

INFORMATION TECHNOLOGY AND THE EDUCATION REVOLUTION

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Information technology is the key to success in the education revolution but it has a much richer role than has captured the headlines thus far. My purpose is to demonstrate how it can find its place in efforts to achieve a transformation in education. After reviewing the call for revolutionary change on four continents, I shall demonstrate through the findings of a recently-completed study in six countries how capacity can be built in schools and school systems. There is a critically important role for industry. Success is dependent on trust.

The call for an education revolution is worldwide

There are calls on four continents for an education revolution. We are familiar with this call in Australia, for it was the centrepiece of Labor's policy at the recent election. There was immediate action in the provision of computers for all schools across the nation, a strategy which may be best understood as the completion of a revolution that was led by schools and school systems from the early 1990s. As I shall demonstrate, the really hard tasks lie ahead.

Where else is there a call for an education revolution? Consider the words of Democratic Party frontrunner Barack Obama – a serious contender for the presidency -- in his second book *The Audacity of Hope*: 'We know that global competition – not to mention any genuine commitment to the values of equal opportunity and upward mobility – requires us to revamp our educational system from top to bottom'. Or consider the vision of UK Prime Minister Gordon Brown in a recent speech:

'I make no apology for saying that education is the best economic policy. And I make no apology for wanting every child to be able to read, write and add up. But education has always been about more than exams, more than the basics, vital as they are. To educate is to form character, to shape values, and to liberate the imagination. It is to pass human wisdom, knowledge and ingenuity from one generation to the next. It is a duty and a calling. As Plutarch said, the mind is not a vessel to be filled but a fire to be kindled. And that is why we have such high ambitions. Not just because education is a matter of national prosperity, although it is certainly that. It is because education is the greatest liberator mankind has ever known, the greatest force for social progress. And that is why it is my passion' (Brown, 2007).

Brown's opening line elevates the association of education and economy. Regrettably, we have tended to see education as separate from economy and the two of them as separate from society when in fact there has historically been a powerful connection between all three. We have difficulty connecting them up in the fast-paced 21st century.

The need for a revolution on a fourth continent may be illustrated in the case of India where, according to an article in *The Economist* last week: 'The public school system

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leaves a third of its pupils illiterate'. This is a paradox given that India is considered to be one of the economic powerhouses of the 21st century and is generally assumed to be a world leader in engineering and information technology. The middle class in India is growing in dramatic fashion and its members are demanding the best schools at the secondary level. A conference on this theme will be held in New Delhi to which have been invited 50 people from around the world who work in the field of educational transformation. Gordon Brown's vision of education as 'the greatest force for social progress' will be tested in the world's largest democracy.

At the heart of the revolution

In his best-seller *The World is Flat* (Friedman, 2005) triple Pulitzer Prize winner Thomas Friedman described ten forces – 'the flatteners' – that converged over the last 20 years. The first was the opening of the Berlin Wall in 1989. The others were the release of Netscape in 1995, integration of work flow, out-sourcing, off-shoring, open-sourcing, in-sourcing, supply-chaining, in-forming, and using 'steroids' – building an enhanced capacity in a mobile digitalised world. He suggests that the tipping point was reached around 2000.

The net result of this convergence was the creation of a global, Web-enabled playing field that allows for multiple forms of collaboration – the sharing of knowledge and work – in real time, without regard to geography, distance, or, in the near future, even language. No, not everyone has access to this platform, this playing field, but it is open today to more people in more places on more days in more ways than anything like it ever before in the history of the world. (Friedman, 2005, pp. 176-177)

This describes one of three convergences that account for the flattening of the world. The second is that there is stronger alignment between the capacities of an enterprise and the potential that is available as a result of the first convergence. The third convergence is that the flatteners are now at work and alignment has occurred in parts of the world that were previously 'frozen out'. Friedman concludes that 'it is this triple convergence – of new players, on a new playing field, developing new processes and habits for horizontal collaboration – that I believe is the most important force shaping global economics and politics in the early twenty-first century' (Friedman, 2005, pp. 181-182).

The chief driving force for the revolution and for achieving the convergence described by Friedman is the quality of teachers. The recent McKinsey & Company report on *How the world's best-performing school systems come out on top* makes it clear: 'the quality of an education system [or school] cannot exceed the quality of its teachers' (Barber and Mourshead, 2007). Finland's recognition of this is one reason why it is the best performing nation. All new teachers must have a master's degree. Rather than limit supply, this policy has elevated the appeal of the profession such that only 10 percent of applicants are selected for entry.

International Project to Frame the Transformation of Schools

We have demonstrated the importance of intellectual capital in a recent international study.

In 2007-2008 Educational Transformations Pty Ltd conducted the International Project to Frame the Transformation of Schools in Australia, China, England, Finland, United States and Wales. This project was funded by the Australian Government and the Welsh Assembly Government with in-kind support from research partners in each country. Funding partners have received the final report. The project provided a deeper exploration of the framework for transformation in *Raising the Stakes: From Improvement to Transformation in the Reform of Schools* (Caldwell and Spinks, 2008), as illustrated in Figure 1. A book based on the findings of the project will be published as *Why Not the Best Schools?* (Caldwell and Harris, 2008).

The purpose of the project was to explore how schools that had been transformed or had sustained high performance had built strength in each of four kinds of capital and aligned them through effective governance to secure success for their students. Particular attention was given to secondary schools in systems where there was a relatively high level of school autonomy.

Intellectual capital refers to the level of knowledge and skill of those who work in or for the school. Social capital refers to the strength of formal and informal partnerships and networks involving the school and all individuals, agencies, organisations and institutions that have the potential to support and be supported by the school. Spiritual capital refers to the strength of moral purpose and the degree of coherence among values, beliefs and attitudes about life and learning (for some schools, spiritual capital has a foundation in religion; in other schools, spiritual capital may refer to ethics and values shared by members of the school and its community). Financial capital refers to the money available to support the school. Governance is the process through which the school builds its intellectual, social, financial and spiritual capital and aligns them to achieve its goals.

An innovative approach was utilised in the development and enrichment of the model from 2005 to 2008. Apart from the project funded by the Australian Government and Welsh Assembly Government, we conducted case studies (49), master classes (4) and workshops (60) involving school and school system leaders in 11 countries where there was an agenda for or interest in transformation and where schools had a relatively high level of autonomy. Forty of the 49 case studies were contributed by school leaders in 13 of the 60 workshops. Several workshops were incorporated in conferences and postgraduate programmes in leadership and management.

A feature of most of the workshops was the invitation to school and school system leaders to respond to key questions on design, implementation, issues and outcomes of efforts to achieve the transformation of schools. Transformation was considered to be significant, systematic and sustained change that secures success for all students in all settings. The interactive computer-based technology Zing (to be demonstrated in another session by its inventor John Findlay) enabled large numbers of individual and group responses to be gathered for subsequent analysis. The interactive technology was utilised in 50 out of a total of 60 workshops, with approximately 2,500 participants generating more than 10,000 responses for subsequent analysis.

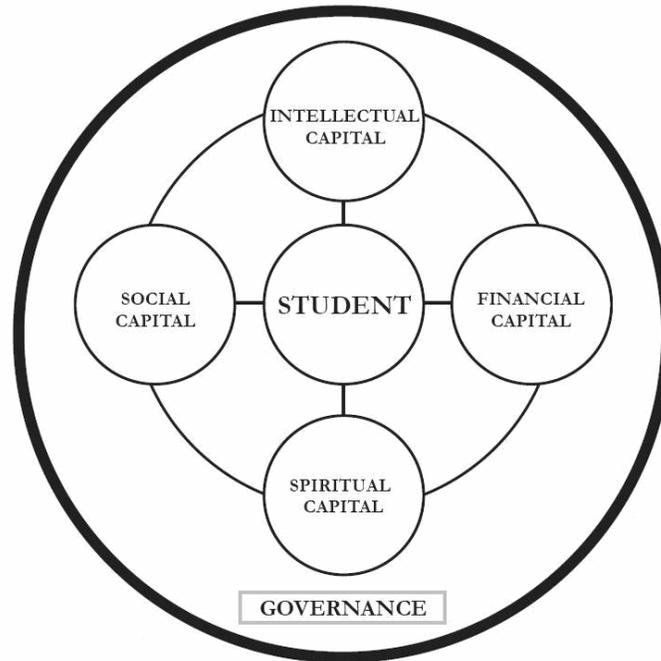


Figure 1 Alignment of four kinds of capital for the transformation of schools

Indicators

Sample indicators were devised for each kind of capital and of governance. They served as a guide to researchers in each of the six countries in the selection of schools and to help build a common understanding of what was meant by each concept (intellectual capital, social capital, spiritual capital, financial capital and governance). The 50 indicators – 10 for each kind of capital and for governance – are listed below. Indicators marked with an asterisk (*) have direct and explicit implications for information technology. The strategies implied in each of these are central to the efforts of schools and school systems in ensuring that there is a richer role for information technology in the education revolution.

Intellectual Capital

1. *The staff allocated to or selected by the school are at the forefront of knowledge and skill in required disciplines and pedagogies
2. *The school identifies and implements outstanding practice observed in or reported by other schools
3. *The school has built a substantial, systematic and sustained capacity for acquiring and sharing professional knowledge
4. *Outstanding professional practice is recognised and rewarded
5. *The school supports a comprehensive and coherent plan for the professional development of all staff that reflects its needs and priorities

6. *When necessary, the school outsources to augment the professional talents of its staff
7. *The school participates in networks with other schools and individuals, organisations, institutions and agencies, in education and other fields, to share knowledge, solve problems or pool resources
8. *The school ensures that adequate funds are set aside in the budget to support the acquisition and dissemination of professional knowledge
9. *The school provides opportunities for staff to innovate in their professional practice
10. *The school supports a 'no-blame' culture which accepts that innovations often fail

Social Capital

1. There is a high level of alignment between the expectations of parents and other key stakeholders and the mission, vision, goals, policies, plans and programmes of the school
2. There is extensive and active engagement of parents and others in the community in the educational programme of the school
3. Parents and others in the community serve on the governing body of the school or contribute in other ways to the decision-making process
4. Parents and others in the community are advocates of the school and are prepared to take up its cause in challenging circumstances
5. *The school draws cash or in-kind support from individuals, organisations, agencies and institutions in the public and private sectors, in education and other fields, including business and industry, philanthropists and social entrepreneurs
6. *The school accepts that support from the community has a reciprocal obligation for the school to contribute to the building of community
7. *The school draws from and contributes to networks to share knowledge, address problems and pool resources
8. *Partnerships have been developed and sustained to the extent that each partner gains from the arrangement
9. *Resources, both financial and human, have been allocated by the school to building partnerships that provide mutual support
10. *The school is co-located with or located near other services in the community and these services are utilised in support of the school

Financial Capital

1. *Funds are raised from several sources including allocations by formula from the public purse, fees, contributions from the community, and other money raised from the public and private sectors
2. *Annual planning occurs in the context of a multi-year development plan for the school
3. *The financial plan has a multi-year outlook as well as an annual budget
4. *Allocation of funds reflects priorities among educational needs that take account of data on student achievement, evidence-based practice, and targets to be achieved
5. There is appropriate involvement of stakeholders in the planning process

6. Appropriate accounting procedures are established to monitor and control expenditure
7. Money can be transferred from one category of the budget to another as needs change or emerge
8. Actual expenditure matches intended expenditure allowing for flexibility to meet emerging needs
9. Educational targets are consistently achieved through the planned allocation of funds
10. The funds from all sources are sufficient and sustainable to meet educational needs

Spiritual Capital

1. There is a high level of alignment between the values, beliefs and attitudes about life and learning held by the school and members of its community
2. The values and beliefs of the school, including where relevant those that derive from a religious foundation, are embedded in its mission, vision, goals, policies, plans and curriculum
3. The values and beliefs of the community are taken into account by the school in the formulation of its mission, vision, goals, policies, plans and curriculum.
4. The school explicitly articulates its values and beliefs in publications and presentations
5. Publications and presentations in the wider community reflect an understanding of the values and beliefs of the school
6. There are high levels of trust between the school and members of its community
7. Parents and other stakeholders are active in promoting the values and beliefs of the school.
8. The values and beliefs of the school are evident in the actions of students and staff.
9. Staff and students who are exemplars of the values and beliefs of the school are recognised and rewarded
10. The values and beliefs of the school have sustained it or are likely to sustain it in times of crisis

Governance

1. Authorities, responsibilities and accountabilities of the governing body and professional staff are clearly specified
2. Mechanisms are in place to ensure that obligations in respect to legal liability and risk management are addressed
3. There is a clearly stated connection between the policies of the school and intended outcomes for students
4. Policies have been prepared after consultation with key stakeholders within the school and the wider community
5. Policies have been formally approved by the governing body
6. Policies are consistent in their application across the school so that students with the same needs are supported in the same manner
7. *Data are used in making decisions in the formulation of policies and making judgements about their effectiveness
8. *Data are gathered across the range of intended outcomes

9. *Information about policies and their implementation is readily available to all stakeholders
10. There is a strong sense of commitment to policies and their implementation on the part of all stakeholders

Two instruments have been developed. In the first, for each indicator, respondents are invited to provide ratings of (1) importance in the context of your school, (2) how well your school is performing, and (3) the priority you attach to further development. The respondent might consider the school as a whole or a particular unit within the school. These instruments have also been used by networks of schools to examine and evaluate the priorities and performance of the network in each of these areas.

The instrument may be used in a range of situations. Its principal use is to frame an audit of a school's capacity to achieve change on the scale of transformation or to sustain high levels of performance. We incorporated the use of this instrument in 22 workshops in the second half of 2007 where participants included school and school system leaders who rated their own schools or school systems. Where there was a group of leaders from the same school, they completed their ratings individually and then compared responses, or worked through the list as a group. The instrument may be completed in the school setting by a leadership team or a group of staff working in the same area.

The instrument travels well across international borders. We used it with leaders from several countries, including Australia, England, Malaysia, Netherlands, Philippines, Singapore and Wales. Participants have not balked at the inclusion of any indicator and have been able to work through the entire set of indicators in the context of their own schools or school systems.

The second instrument is concerned with governance and is designed to assist the school in the specification of roles and responsibilities for the governing body of the school and the principal, who normally serves as its chief executive officer. We list each set of indicators for each form of capital – intellectual, social, spiritual and financial – and invite respondents to suggest a distribution of roles and responsibilities, choosing from seven modes in each instance.

Relationships between indicators

A closer examination of these sample indicators highlights the relationships between the four kinds of capital. The relationships are best illustrated as intersecting sets as in Figure 2.

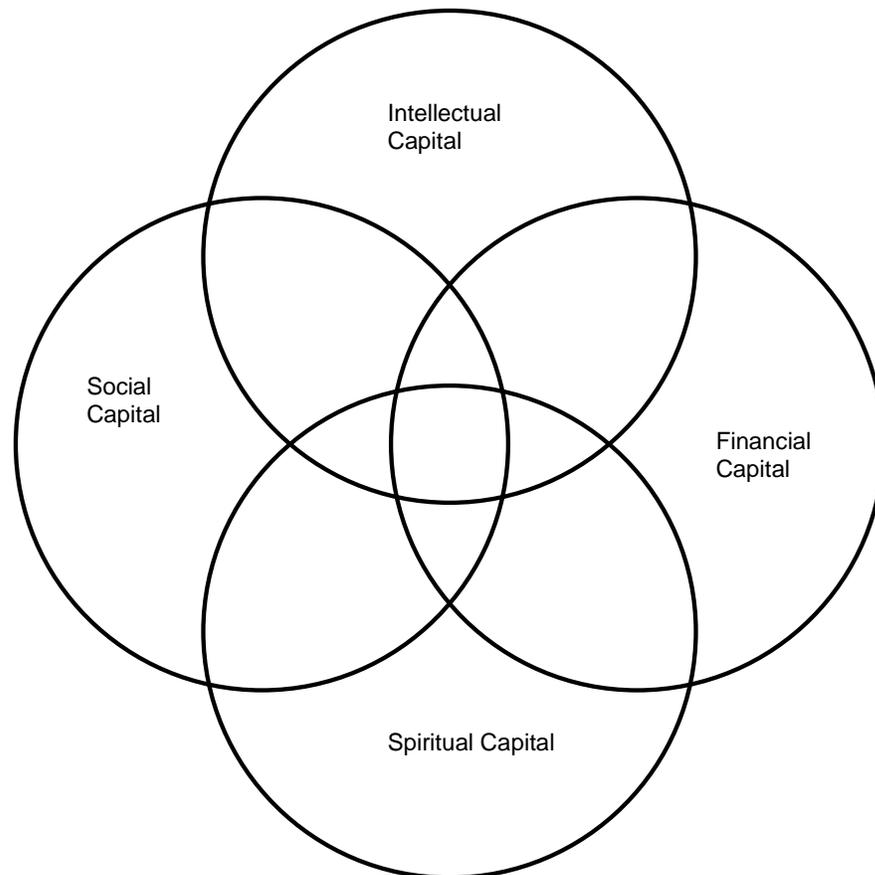


Figure 2 Relationships between the four kinds of capital

Based on the findings of the project, our further work at Educational Transformations involves partnerships with schools and school systems to:

- Conduct an audit of current capacity for transformation. The focus might be the system as a whole, a region or district, a school, or a unit within a school. The end point is the identification of priorities.

- The indicators validated in the international project suggest strategies for action. Each strategy requires further specification and this is the next step after the audit is conducted and priorities are established.
- Conduct an audit of structures, roles, responsibilities and accountabilities in governance and identify priorities and strategies to ensure effectiveness.
- Design and deliver related professional development programs to help build understanding and capacity in the processes of transformation. These programs might include seminars, workshops, site visits to schools and systems where transformation has been achieved, or master classes by leaders who have excelled in this domain.

Implications

At least 23 of the 50 indicators have explicit and direct implications for the design and delivery of information technology. Especially noteworthy is that all 10 indicators of intellectual capital are included in the 23. This demonstrates how information technology is a key energiser of the education revolution. Hardware and software are pre-requisites and appropriate funds must be acquired and allocated.

System leadership

Outstanding practice of the kind contained illustrated in these indicators does not happen by itself through energies and expertise generated at the school level alone. Schools require support. Traditionally this has come from 'the system' but increasingly it comes from a range of providers, as implied in several of the indicators. Those in the industry have a critical role and support has been an important factor in progress to date.

There are developments that suggest that system leadership will expand in other ways. In England, for example, 90 percent of 3 100 secondary schools have a partnership with business in a way that makes sense as far as the school's curriculum is concerned. This transformation was largely achieved in the decade of New Labour under Tony Blair. These schools have changed from a standard comprehensive to a specialist schools model. Each offers at least one of eleven specialisations while still addressing the broad national curriculum.

The specialisations are technology, arts, business and enterprise, engineering, humanities, language, mathematics and computing, music, science, sports and special education. A total of 583 secondary schools specialise in technology. Each school has one or more partnerships with business, broadly defined, in its area of specialism. Except for small schools, business contributes £50,000 in cash or in-kind support, generating from government an additional £100,000 capital grant and a per student recurrent grant (for example, the recurrent grant is £129 per student up to 1,000 students). In each instance the school must demonstrate in a three-year development plan how the specialisation will enhance the overall performance of the school. A non-profit charitable trust (Specialist Schools and Academies Trust) is funded by government to support schools in seeking specialist status and to be the vehicle for directing large amounts of business support. Examples of support include HSBC, Rolls-Royce and RM, the leading supplier of ICT software and services to schools.

While academics debate the extent of the impact, there is clear and consistent evidence that specialist schools outperform non-specialist schools on actual and value-added

measures in examinations for the General Certificate of Secondary Education (GCSE) and that the difference tends to be greater in schools in challenging circumstances. While there are differences among the specialisations as far as impact is concerned, the impact becomes stronger the longer a school remains in the program. All secondary schools will be specialist within a year or two, each with its partnerships with business. It is fair to conclude that this is one of the most significant developments in secondary education in any country.

Such partnerships deliver expertise and money. Tony Blair's successor Gordon Brown wants the same kinds of partnerships for primary schools. Most of England's successful businesses participate in the scheme that has had its biggest impact in disadvantaged settings.

It is likely that Australia will move down the same path as far as specialisation is concerned. So we face a double challenge: to ensure all schools, both primary and secondary, have adequate technology; and to ensure that a sufficient number of schools have the very best technology. The information technology industry should be ready to extend its already impressive contribution to the education revolution.

Facilities and e-government

There are two important implications in respect to infrastructure. One concerns facilities. Most schools built prior to the last decade are in run-down condition or are not suited to learning and teaching in the 21st century. In Australia, we need massive re-building programs of the kind now underway in England where buildings that were considered state-of-the-art 50 years ago are being bulldozed and replaced by outstanding facilities valued up to AUD\$100 million. In the newer academies, built mainly in highly disadvantaged settings, there is a significant industry or philanthropic contribution to costs. There has been belated recognition of the issue in Australia and some impressive new schools have appeared in recent years. Some are designed around quite different approaches to learning and teaching that focus on the use of technology and working in teams. The Australian Science and Mathematics School at Flinders University is an example of such a school (see Chapter 10 in Caldwell and Spinks, 2008 for an exploration of this theme).

Outstanding facilities contribute to the morale of the profession as well as facilitate the use of information technology. Surveys reveal that up to half of beginning teachers do not expect to be in the profession after five years. Up to 30 percent of teachers are expected to retire in the same period. Information technology can also make a contribution to the morale of the profession through the provision of timely and useful data (as implied in several indicators) and also reducing or making manageable the amount of paperwork. This is a particular concern to principals and other school leaders and managers at all levels of a school system. The larger issue is the slow pace at which we are introducing e-government in education (see *The Economist*, 2008 for an exploration of this issue in a general sense but also in reference to education).

Trust

The integrating force in all of these matters is trust. Aligning the four kinds of capital, with information technology the energising force, will not occur without trust among all

stakeholders, especially between policymakers, professionals and providers. This is an underlying theme of Stephen Covey in *The Speed of Trust* (Covey, 2006).

There is one thing that is common to every individual, relationship, team, family, organisation, nation, economy, and civilisation throughout the world – one thing which, if removed, will destroy the most powerful government, the most successful business, the most thriving economy, the most influential leadership, the greatest friendship, the strongest character, the deepest love.

On the other hand, if developed and leveraged, that one thing has the potential to create unparalleled success and prosperity in every dimension of life. Yet it is the least understood, most neglected, and most underestimated possibility of our time.

That one thing is trust. (Covey, 2006, p. 1)

References

Barber, M. and Mourshed, M. (2007). *How the World's Best-Performing School Systems Come Out on Top*. London; McKinsey & Company.

Brown, G. (2007). 'Vision for Education'. Speech at the University of Greenwich. 31 October. (www.labour.org.uk/gordon_brown_sets_out_his_vision_for_education accessed 7 November 2007)

Caldwell, B.J. and Harris, J. (2008) (forthcoming). *Why Not the Best Schools*. Camberwell: ACER Press.

Caldwell, B.J. and Spinks, J.M. (2008). *Raising the Stakes: From Improvement to Transformation in the Reform of Schools*. London: Routledge.

Covey, S. (2006). *The Speed of Trust*. New York: Simon & Schuster.

Friedman, T. (2005) *The World is Flat: A Brief History of the Globalised World in the 21st Century*. London: Allen Lane.

Obama, B. (2008). *The Audacity of Hope: Thoughts on Reclaiming the American Dream*. Melbourne: The Text Publishing Company

The Economist (2008). 'The Electronic Bureaucrat: A Special Report on Technology and Government'. 16 February. Supplement, page 18.

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