# 25

# Impact of information and communication technology on the management of future schools

*M. Mäkelä, A. Tatnall, P. Nolan, and C. Fulmer*

*with F. Frank, A.C.W. Fung, H. Gorsler, T. Okamoto, A.J. Visscher, H. Yndestad, and W. Yongmanitchai*

### Abstract

Future schools will involve participants (students, teacher tutors and the school community) working in collaborative environments. Members of the working group discussed the possible influences of IT on learning in and management of future schools, looking at some recent trends from the countries represented. They concluded that changes will occur in schools, but not without difficulty and change in the mindset of all concerned.

## 1    SCHOOLS IN THE FUTURE

The aims of education may be more achievable in the future with changes in both schools and technology - the question is whether IT (Information Technology) will make a difference. Will IT make it easier to achieve these goals? Schools of tomorrow could be different from today's schools for the following reasons.

- Society is changing from a labour and capital intensive mode of production towards an information intensive one.

- Outside demands (labour markets, development of information technology and the information industry, pressure of parents and society, etc) will set new goals for the schools and for their curricula.

- The new technology is already available and there is a demand from students to use this technology. Furthermore, students are motivated to learn with this new technology.

However, in spite of promises offered by prior technologies (such as TV and video), fundamental changes in the processes of schooling have not been realised. The issue is whether IT will follow this same path, or achieve a more enduring and effective impact in schools. The task involves both changes in schools and the appropriate application of IT tools.

The permanent skills relevant to lifelong learning are the skills of communication and cooperation (team work), and a capability to search for, and find relevant information from different sources in a changing problem solving situation. It will be more important to learn permanent skills and to learn to learn new things than to mechanically remember given facts.

Recent research results from learning psychology and pedagogical experience have led to the modern concept of active learning, and teaching must change according to these precepts. Students must control their own learning process actively participating in cooperative working teams and solving interdisciplinary problems together with teachers. Learning results should lead to generalisations and abstractions that are transferable to other experiences. The curriculum will thus be custom designed, interdisciplinary, fragmented, flexible, and capable of meeting specific need and demands.

As learning will happen any time and everywhere, the school of the future is a larger concept than the present one. It will be a distributed system with a fragmented netlike structure and without any clear hierarchy. The most important parts of the system are:

• the people involved - students, teachers as tutors or facilitaters of learning, administrators and managers of the system, and members of the "outside" world,

• space - school buildings, homes, libraries, museums, working places, etc and

• communication networks - computer networks, telecommunications, etc

People are working in collaboration together. They are distributed flexibly in time and space. The system is in continuous change, and adaptation to the change is vital.

# 2     'IT' IN THE FUTURE

Based on the evolutionary trends in IT one could forecast that continued improvements will be achieved in the following areas: networking connectivity, user interface, information accessibility and productivity tools. Recent advancements in technology offer the potential for asynchronous communication, integration of applications data sources, remote access to systems and large quantities of information. Multimedia technology and video conferencing allow group participation 'on the screen' from remote sites. Another thing that makes this different is that there is a multimodal interface nature to the technology - we have more and different ways of getting information and of communicating.
Specific examples for some countries are listed below:

• Hong Kong - with SAMS (School Administration and Management System), schools will be getting Internet accounts supported by the government: the Education Department is being computerised

• Thailand - School Net links 200 schools. The reason this is being done is to better utilise resources and to provide distance education and resource sharing. IT Campus resource sharing also occurs between specialisation areas (eg agricultural science and

medical science) with a video center at each university to use these resources. Web pages are used to interconnect to people and other schools and to provide distance education.

- Japan - a 100 school networking project is being scaled up to 1000 schools. The Ministry of Education will make plans to foster innovation in education in schools with a new integrated curriculum and will conduct a new curriculum incorporating integrated problem-based, cooperative, integrated subjects and communication skills.

- Victoria, Australia - two seemingly contrary trends are apparent: networking between schools and with the Department of School Education, and individual school governance. This centralisation and decentralisation represents both top-down and bottom-up trends.

- Finland - a yearly conference on this matter has been held for the last four or five years.

- Norway - started ten years ago. The 'Uninet' network of universities and colleges provided an integrated easy step to go into the Internet - a gateway was open already. This consisted of a satellite-based system for a total quality management program - all students know which school they will go to in the first year.

- U.S. - public schools have satellite uplinks and use video conferencing, schools are communicating around the world using satellites and are hiring information analysts. Students in some schools talked to the astronauts.

- Netherlands - 'study house' concept, student-centred learning, more decentralisation. Schools have become more independent and they do more on policy development now, and the government doesn't make as many decisions.

# 3    IMPACT OF THE NEW TECHNOLOGIES

Information and communications technologies will assist new schools to be functional. They will offer a means to distribute huge amounts of information in hypermedia form. They offer a total working environment for the learners and their tutors as well as for others, and can work together at different places and at different times seeking information in order to solve their problems. IT is a tool for integration and for problem-oriented learning in research teams.

Networked computing helps daily work, improves contacts and contents, broadens views. It is a basis for management of the changing system. Administration and management of the system will be impossible without a suitable management information system supporting decision making.

IT also offers new possibilities: distance learning using satellites and Internet access gives students the opportunity to learn at home or at remote places where it is not possible to reach school otherwise. IT offers huge amounts of information. Schools should also be able to help students to choose the 'proper' information and to evaluate it.

We must remember that IT is only one tool to make things possible, easy and flexible, and to increase productivity. IT cannot replace the human aspects, and other tools should be used when appropriate. Teachers will still be needed, but in a new role.

One concern of the impact of IT on schools is that individuals may become isolated with changes in traditional schools as schools evolve to use the networking technologies. The socialisation goal of schooling could be compromised. Opportunities for students,

teachers, and other educational stakeholders to meet in groups should supplement this individualised learning mode.

Some learning control is needed. We must be sure that the students have learned the generic skills and capabilities required. Also management will need measures to control costs and ensure effectiveness of the system.

IT better enables the analysis of data and therefore enhances rational decision making. It also facilitates use of the data at a higher level for activities like decision making rather than for routine information retrieval. These tools facilitate collaborative work which reduces compartmentalisation of both content and work, through integration.

The traditional organisation of schools will be redefined, and schools may possibly evolve into smaller organisations. This will be painful, or even bad, if school management cannot manage the learning. Students will have the power, and schools must rise to the occasion.

# 4	CONCLUSION

The following conclusion are suggested:

- Participants in the group often used different words for the same ideas - there were communication difficulties, and this will be common in future schools also.

- A clear framework for management of the future system is needed.

- Technology should not be allowed to become dominant.

- Implementation and utilisation require time - perhaps one or even two generations, and at least several years. There are severe problems in the introduction of IT.

- Teacher education will be crucial.

- It is difficult to separate the features of the future schools from the impacts of IT. They will belong together.

- Change is hard to make. Technology provides the opportunity to make these changes but the decision to proceed must be a human one, taking into account the effect it will have on individuals.  Change will not occur without some pain.

- The trends of changes in both schools and technology are similar: cooperative, interactive, connective, centralised/decentralised, resource sharing.

- Changes in schools and technology will not occur without a change in the mindset of all those concerned with schools and information technology.