Learning in Informational Society: Professsor G. Ram Reddy Fifth Memorial Lecture*

R.V.R. CHANDRASEKHARA RAO
Former Vice-Chancellor, Dr. B.R. Ambedkar Open University, Hyderabad, India.

I am grateful for this honour bestowed on me. To speak on the occasion of commermorating Professor G. Ram Reddy is for me a solemn moment. Very few in this audience may have had (the privilege and pleasure of) as close a relationship with him as I had. It was more than 40 years since we met for the first time as students. That association only grew with time, never subject to any diminishing returns in affection and endearment. He was as charming as he was sincere. As a sociable man interacting with many at different levels and in different contexts he did experience a sense of being a let down. But malice had never been his response even in the worst situations.

As an academician and builder of institutions his forte had won all-round admiration and acknowledgement. Rising from a family background that was humble, through sheer perseverence and grit he reached the pinnacle of his academic career, the Chairpersonship of the University Grants Commission. But he cherished equally his accomplishments as the founder of distance education institutions in India. The Dr. Ambedkar Open University in Andhra Pradesh and later this renowned institution—IGNOU were the institutions he looked to as his extremely satisfying and enduring contributions.

Rarely does one combine in oneself the traits of a visionary, a realistic planner, and an indefatigable chaser after the apparatchik to concretize his ambitions. Ram Reddy was one such few. In this he resembles that great British progenitor of open learning, Michael Young. David Bells said of Young:

> *"It is relatively easy to spout ideas, but it is much more difficult to translate the ideal into specific policy, and even more difficult to translate that policy into legislation. The next step involves mastering the political process to get that legislation passed and then, the most difficult of all, the task of creating the necessary institutions and agencies within the bureaucracy to carry out those initial ideas and policies"...*[1]

These qualities fit Ram Reddy admirably.

I must admit to a trepidation to speak about our own personal relationship. It was so close and intense that in his death I myself feel permanently diminished. My debts to him are irredeemable. I fondly wish I could claim our friendship conformed to Aristotle's characterization:

* *Prof. G. Ram Reddy Fifth Memorial Lecture was organised on July 2, 2000 at IGNOU, New Delhi by IGNOU in collaboration with the Commonwealth of Learning, Vancouver.*

Indian Journal of Open Learning, 2001, 10(1), 1-18
ISSN 0971-2690. Printed in India.

> "Friendship is essentially a partnership. Also a friend is a second self, so that our consciousness of a friend's existence...makes us more fully conscious of our existence"...[2]

The Theme

The subject I have chosen to speak on may not directly relate to open learning or distance education and this may be construed as rather unconventional for the occasion. Yet my plea is that the transformtion of the nature of the learning process in the contemporary decades has had an intense impact both on the methodologies of learning and the contents of what is to be learnt. Further, the late Prof. G. Ram Reddy, whose memory we commemorate today, was as much interested in the wider reaches of the learning endeavour as he was with distance education.

Globalization of New Learning Strategy

The global reorientation of thinking about learning is so metamorphosed in recent years and the emphasis laid on the 'subject' or 'agent' of the learning process is so sustained that phrases like 'learner-oriented education', 'learning society', 'life-long learning' abound in the discourse in education in general. Correspondingly, there is the accompanying linkage with the technological revolution as being at once the cause and consequence of this metamorphosis in learning. It is in the context of the linkage between learning and technology that the challenges and opportunities for open learning come into focus. Among the many puns that the concept of open learning is subject to, I would like to add yet another: contemporary society is the 'open sesame' for learning.

The New Information Society

Essentially the information revolution is identified as knowledge-based. The very word 'informational' in the phrase information age connotes this. But is this age entitled to be called 'knowledge-based'? We will deal with this briefly before we go into what is 'Informational Society'.

Blurring of Knowledge-Information Divide

A classification of the concepts of information and knowledge is very esssential in this context.Those with literary and philosophical sensibilites would demur at the paring of those two words *information* and *knowledge* in a complementary sense. After all the ringing lines of Eliot, "Where is the wisdom that we lost in knowledge; where is the knowledge we lost in information", are too pressing to ignore the hierarchy in which Eliot arranged them. But, then in the secular and even the materialist mindsets that condition our contemporary scientific and sociological discourse, the complementary and even the near-identity of knowledge and information is to be taken for granted. Still, fine distinctions are drawn between the two. Danier Bell defines Knowledge

> "as a set of organized statements of facts or ideas, presenting a reasoned judgement or an experimental result, which is transmitted to others through the communication medium in some systematic forum. Thus, I distinguish, knowledge from news and entertainment."...[3]

As for information, Machlup in his influential work, *The Production and Distribution of Knowledge in the United States,* simply defines information 'as the communication of knowledge'. Thus, with Machlup there is an excessive broadening of the definition of knowledge, almost making knowledge and information congruent. On the other hand, Marc Porat in his *The Information Economy, Definition and Measurement* proposed an operational definition of information as "data that have been organized and communicated".[4]...

What is an informational society and how does it differ from an information society? Here, the major thesis proposed by Manuel Castells, in his very recent work, *The Information Age: Economy, Society and Culture* in three volumes is significant. The distinction between the Information Society and Informational Society is critical to the proper understanding of our subject and I cannot help but quote him at some length:

> *I should like to draw an analytical distinction between the notions of 'information society' and 'informational society' with similar implications for information/ informational economy. The term information society emphasizes the role of information in society. But I argue that information, in its broadest sense, e.g., as communication of knowledge, has been critical in all societies, including medieval Europe which was culturally structured, and to some extent unified around scholasticism, that is, by and large an intellectual framework. In contrast, the term informational indicates the attitude of a specific form of social organization in which information generation, processing and transmission become the fundamental sources of productivity and power because of new technological conditions emerging in the historical period. My terminology tries to establish a parallel with the distinction between industry and industrial. An industrial society, a usual notion in the sociological tradition, is not just a society where there is industry but a society where the social and technological forms of industrial organization penetrate all spheres of activity, starting with the dominant activities located in the economic system and in military technology, and reaching the objects and habits of everyday life. My use of the terms 'informational society' and 'informational economy' attempts a more precise characterization of current transformation beyond the common sensible observation that information and knowledge are important to our societies.*[5]...

The Information Technology Paradigm

To further appreciate the interface between the Information Technology Revolution and Education, it is useful to note how the IT paradigm is characterized. Adapting the classic analysis of scientific revolutions adopted by Thomas Kuhn, the notion of the technological paradigm is analyzed by recent writers as consisting of five characteristics:

1. Information is the new material for the IT Paradigm: there are technologies to act on information, not just information to act on technology, as was the case in the previous technological revolution.
2. The pervasiveness of the effects of new technologies is the second feature. Because information is an integral part of all human activity, all processes of our individual and collective existence are directly shaped by the new technologies.

3. The third characteristic refers to the networking logic of any system using these newinformation technologies.

4. The information technology paradigm is based on flexibility. Not only are processes reversible, but organizations and institutions can be modified and even fundamentally altered.

5. The growing convergence of specific technologies constitutes yet another feature. Thus,microelectronics, telecommunications and computers are all now integrated into information systems.[6] ...

From the above, the multi-faceted nature of the interaction between the new technologies and the learning process can easily be discovered. Particularly, the second and third characteristics - i.e., the all-pervasive nature of the new technologies and the all-pervasiveness of this technology. The networking logic clearly suggests the social dimensions of the technological change. Here, the important question is whether technology determines society. Even if it does not do so, society does not unilaterally script the course of technological change. A complex pattern of interaction underlies their relationship. The works of the best historians such as Fernaad Braudel, the initiator of the Annals School of historical writing are ambivalent on this point. The point is that the contemporary technocrotic revolution makes this dialectic interface even more intermeshing. The consensus on this is well-articulated by the renowned historian of technology, Bruce Maglish, in proposing

> "the recognition that human biological evolution, now best understood in cultural terms, forces upon us the consciousness that tools and machines are inseparable from evolving human nature. It also leads us to realize that the development of machines culminating in the computer makes inescapable the awareness that the same theories that are useful in explaining the workings of mechanical contrivances are also useful in undrestanding the human animal—and vice-versa, for the understanding of the human brain sheds light on the nature of artificial intelligence."[7]...

One need not agree with the deeper implications of Maglish's statement, especially the one relating to Artificial Intelligence duplicating the natural human brain. The debate on this is at once profound and incomprehensible to the ordinary intelligence of people like me. Roger Penrose, an eminent mathematician himself, questions whether even the development of parallel computers holds the key to building a machine with the capabilities of a human mind. But this debate in itself does not detract from the dialectic relationship between human nature and technology.

It is in the context of this that the implications of the learning process become evident. When the physical processes involved in learning undergo change because of transformation of technology, the impact of the latter on the means and ends of learning become even more manifest. And it is with this problem that we are concerned.

Learning / Education in the Informational Society

Apart from the wider and latent impact of the informational revolution on society, the immediate and more manifest impact of the cause / consequence intermix needs to be addressed. We shall discuss the consequences first.

We all talk about the pervasive role of technology in our everyday lives : the housewife's dependence on the pressure cooker and her felt helplessness when a gasket is to be replaced; the need to fix a blown-out fuse at home; repairing a leaking pipe in the plumbing system of our home; and many other examples abound. The growing paucity and expensiveness of outside resources in this regard make it now imperative that we all become technology conscious and in its turn technology itself is becoming user-friendly (just look at the user manual that comes with almost every gadget we buy).

IT and Enhanced Process of Work

Now the intrusion and penetration of IT into offices and homes has had an exponential impact. To be sure, such an impact, quantitatively speaking, may yet not be as immediately felt in developing societies as the impact of old-fashioned technologies is felt. But when we take the pace and intensiveness of the impact in the area where IT is penetrating, then, the nature of the impact or the push-factor on learning becomes more evident. For, the reception of IT in business and industry, the service industries, and even in the government office floors is witnessing an algebraic progression. The requirement of IT skills and capabilities is so immediate and presssing that the nature of acquisition of knowledge has already exhibited a transformation from what it was only a decade ago, even in the developing societies. Schools vie with each other in introducing computer-awareness courses and even computer-based learning in established conventional courses. Software development in this area is an important part of computer firms. Secondary schools adopt a computer-based curriculum, and at the tertiary stage there is a veritable rush to replace, at least partially, traditional humanities and social sciences programmes (and even pure sciences courses) with computer applications programmes. Manpower requirements from the engineering streams of technical institutions are relegating civil and mechanical graduates to a corner unless upgradation of qualifications by acquiring electronics and computer programmes is also accomplished.

Retraining and Detraining : Imperatives

At the business and industry work-force level, IT virtually converts the need for general education into the need for retraining, involving even detraining of past skills. In fact, even by 1957, Robert Merton in his *Social Theory and Social Structure,* referred to the employee's perception of university education as one of *trained incapacity.* If retraining the workforce consists in the policy of training, training, willy nilly, becomes equivalent to education and together their end goal in its turn is employment. No wonder, some countries renamed their former educational ministries as Ministries of Employment as is the case with Britain. Thus, while the next generation of the workforce is being initiated to familiraize and learn new technologies, the current generation is under the threat of becoming obsolescent and hence under constant pressure to unlearn past skills and learn new ones. So much so that what has come to be called as *human resource development (HRD)* now comes under the purview of formal learning. It is precisely at this point that open learning or distance education comes to play its special role, in addition to discharging its first generation role as a second chance channel to offer traditional educational programmes in tandem with the channel of conventional universities.

The standing forth for human resource development revolutionizes the opportunities for open learning. For instance, the Indian Policy Document on education envisioned in 1986, incorporates for the first time HRD as of special concern for distance education, thus, commissioning open learning with an overarching mandate.

The uniqueness underlying the HRD concepts and its interface with the new socio-economic implications to learning and economic productivity require a brief survey of the origins of the concept.

Human Resource Development: A new premium on the new paradigm in learning

The concept secured its recognition when the U.S. economist Theodore Schultz in his seminal work, *Investment in Human Beings*, analyzed educational expenditure as a form of investment. This was followed by G.S. Becker's work entitled, *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education.* Others followed this up. The pivot of this thesis is that

> Investment in human capital produces benefits for both the individual and society as a whole. The individual takes part in education or vocational training by increasing his or her chances of employment and by increased life-time earnings. The costs and benefits of education also affect society as a whole, since society benefits from the increased productivity of educated workers throughout the world. This is recognized by Governments who pay some or all costs of education and provide free or subsidized tuition in schools and higher education institutions. The costs and benefits to society can be compared by means of the social rate of return.[8]...

'The social rate of return' can be called the profitability of learning and this could also be regarded as an index of the productivity factor contributed by learning. Research on the productivity of different levels of education and training, and the question of relative yield of investment in human capital and physical capital has yielded very interesting results, though fierce debate among education economists still persists in this area. One representative study by Psacharopoulas, involving a comparative study of 44 countries across the globe, measuring the social and private rate of return to investment in education for the period 1958–1978, revealed four underlying patterns:

1. The returns to primary education (whether social or private) are the highest among all educational levels.
2. Private returns are in excess of social returns, especially at the University level.
3. All rates of return to investment in education are well above the 10% common yardstick of the opportunity cost of capital.
4. Returns to education in less developed countries are higher relative to the corresponding returns in more advanced countries...[9]

The above patterns confirm that expenditure on education does represent investment in human capital, and that it is a profitable investment, both for the individual and for society. But what about the comparison between the human capital investment and physical capital investment? Here also the Psacharopoulas study, which corroborates the findings of other studies too, concludes that

1. the returns of both forms of capital are higher in developing countries and
2. human capital is a superior investment in developing countries but not in developed countries. What is most revealing is the heightened positive correlation between the high returns investment in education in developing countries [10]... This should be a shot in the arm of these countries and encouraging them to further investment in education. In this, investment in open learning with its concomitant of investment in I.T. should receive high priority.

Vocational Education and Skills Acquisition

On the question of education and economic productivity the trend towards the vitalization of vocational orientation had been noticed even before the I.T. revolution. Thus, in the monumental work *Education, Economy and Society* by A.H. Halsey and others, published in 1961, it was stated:

> *education increasingly takes on the character of 'training', specialisation takes place earlier, is more thoroughgoing and is increasingly of a kind directly related to the requirements of modern trades and professions.*[11]...

The IT revolution has both quantitatively and qualitatively pushed the trend further. This phenomenon is brought out vividly in the chapter entitled: *The New Knowledge Network*, by Stanely Arnowitz and William De Fazio, in the newest work on Education by A.H. Haslsey and others. A few lines will suffice to illustrate the challenge.

> ...the scientific and technological revolution of our time is not confined to new electronic process but also effects organisational changes in the structure of corporations, which has fundamentally altered the forms of work, skill and occupation. The whole notion of tradition and identity of persons with their work has been radically changed. Scientific and technological innovation is no longer episodic. Technological change has been routinized. Not only has abstract knowledge come to the center of the world's political economy, but there is also a tendency to produce and trade in symbolic significations rather than Today, knowlede rather than traditional skills is the main productive force. The revolution has widened the gap between intellectual, technical and manual labour, between a relatively small number that require less; as the mass of jobs are deskilled there is a resultant redefinition of occupational categories that reflect the change in the nature of jobs[12]...

Vocational education is now appropriately distinguished from technical education. While technical education is defined as development and skills and knowledge to be applied in practical situations Vocational Education is signified as demonstrated and acknowledged development of knowledge skills and atttitudes necessary for a place in the workforce at level ranging from pre-trade to the para professional. Prof. V.C. Kulandaiswamy, building on the above differentiation, concluded

> from the point of view of distance education one may generalise that the difference between vocational and technical education is one of difference in providing opportunities for the acquisition of knowledge and development of skills. The skills component is more prominent in vocational education than in technical education

Because the informational society demands greater and quicker adoption of and adaptation to skills, and these further require a higher level of comprehension the appreciation of skills with what we usually call knowledge, the latter element also enters into the picture. Thus the danger of lapsing into functional illiteracy is most imminent in contemporary society.

The Informational Society as the solution to the Learning Challenge

The foregoing analyses the consequences of the informational society that impinge on learning, the solutions to the challenges that push the learning process are supplied by the very same technological revolution that created the informational society. The vast array of educational devices that are heir to the revolution and that are already mobilized in the learning endeavour, comprising both methodological changes and teaching and learning techniques, highlight this point.

Among methodologies, the option of distance education stands out as the foremost. To this audience one cannot overstate this particular development. The very concept of open learning as an answer to the solution to the challenge of contemporary learning requirements is a recognition of its viability and sustainability. Correspondingly, pedagogical theory itself has put a premium on learning-oriented acquisition of knowledge and skills, and in so doing has supplied theoretical *imprimatur* to new learning. The surprise is that the methodology of distance education, like all revolutionary changes that lie unmanifest in slow incremental changes that precede them, had taken a long time in finding reception, though it galloped when once it established its credentials. I take just one instance. I am intrigued by the fact that the Robbins' Report of 1963, considered to be a radical exercise on the expansion of higher education in Britain to meet the demands of democratization, did not mention the option of distance learning for higher education. Indeed one of its major recommendations that of creating a binary system of degree-awarding, conventional-type Universities and the polytechnics without power of awarding degrees, cannot but be regarded as retrograde in terms of the flowering of open learning in technical edcuation. No wonder that Sheldon Rothblatt in his epoch-making survey, *The Modern University and its discontens: The Fate of Newman's Legacies in Britain and America*, published in 1997, was forthright in his criticism of;

> although the point is rarely resurrected in post-Robbins' discussions, the Robbins' report was quite definite about the need to insulate higher education from market pressures, most particularly in the case of student demand as represented by institutional transfer.[14]...

Nothing could be more appropriate than that the demands of contemporary interface with business and industry and learning made the British Government abolish the binary system of universities and polytechnics and thus throw open the Ivory Towers, in the felicitous phrase of our Ram Reddy. It is now the turn of the ivory towers to eagerly enter the technical education arena and thus take a leaf out of the open learning initiatives.

The mention of innovations in education technology should hasten me to mention the unredeemable debt that both learning and technology owe to Michael Young well before the rise of the informational society. Young, among his myriad initiatives in education, social research and social defense, visualized the marriage of technology and social empowerment.

> If you have the technology without the face-to-face groups then in educational teams nothing much may happen. If you have the groups without the technology, something will happen, but it will often happen better with broadcasting. For there is technical knowledge available... which can raise the quality of life for millions of people and increase the control they have on their own lives, if the knowledge is made more easily available. The new distance learning belongs to a world wide movement. The barefoot technologist of education is partner to the benefit manager and the barefoot doctor.[15]...

Young's vision has by now been vindicated in ways unimaginable only a few decades ago thanks to the informational revolution.

The mobilization of technology for learning is succinctly summarized in *Vocational Education At a Distance* edited by Rumble and Oliveira thus:

> Pedagogic technical developments, including the of educational radio from the 1940s, educational television (ETV) from the mid 1950s and 1960s, audio and video cassettes (in 1970s and 1980s) resulted in a wave as media and resource-based learning was incorporated into traditional educational programmes, first under the guise of innovation and through pilot projects, and increasingly as a matter of routine. These developments made the distinction between distance and conventional education less clear-cut. The move made so many distance systems use face-to-face tuition as a subsidiary part of their pedagogic strategy.[16]...

Since Rumble and Oliveira wrote those words, the manifestation of globalization brought about further change through the Internet and the multiplicity of information disposal, retrieval and access technology.

> Thanks to these new digitization techniques, a complex and voluminous mixture of data, sounds, spoken and written words, and fixed and animated, real or synthetic images can be transferred by informational technology, at negligible cost in time and money. This content is the most valuable of raw materials since it gives it access to knowledge, skills and training...[17]

These are the words of the Report of the French Commission for Education, Science and Culture, published last year by the UNESCO.

Of course, not all countries can afford the luxury of the use of this comprehensive educational technology. The developing countries are still prone to the lag-factor. Paradoxically enough, while the conclusions of the Psacharopoulo's study as cited earlier, confirm that developing countries' investments in education are more and also yield better results than those in developed countries. Mobilizations of upto date technologies tell a different story. John R. Arblaster, in his paper read at the Dr. B.R. Ambedkar Andhra Pradesh Open University's International Seminar on *Technical and Vocational Education through Distance Education*, held in 1992 said the following about the adoption of network type of technology to education.

> My experience in this regard is that the potential applications of technology in the learning process are far ahead of the distance education's comfort in applying them, the teaching faculty's wishes, and the learning needs. Therefore, technology decisions should be taken with great care, because often unless the right conditions prevail, they can mean great expense with little value added to the quality or quantity of the distance education experience for the learner.[18]

However, one cannot afford to be too patient in this regard lest the vicious circle of technologies advance and a society, sluggishness in receiving it, drags the society into a state of permanent obsolescence, technology-wise. Mercifully, obstacles like faculty resistance or learners lag can themselves be overcome by appropriate strategies. Pressures from industrial advances, compulsions of public policies to reach out to the economically, culturally and educationally backward communities and regions in the developmental process, and the need to keep up with the process of globalization (whether one likes it or ot) are bound to act as independent variables scaling the walls of skepticism in educational institutions. The case of Singapore, where a deliberate attempt by the state to steer the economy and, along with it, the educational system, with large inputs into

vocational and higher education was successfully made, as analyzed by David N Ashton and Johnny Sung, is instructive. This illustrates Singapore's phenomenal transformation from a colonial economy and educational system, to a post-industrial pattern in economic development. A three-phase development strategy was pursued: The first involving drawing investments from MNCs, the second, attracting higher value-added industries which required the upgradation of the education system with a new training infrastructure; and the third phase, starting towards the end of the 1980s with a vision document called the 'The Next Leap' inaugurating a new package of educational package commensurate with efforts to further push the economy. This new package consisted of:

1 the identification of the basic skills referred for effective participation in an advanced industrial society; the production of intermediate-level technical skills and

2 the expansion of higher education. Due to this push, over 90 percent of the 15 to 19 years old in education and over 26 percent of the 20 to 24 year old in tertiary education...[19]

It is the linkage between economic development and education initiated by the state that ensures Singapore to be the springiest tiger among the Asian economies.

It is true that Singapore, in terms of scale is miniscule when compared to countries like India. Further, Singapore's political record is rather unsavoury. Even then, it is worth while to emulate some of its strategies.

Prima facie, in the developing countries like India, there is a dysfunction between the pace of information technologies progress and of its adoption in the formal learning sites. Thus while India is one of the foremost among the Third World countries to initiate and consolidate software industries, the learning sites are still to feel its impact in any appreciable manner. To be sure, the orientation of learning and education does bow to the demands of the new technologies opportunities as already adverted to. Yet, in terms of adoption of this technology by the wider learning environment, we witness a discontinuity.

While there is more than marginal quantitative growth of student enrolment at all levels of education, the qualitative factor in terms of instructional pattern is unflattering. Enrolment in education increased from 2.4 crores in 1950-51 to about 19 crores in 1996-97 according to official figures. The number of students in educational institutions out numbers the total populations of United Germany, the United Kingdom and Canada taken together. Schooling facilities are accessible to nearly 95 percent of the school-going age children. All this co-exists with a shameful literacy rate for the population as a whole.[20]

On the quality side, not many comprehensive studies are available assessing especially the linkages between investment in human capital and economic productivity and the role of informational technology absorption. Research is largely confined to macro-level findings and interstate comparisons. In other words, concepts like "investment in human capital" are increasingly made use of with no systematic studies on the productivity aspect of this capital. The need for such studies is urgent.

Leaving these broader issues aside, even in the matter of incorporation of the new

technologies by educational institutions there is paucity of comprehensive material. One can only resort to impressionistic assessments.

At the school level, introduction of computer-awareness is still the exception than the rule, confined as it is mostly to private schools, with the vast public school system largely left out. The college level scene is slightly different. But here too, though computer applications are introduced as a special subject, computer-associated learning in general figures little. At the postgraduate level the situation is the same. In fact, the conditions there are so weird that in humanities and social sciences, there is a diversion of students from well-to-do backgrounds, to private institutions with programmes in technical (e.g. computer-oriented) areas even though their academic background is anything but technical.

Thus, our enquiry in this regard will have to be restricted to distance education experience. This should be familiar ground to all of you. Hence I will summarize. In dual-mode institutions, especially the distance education affiliates of conventional universities, educational communications technology is practically nil. Many of them have not got beyond the pure correspondence stage; even study centres are a rarity. Coming to open universities, those in the various States have varied experiences. The provision of audio-video backup at the study centres is no doubt in place but the actual facilitation of this is largely in a neglected state. The use of radio broadcasts in reaching the pupils in their homes is, however, a regular feature. Television use is augmented even in some State open universities with the inauguration of telecasting of subject-wise lessons on a regular basis. In some States, telecommunications are used in joint collaborative ventures between state development agencies like *Panchayatraj* institutions and the concerned State open universities, particularly in the tribal districts. With the further extension of telecom network this should provide a new deimension to the penetration of information technologies in education.

IGNOU stands forth as the Paradigm case as use of the informational technology for the learning enterprise. In addition to the standard features of student support, the expansion into interactive video lessons with phone-in provision and coverage of significant education-related events for use in general public telecasting, by the University's Electronic Media Production Centre is a good augury.

In pursuit of *reaching the unreached*, a significant additional media support input in the form of interactive radio counselling began two years ago, now covering over 20 Capital stations of All India Radio and relayed by over 70 stations. Now it is a synchronized weekly transmission–IGNOU HOUR–on Sundays with coverage almost all over the country. A monthly slot in this is earmarked to State open universities. A matter of even greater satisfaction and pride to IGNOU is the opening of *Gyan Darshan*, the exclusive educational TV channel of India, entrusted to IGNOU by the Government of India. It is a 16-hour non-stop facility combining the existing educational programmes and the new initiative of telecasting curriculum-based programmes to various groups of learning primary school children, teachers and so on. Thus, integration of primary and teacher education with IGNOU's own higher education curriculum is ensured under this initiative. Given the vastness of the country and its linguistic and cultural diversity, broadcasting and television media's extension is in itself a substantial achievement in

wielding technology for learning. However, the use of other near-state of the art devices like the Internet and joining together of the television and the computer for education, is still not a regular and sustained feature. A start is made in this regard in offering oline courses through the internet in areas such as webpage design, Java Programming. In all this expansion of educational technology, the tasks of consolidation and sustaining the quality of counselling, attractive formatting, quality of broadcasting and telecasting are yet to be fulfilled and no one knows this better than the university's facilitators themselves.

The even wider task of endowing all the distance education sites with a real network of electronic media communications can only be achieved by adequate government support. Apart from a dedicated television channel for education, which is more a macro-level facility, investment in micro-level networks at least at all study centres is a priority.

In countries like India, state investment in education and communications in educational technology cannot but be the primary source and open learning should receive its due share. While industry's contribution is coming in the shape of innovative development of software technologies, its contribution to educational programmes is still to make a mark. In the relative roles of research, industry and the government in pushing the information age, developing countries have to rely mostly on the governmental sector. The role of the state in the gestation of the informational society in various parts of the globe is rather uneven. Ironically indeed, even the role and encouragement of business and industry has been rather half-hearted as had been the case in the United States which is the very home of the information technology's revolution.

The case of the United States

The origin of the revolution in the U.S. itself is a story of purely private and individual entrepreneurial endeavour triumphing over established industrial and academic institutions' indifference. A case-study of the origins of IT in the U.S. is instructive...[21]

The story started with William Shockley, the inventor of the transistor, moving to Stanford after his solicitations for support on further research applications in microelectronic technology were spurned by the large companies on the East Coast, such as RCA and Raytheon. Forming a new firm with the backing of Beckman Instruments, Shockley recruited eight brilliant engineers mainly from Bell Labs, one of them being Bob Noyce. However, disappointed with Shockley's overbearing style of functioning and his reservations over the young teams' enthusiasm to work on silicon as the most promising route to the larger integration of transistors, they parted company with Shockley. They then went on to create Fairchild Semiconductors, where the invention of the planner process and of the integrated circuit took place. Soon a breakup of the young team itself occurred, each member starting his own unit. The resulting diffusion of entrepreneurial research in cutting-edge technology provided the routes for phenomenal expansion of semiconductor firms in as much as one-half of the 85 largest American companies in this line can be traced back to this spin off from Fairchild Semiconductors.

> It was with this technology transferred from Shockley to Fairchild, then to a network of spin-off companies that constituted the initial source of innovation on which Silicon Valley, and the microelectronic revolution were built[22]...

The irony is that by the 1950s Stanford and Berkeley were not yet leading centres in electronics while MIT on the East Coast was, which accorded for the then concentration of the industry in New England region. Yet within a decade and a half the scene got transformed. Studies in the transformation confirmed that a decisive role was played by the social and industrial organisation of companies in fostering or stymieing innovation. While established and large firms in the East were too rigid (and too arrogant), to contently retool themselves towards new technological frontiers, Silicon Valley kept churning out new firms and practising cross-fertilization and knowledge diffusion by job hopping and spin offs. It is said that late evening conversations at the local bars near and around Silicon Valley did more for the diffusion of technological innovation than most seminars in Stanford.[23] The development of the micro computer, which constituted a historical watershed in the use of IT, followed a similar path. By mid 1970s, Silicon Valley had attracted tens of thousands of bright young women and men drawn to the new Mecca in search of the Talisman of invention and money.[24] One such in-gathering teams was the Home Brew Computer Club which included Bill Gates, Steve Jobs and Steve Wozaniak. And it was these and their colleagues that went on to establish in the following years–new companies like Microsoft, Apple, Comenco and North Star. Bill Gates founded Microsoft, Wozaniak and Jobs founded Apple and so on by the late 1970s.[25]...

The lesson to be drawn from this enterprise saga is that the development of the IT revolution produced a milieu of innovation where inventions and applications interact. This required a concentration of research centres, advance technology firms, higher educational institutions and business networks of venture capital to finance start-ups. Silicon Valley is a product of such milieus. Once this was consolidated, it generated its own dynamics further attracting knowledge, money and talent from around the world. Equally important is the fact that the complacency born out of arrogance inhibiting foresight made the East Coast miss the IT revolution.

In Europe and Japan the story is rather different. Hence the main metropolitan areas are the major centres of innovation and production in IT. Even more important is the fact that here (Europe and Japan) the role of the state is much more decisive in fostering the IT revolution. This could even be called the role of ideology in that the American model of entrepreneurial initiatives is replaced by the deliberate promotion by the state, particularly in Japan and China. Japan established the Ministry of Information Technology and Innovation (MITI) where strategic planning and constant interface with industry supported the key elements in producing the Japanese prowess that overwhelmed mid Europe and overtook the U.S. in several segments of IT[26] It will be of interest to note in this context that English terminologies like *information technology, information society, informatization, information superhighway* originated in Japan in the mid 1960s under the term *Johoka Shakai* in Japanese and were transmitted to the West in 1978.[27] The case of China is the paradigm case of state ideology bringing about technological change to open up its economic and intellectual potential to cath up with the developed world to the extent of even compromising with many of the purist elements

of communist ideology.

The rather long foregoing narrative on the development of IT in the U.S.A. and other parts of the globe is undertaken to afford comparisons with India. As in the non-U.S. context governmental ideology of deliberate promotion of technology has been the main stay of Indian expectations. However, the added benefit is the entrepreneurial element in pushing IT. The recent creation of the Ministry of Information Technology combined with the high salience of computer industrial entrepreneurship does provide India with at least a good part of the milieux referred to when illustrating the U.S. case.

However, so far as application of IT for the education context is concerned, much would depend on governmental institutions in India.

To the extent distance education is concerned, leaving aside Japan whose society's infrastructural wherewith can absorb far more of communications technology applications, India so far has been looking towards the extension of broadcasting and telecasting for learning purpose. As already mentioned, the permission for laying a broader network of communications technology to reach the "unreached" would necessitate the undertaking of a mission dedicated to open learning. Allow me to call it MEET – Mission for Extension of Educational Technology. That would be a viable way of meeting the challenges of the informational society.

Looking at a sample of investment in Open Learning at the higher education level, the Central Government has till 1999 extended aid to the tune of Rs.198.34 crores to IGNOU, I may be pardoned for not being more detailed in my figures. Taking the Central Government funds, both plan and non-plan, IGNOU received about 500 crores during the period 1995-2000. 100 crores a year would seem very handsome funding. However, realising that this university takes a very large number of students when compared to even the largest of the conventional universities and the fact that part of this fund goes to state open universities and other distance education centres, the grant is modest indeed. Laying a comprehensive infrastructure of communication technology is most expensive, both in terms of equipment cost and operational cost. It is true that the establishment of *Gyan Darshan*, should be regarded as additional endowment by the Government to the University. Yet when we talk of a national technology network catering to distance education needs, broadcasting and telecasting facilities can only be a part of such venture. Therefore, a further, crash programme to assist the University in this regard is an imperative need IGNOU has, even with the modest means available to go ahead with programmes of setting up many computer labs and tele learning centres in its Regional Centres. Besides, six computer labs are being set up in the relatively inaccessible North Eastern region. While this is encouraging as it is, still more needs to be done. I have referred to the difference in the experience of the U.S. on the one hand and Europe and Japan on the other in terms of the inputs put by private entrepreneurship on the one hand and government initiatives on the other. In the context of India, it has to be mostly of the latter type. The contribution by the informational technology industry has so far been in the form of private entrepreneurial initiatives. A sustained cross-fertilization in innovation in educational programmes development is yet to be forthcoming in this. The University should make greater efforts to cultivate the industry.

The Flip side

In the foregoing pages we referred to the consensus that education in the IT age increases productivity. There is the opposite side to this assertion. Learning and education, especially in the informational society, is also viewed critically as simply acting as a *screening* device, styled as *the 'screening'* or *'filtering hypothesis'*, or alternatively, *the 'certification'* or *'sheepskin' argument...*[28] The criticism avers that technology education simply confers a certificate, diploma or 'sheepskin', which enables the holder to obtain a well-paid job without directly effecting holders productivity. This would certainly endanger social relations by promoting division in the capabilities and incomes of the workforce.

Further, there is now the realisation of the danger that over enthusiasm for vocational technical education is leading to the total subordination of the educational system to economic quality in the 21st century...[29] There is now a widespread agreement that the exact relationship between the vocational and general education remains uncertain.

It is with this in view, perhaps the UNESCO document referred to earlier regards information as having a life of its own. Does this imply that IT drives our lives? Indeed, it appears to be a force that penetrates the core of our life and mind. Is this prospect good for us? Can we reconcile ourselves with the traditional wisdom that after all technology itself is neither good nor bad, but it depends on how we wield it. But, then, we are confronted with Melvin Kranzberg's famous law "Tehnology is neither good nor bad, *nor is it neutral*"...[30] How is one to face this dilemma? Or perhaps it is not a dilemma at all in view of the possibility that the human mind is equitable with Artificial Intelligence as Bruce Mazlish stated. Such recognition of the trends in learning released by IT can be seen from a wider context.

We are dealing with the phenomenon of a radically new technological paradigm which more than anything else that preceded it in human history is conditioning our lives, and consequently the process of learning. Life-long learning has by now become a cliche with a connotation that is at once a limiting concept of learning and an open-ended concept.

For ages past too, life-long learning had been evoked to depict that the process of living imparts knowledge and experience involving both a chastened perception of the meaning of life and a useful vector to live by Wisdom, Knowledge and Information were held to be the desiderata of the human living condition, if discriminately viewed. Formal educational phase, under this perception is clearly distinguished from the outcomes of learning that is earned in life's sojourn. The former is more or less associated with Knowledge Information necessary for one's livelihood purposes, the latter is conceived as distilled wisdom and knowledge for higher purposes of reflection on the human condition. Herein lay a clear differentiation between useful and utilitarian function of learning and the ontologically-oriented purpose of learning.

The contemporary meaning of life-long learning refers mostly to the utilitarian purpose only: that technological change is so rapid, inexorable and ceaseless that throughout one's lifetime the learning process must continue for the sheer purpose of material living. The consolation is that technology supplies the deliverance mechanism facilitating

the imposed continuity of the educational endeavour.

Perhaps, there is an inevitability in this regard given the contemporary process of living — Anthony Giddens in his *Modernity and Self Identity*, calling the nature of modernity as "juggernaut-like", categorically states:

> in conditions of late modernity, we live in the world in a different sense than previous eras of history...[31]

If the very process of living changes so radically, then, accompanying categories of learning associated with living also are subject to inexorable change.

Yet another major sociological study *Man in the Age of Technology*, avers that the process of change engendered by modernity are intrinsically connected to globalising influences and that the sheer sense of being caught up in massive waves of global transformation is perturbing. Learning to live with such perturbance is the major challenge...[32]

Can the agents of education endeavour to cope with this challenge? And can... technology-based education, known for its innovativeness, innovate means to synthesize purely utilitarian learning with *learning to be* which, after all, means learning to be human?

The diminishing emphasis on the classical conception of learning is also characterised by Jacques Delores as the 'fading certainties of the Enlightenment'...[33] It is with this crisis in mind, UNESCO's *International Commission on Education for the 21st Century,* in its report of 1996, gave the celebrated motto for education as Learning to Learn and elaborated what that learning constitutes: *learning to know, learning to do, learning to live together and learning to be...*[34] This university had the great privilege of hearing the discourse of Dr. Karan Singh on this theme in 1999. His wise counsel was these four concepts encompass a comprehensive conception of education. I would only add my reading of the concepts thus. While the first two: *Learning to know* and *Learning to do* relate to learning as the tool to earn livelihood, the other two: *learning to live together* and *learning to be* constitute the gateway to the further aspects of what constitutes living.

Let me end by thanking the University, and the Vice-Chancellor, Dr. A.W. Khan for this honour. I deem it my good fortune to be here today. The stars have always been favourable to me, more so in granting the friendship of Ram Reddy. Emily Dickinson had written:

Nature assigned the Sun
That — is Astronomy
Nature cannot enact a Friend
That — is Astrology...[35]

References

1. Daniel Bell (1995) *The Sociologist as Man of Action,* in Geoff Dench, Tony Flower, Kate Gavron (eds.), Young at Eighty: The prolific public life of Michael Young, Carcanet, Manchester, p.124.

2. *Nucomachean Ethics,* tr. H. Rackham.

3. Manuel Castells (1996) *The Information Age: Economy, Society and Culture, Vol-I,* Blackwell, p.17, fn.27.

4. Ibid.

5. Manuel Castells, op.cit, p.21, fn.33.

6. Manuel Castells, op.cit, pp.61-62.

7. Bruce Mazlish (1993) *The Forth Discontinuity: The co-evaluation of Human and machines,* New Heaven, Yale, p.233.

8. Maureen Woodhall (1997) *Human Capital Concepts,* in A. H. Halsey, Hugh Lauder, Phillip Brown, Amy Stuart Wells, (eds.), Education: Culture, Economy, Society, Oxford, p. 20.

9. Ibid., p. 220

10. Ibid.

11. Floud and Halsey (1961) *Education, Economy and Society,* (eds.) Oxford, p.9.

12. Stanley Aronowitz and William De Fazio (1997) *The New Knowledge Work,* in A. H. Hasley and others, (eds.), Education : Culture, Economy, Society, Oxford, p. 194.

13. V.C. Kulandai Swamy (1993) *Keynote Address,* in RVR Chandrasekhara Rao, (ed.), *Technical and Vocational Programmes Through Distance Education*, Dr. B. R. Ambedkar Open University, Hyderabad, p.6.

14. Sheldon Rothblatt (1997) *The Modern University and its Discontents: The fate of Newman's Legacies in Britain and America,* Cambridge (UK), p. 274.

15. Tony Dodds, *A Vision of Development: Education in Seven-League Boots*, in Geoff Dench, Tony Flower, Kate Gavron, (eds.), Young at Eighty: The prolific public life of Michael Young, Op.cit,p.32.

16. Joao Oliveira and Greville Rumble (1992) *Vocational Education at a Diacen,* in Greville Rumble, Joao Oliveira, (eds.), Vocational Education at a Distance, Kogan Page, p.5.

17. Yves Brunsvick and Andre Danzin (1999) *Birth of Civilization: The shock of globalization,* UNESCO (Challenges Series), Paris.

18. John R Arbiaster, *Practical Considerations for ImplementingTechnical/Vocational studies Through Distance Education*, in RVR Chandrasekhara Rao, (ed.), Technical and Vocational Programmes Through Distance Education, op. cit, pp. 33-34.

19. David N Ashton and Johnny Sung, *Education Skill Formation and Economic Development: The Singaporean Approach,* in A.H. Hasley and others, (eds.), Education: Culture, Economy, Society, op.cit, pp. 29-210.

20. Jandhyala B.G Tilak (1999) *Investment in Human Capital in India: An Inter-State Analysis of Stock and Flow of Human Capital,* in RVR Chandrasekhara Rao, A. Parasanna Kumar, K.C. Reddy, (eds.), Perspectives on Indian Development: Economy, Polity and Society (Essays in Honour of Prof. B. Sarveswara Rao), Sterling Publishers Pvt. Ltd., pp. 277-278.

21. Manual Castells, op.cit Vol-I, pp. 53-55

22. Ibid. (p. 55)

23. Ibid. (p. 55)

24. Ibid. (p. 55)

25. Ibid. (p.55)

26. Ibid. (p. 57)

27. Mauel Castells, op.cit Vol-I, pp. 21-22

28. Maureen Woodhall, *Human Capital Concepts*, in A. H. Halsey, Huge Lauder, Phillip Brown, Amy Stuart Wells, (eds.), op.cit, p.222.)

29. Ibid.

30. M Kranzberg (1985) *The information age: evolution or revolution?*, in Bruce R Guile, (ed.), Information Technologies and Social Transformation, Washington D.C., p. 50.

31. Anthony Giddens (1991) *Modernity and self-identity: Self and Society in Late Modern Age*, Stanford, p. 184 and p. 187.

32. Arnod Gehlen (1980) *Man in the Age of Informational and Technology*, New York: Columbia University Press.

33. Yves Brunsvick and Andre Danzin, (eds), *Birth of Civilization: The shock of globalization*, in UNESCO Publishers, op.cit, p. 38.

34. Jacques Delors (1996) *Learning: The Treasure Within*, Report to UNESCO of the International commission on Education for the twenty first century, Paris.

35. Emily Dickinson, *Nature assigns the Sun.*

[Prof. R.V.R. Chandrasekhara Rao was Vice-chancellor of the Dr. B.R. Ambedkar Open University, Andhra Pradesh in 1989. After completing his term of office in 1992, he was invited to join the Commonwealth of Learning, Vancouver, Canada, as Director, Asian Programmes, from where he retired in 1996. *Address:* Anita Apartments, Durgabai Deshmukh Colony, Shivam Road, Hyderabad, India, Tel. 91-040-7639950]