DISTANCE EDUCATION AND COMMUNICATION

-in an Evolving Sociocultural Context

Arne Kjellman

The rapid development of the computer and communication technologies (the Information Technologies – IT) has laid the base for an Information Society (IS), which has become somewhat different from the society in the early computer days. The data and computer specialists are still needed, but today's IT has an area of application that extends well beyond what is expected to be covered by these specialists. Prominent IT skills are today needed outside the group of dedicated specialists and the common use of Internet has put a new demand on the skills of both the teacher and the everyday man. The IT generation does not even put up with the computer as a pure information tool – the entertainment industry is rapidly growing very fast on its behalf.[1]

To participate in the new IS require new skills – and the education system has to cope with both this rapid change and the new advanced opportunities offered by the modern IT. During the last decade of the 20th century some major advancements of IT has been made that has brought the IS to a point of annoyance – where the methodological advance mismatch the level of technological advance – and this state is reflected both within the educational system, as well as when it come to make use of the new technological advancements. This mismatch that have become obvious within the area of IT-pedagogic is very often experienced as *state of transition* that poses a row of new difficulties to overcome.

Most well developed Western countries have lived in the "computer age" for many decades and the use of computers are now straightforward, however the mentioned *state of transition within IT-pedagogic* rises many obstacles especially on the methodological plane. When we focus our attention to the so-called developing countries, for instance those belonging to the former Soviet Union - we understand the situation is somewhat chaotic for two reasons: a) in a short time they have to catch up with the advanced state of

Western IT b) a large part of the population are still computer illiterates. This is a situation that cannot be overcome by external financial and technological support only and has been clearly recognized during several contact conferences and attempts to form development projects particularly in the Baltic States Estonia, Latvia and Lithuania – also including the S:t Petersburg area and Belarussia.

While we in the Western countries are discussing how to implement the latest achievements in the fields of IT and how to develop useful networks for distance education (DE) parallel to educating the availed teacher staff in the use of computer technology and software – the developing countries are struggling with the build-up of telecommunication infrastructure and to learn the efficient use of the modern computer. The young generation seems very fit to such adaptation but the old-fashioned teacher staff are reluctant – for not to say reactionary. In the more developed countries we must understand that they are in some sense asked to pass trough a transition from peasant culture into a modern IT-society within the time-span of 5-10 years. This is a stage of development has been going on the last 60-70 years in Sweden and likewise in other developed countries.

Discussing IT – and other phenomenona

The Swedish media debate the last years has been focused around the growing IT-industry, the rapid advancements of a presumed cyber culture and the “new economy” emerging as the result of the build-up of Internet and the fast computer- and telecommunication networks.

In the center of the media debate is the so-called IT-bubble. But are we really discussing the “burst of the IT-bubble”, which is most of all seem to be the burst of a groundless dream promoted by a superficial mass media speculations? Should we not instead discuss the continuation of the successful modern computer technology and its applications? Are we here discussing the use of computer networks for ruthless speculations and/or fraud - thereby blaming the negative outcomes on the “blind powers of markets”? Should we not instead discuss the future use of telecommunication infrastructure in learning and communication? Since the first successful IT-applications occurred early in Sweden we have had a long time to assimilate the computer technology and its use and should for that reason not that easily be led astray by the naïve and somewhat undifferentiated media debate.

The computer and the IT has come to stay and the impact of DE, flexible and life-long learning will be tremendous and overwhelming, however, in an evolving sociocultural context the advancement are far much slower – and should be. This is to the benefit of mankind and its sociocultural development - the future must connect to the past otherwise

we will endure in a state of rootless ness. This is valid in a human IT context in any developed country and also as well in the developing countries. This is valid in East and West – and the vile efforts to hurry up technological reconstruction for the sake of early profits will widen the gap already encountered. For this reason this paper will try to connect to the past by a brief historic outlook of the computer age of the 20th century – a recollection to somewhat moderate the hysteria whipped up the last 5 years and at the same time plead for a long-term work towards an attitude of stoic perseverance because this is what is needed to successfully integrate the use of IT and implement DE in an evolving sociocultural context. What else there is will probably disappear like a confused dayfly.

The historical perspective

To connect to the past let us look at the extraordinary successful evolution of computers and their use during the 20th century. This evolution is most often described in generations of computer hardware or programming languages. Modern technology is intended for use, but strangely enough the aspect of its everyday use is normally absent in most evolutionary tales. Accepting this situation human culture once more become compliant to technology and yet, it is the evolution of computer applications in the sociocultural domain that is so astonishing – and so very promising. For that reason we must in future concentrate on the user aspects.

The first computing machines were built during the Second World War. At first they were simply thought of as electronic versions of mechanical calculating machines. One of the primary objectives was to build more efficient calculators to produce mathematical tables, in particular ballistic tables for military use. People using calculators earlier computed such tables, but with the rapid development of weapons during the war, such human facilities could not keep up due to complexity and lack of time. For instance when hunting down German submarines the seed of computer simulation was born under the name of operation analysis.

All through the 50s the use of computers as calculators continued to dominate. In order to make fast and complex computations the input data were fed into computers and there handled by *stored programs*. To program these machines meant turning calculation tasks into “calculation recipes” that these machines could handle. The programmer was here a very important person that besides programming also had to master the art of calculation - numerical analysis or administrative data processing (ADB) respective. In those days the domain of application was subject to a split into technical and administrative applications - that still remains.

The domain of computer application seemed narrow and exclusive those days: some

advanced research and technical development, mostly military, some recurrent very special calculation tasks for insurance companies and banks, and maybe a few other special services. However, in the early 60s, when computers began to be used as information systems, it was their capacity to handle large sets of data that became the focus of attention. Companies and government agencies to register and keep track of people, products, payments, taxes, etc used computerized information systems. This second stage of computer technology use was made possible by the development of technology, notably the development of diverse *mass memory devices* - especially the magnetic disk memory that offered a place for the *operating system* of the computer. This facilitated the process of program development considerably leading to that information systems were introduced in most large organizations with the ambition to automate administrative work (ADB). At the same time computers were beginning to be used to control and monitor production processes in industry.

The focus on technological advancements

With each new development of the technology some new area of application were invented. Thus was born the idea of ”management information systems,” for administrative control and monitoring by the advent of the computer screen intended for the executive’s desk. Thus, when the computer terminal (work station) was first introduced in large organizations, it was under the banner of ”office automation”. Attempts were made all through the 70s to introduce home computing by means of rather simple devices. However this was a success for computer sales only – the time was not ripe for personal computing yet. When the personal computers (PC) finally became a major success, it was due to their use in offices, as spreadsheets calculators, word processors, and desktop publishing tools. The computer technology was not yet advanced to revolutionize the media industry.

The 80s became the decade of the PCs and the use of computers again shifted its center of gravity. The concept of databases renewed the interest in information systems that become helpful in managing complex organizations, and companies began complaining about the complexity of their information systems architectures. Interacting with the computers was still very difficult and set aside for the specialist. The shift on focus on personal computing, however, meant a focus on graphical interfaces, menus, push buttons, and direct manipulation. Human computer interaction became an exciting domain for designers, and “interface design” became a notion spreading outside the computer industry proper.

At that time Internet was a well-known phenomenon already among computer specialists. The precursor of Internet was created in 1969 with the birth of ARPANET, an

experimental project of the U.S. Department of Defense Advanced Research Projects Agency (DARPA). It motivation was an ”early warning system” for U.S. in the shadow of the Cold War but it also had the humble mission to explore experimental networking technologies that would link researchers with remote resources such as large computer systems and databases. The success of ARPANET helped cultivate numerous other networking initiatives, which grew up intertwined; 30 years later, these have evolved into an ever expanding, complex organism comprising many millions of people and numerous networks – all now brought together under the conception of INTERNET.

The Internet-revolution

The big operators were grappling with the problems of networks and client server technology that were introduced in the late 80s. The computer now became the “Communicator” – computer properly connected were virtually able to “speak to each other”. The optic-fiber and satellite communication paved the way for the Internet-revolution of the 90s, the mouse technology and Windows made computer use convenient for common everyday use. If things had stopped here with internal client-server networks, document management, process engineering, and customer orientation, the networks would have remained a major business innovation with an important impact on banking, office work and business economy.

Software products like Explorer and Netscape opened up the high-speed data nets to the public - a development began that again would change the focus of information technology use. When network usage was combined with a widespread political and media attention to Internet the interest in information technology more or less exploded. The computer became the medium of communication, and not only for office work, but for entertainment, education, news, marketing, and so on. Speculations began about a future, interactive, synthesis of television, telephones, and computers in a global communication medium, a world of information in which people would work and live. The stock market turned into a gigantic game of monopoly assisted by high-speed computer networks – in a sense we were told that we facing a new economy, a new world of communication. We were once more offered the Promised Land. In some sense the former peasant that once moved from the country to the city to meet the demands of the industrial revolution, was now forced to move again to meet the new demands of the dawning information technology – and now he had to move to the Net.

This most recent use of computers has again moved the focus of our attention, and introduced a whole new way of speaking about the technology: information technology (IT), Internet, infrastructures, interactive video, multimedia, cyberspace, networks. With

the current use of computers, the technology has really become pervasive. It has moved from the workshops of computing in the 50s, to the accounting offices of management in the 70s, to the offices, universities and advertising agencies of the 80s, to the world of media, entertainment and general education of the 90s – today penetrating the world of our teen-agers to the point where they "cease to exist" if they are not connected to the Net.

Modelling the world

About 1990 the achievements in computer technology made possible a possible stage of *transition* into an era called the IT-age characterized by the emergence of the *notion of a media space*. In this context numbers and text are no longer considered to be just symbols – but instead *models and expressions* made up by the human intellect and functioning as the very tools of *communication, prediction and control.*

To manage the complexity of the world and worldly expressions these models has become *multi-faceted* – thereby introducing the conception of *multimedia* – and in consequence allowing for a richer explication of human ideas and impressions. By this development the computer has rather become the *work tool of a creative humanity* rather than the data processing unit it was in the early days. Multimedia presentations and Internet has become the database facilities where we can publish and retrieve information in an immense scale throughout the world – in any place at any time.

This development has displaced the need of skills from *computing* to *networking* and the pedagogic has to be adjusted accordingly. There is also another trend clearly visible however – traditional pedagogic by lecturing ("pouring") knowledge into the heads of the students are not sufficient any longer – modern IT pedagogic depend on the *active learning process* of the student. The teacher at best presenting the alternatives to the student, at the same time advising a feasible way of *building knowledge and learning skills* in their own manner – just the way Socrates advocated some thousand years ago. This is the *transition* which is about in data pedagogic and below I suggest this transition is will develop into a *shift of paradigm in Western scientific thinking.* For such a transition to be successful there is a need for corresponding sociocultural developments – this is the lesson learned from the meetings with the developing countries.

The experimental methodology has been extremely successful in the natural sciences through the years and now by the increasing use of computers in the social domain computer simulation can effectively be implemented as a useful tool also here – so in a sense the social sciences can develop new "experimental" strategies.

A time of transitions

Traditionally information[1] is often seen as transmitted from a "sender" to a "receiver" that acquire some knowledge when receiving this "information", more or less in the same way we hand over a basket of food to a hungry presumptive consumer. Learning, according to this view, means the almost *passive reception of information* with the following storing in the brain, just the same way we normally handle food and store it in the fridge for a later use.

In a similar way the environment of man (called the world or reality) most often is thought of as pre-given and independent of the observer, and in consequence regarded the *subject of plain discovery***.**

These two traditional analogies – materialism and information technology lies behind efforts that have been extremely successful during the 20th century and they both suggest the human brain to be a "stiff container of knowledge" and that "information/meaning" about the phenomena "outside" human mind is more or less directly accessible to human by perception. This state of affairs has had a very heavy impact on human culture as well as the teaching traditions, inasmuch the tutors and educators often has resorted to a inclination to try to virtually "pour" knowledge into the brains of the learners (consumers).

This paper has superficially challenged this sender-receiver tradition of pedagogy – so saliently present in much modern cultural activity – instead pointing to *a state of transition*, which is now made obvious by the technological advances and IT:

Traditional data pedagogics -> modern IT-education

This advancement has given us outstanding computing facilities and high-speed communication networks, like Internet and other user-friendly facilities. Such hard/ software progress has brought us to a point of transition also in pedagogic allowing for a new methodologies like DE, flexible and lifelong learning. In fact we are in pedagogy facing a not just one transition - but rather a row of major transitions – all demanding special competence of its exploiters:

COMPUTER: the number crunchier → the media (model) communicator

PROBLEM SOLVING: algorithmic computation → simulation

PEDAGOGIC: teaching → learning

LOCALIZATION: local face-to-face → distance learning

PERSONAL SKILLS: computing skills → networking skills

TARGET GROUP: data specialists → today's IT-generation

This is a row of important transitions that have already had a heavy impact on both learning technologies and methodologies as well as the systems of education at all levels – and will be even more important in future. This situation calls for major developments in the sociocultural domain – since such a row of transition most of all put a new demand on the practitioners. Technological advancement must never be an end in itself and for that reason technology must always wait for the emerging sociocultural maturity.

I want to push the idea of an impending transition even one step further suggesting an ongoing and profound shift in Western scientific thinking. My claim is that we are now facing another even more important transition:

descriptivism → constructivism

This is a profound transition - a true shift of paradigm in the sense advocated by Kuhn and I believe this profoundness is also the main reason of the heavy resistance sometimes faced when presenting these ideas of advance. One important reason for this resistance is the claim that scientific realism cannot be successfully defended in the context of scientific "objectivity" when using the traditional realistic (object-oriented) approach. This is a startling claim and the plead for such an indirection very often results in extraordinarily resistance sometimes to the extent the opposing scientists do not even feel obliged to follow the rules of the academic debate in their efforts to defend the existing realistic scientific paradigm – but this will not relinquish.

The claim is that the traditional realistic (or materialistic) *object-oriented approach to knowledge* as advocated mainly by today's physicists and engineers must be succeeded by a *subject-oriented approach to knowledge* in order to come to grips with the problems of consciousness studies among others – and this includes quantum mechanics as well. The understanding of mind and its capacity of learning are very much facilitated by the subject-oriented approach. The keyword to use in this learning revolution will be *cognitive resonance* – an explanatory model that will replace the traditional one of pure "information transmission". Such process of resonance is most easily characterized as a "cognitive lock" between an observer and its object of observation in the physical domain - or a receiver and its object of communication in the social domain. This is a *holistic* process of

cognition that epistemologically starts with the *cursive cognition* of a new and unknown phenomenon to the observer. The emergence of such a new phenomenon initiates a recursive cognition/confirmation procedure **–** called an *epistemic loop* – which on its successful termination results in knowledge about the phenomenon **–** *a process of private learning.* Once such a procedure is successfully completed and firmly established the *re-cognition process* proceeds pretty fast, so that the recognition phase generally is carried through in tenths of a second. For several reasons[2] such an approach to human learning does not fit into the traditional realistic worldview. The processes high-lighted by the subject-oriented approach certainly ask for a more *constructivistic approach*[3] in the sense as advocated by Piaget among others. However the out-line[4] of such a theory is quite a different task.

Summary

Beside the obtrusive IT evolution we can in the sociocultural learning domain notice another ongoing transition from the traditional data pedagogic to a more advanced education imposed by the IT-age. These efforts – most often called flexible, life-long learning or DE – most markedly means a shift of both activity and responsibility - from teacher to the learner. This situation imposes special difficulties onto the entire sociocultural domain – especially in developing regions. This paper has stressed that a precocious technology driven by pure economical interests cannot be a sound base for the development in the sociocultural domain. We have identified five points that in a sense captures the evolving DE and its impact in a scientific and sociocultural context:

– For the computer competent DE is a fairly easy matter - time consuming however

– Technology is not the main issue – competence is important however

– The use of computer simulation in DE and social research is very promising.

– We are facing a major transition in tradition pedagogic – a radical shift of learning paradigm.

– The learning mechanisms of the human brain calls for a new scientific paradigm

Annotations

1) Information is a notoriously fuzzy concept having different meanings - reaching from the pure technical notion as defined by Shannon & Weaver to others implicating also the meaning of the data indicated

References

Kjellman, A. *The Subject-Oriented Approach to Knowledge and the Role of Human Consciousness.* Special Issue, “Directions in Sociocybernetics”.Ed. R.E. Lee. International Review of Sociology. In Progress.