of-date.' You said that our way of formulating knowledge was inappropriate. You emphasized the dominance of narrowly defined intellectual skills. We listened too carefully to your advice. So we told parents that they needed to care for their children only when they were very young, but that 'proper' learning would now be organized by professionals in schools. The old men were saddened as no one wanted to learn their wisdom, and the old women mourned for the grandchildren would never come and talk to them. We emphasized higher education, and our students did well. So well that they were over-qualified and there were no longer challenging jobs for them in Ethiopia. They started to leave for lucrative careers in America, in Europe, and in Australia. Many of them left our country for good, denying it the leadership it desperately needed. Society became increasingly unstable. We had, as it were, too many people trained to be clerks but few who were wise enough to be leaders."

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¹ Please Note: The ideas addressed in this article are developed further in Ryan and Abbott's book *The Unfinished Revolution* to be published later in the year 2000. For advanced copies please contact the 21st Century Learning Initiative at <info@21learn.org>.