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Beyond the Rainbow

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'Accelerated and exponential change appears to characterize societal and institutional settings in the Western world. Leaders in the field of education need more accurate predictions of alternative futures impinging on their areas of activity ... and this condition will carry forward into the foreseeable future.'

An edited version of Hensley and Yates' introduction to *Futurism in Education*, McCutchan, Berkeley, Cal., 1974.

We are at the beginning of change in all aspects of our education. In Queensland we could well be confronting a new phase in the educational system which will be vastly different from the past. As the Twenty-First Century draws closer, so, too, will we witness more changes in our society and our educational systems. So there is likely to be little resemblance to that which we have known in the past.

For the future certain choices seem to be already self-evident. Technologists and scientists will need to be trained not only for the application of conventional work level, but also, generally, up to post-doctoral standards. In this sense, electronics will become a major area of development. Beyond the traditional place of education - the school, or college - there needs to be a huge expansion of in-house or industrial training to cope with the short term re-orientation that will be needed as a result of new technologies and the need to cope with retraining, consequent upon other secondary changes. These come about because of the ever-increasing rate of technological change.

In recent years, there have been many reports commissioned by governments; and there have been suggestions that many changes are likely to occur. Given that resources are limited, and that there are many demands on education and training and the respective contributions to be made by individuals, employers and government.

Of 250,000 young Australians who reach school leaving age each year, close to 100,000 immediately continue their education and complete 12 years of schooling. Many advance to higher education. Some 35,000 to 40,000 gain apprenticeships. Perhaps 10,000 to 15,000 enter either full-time vocational courses in certain areas which have no 12 year prerequisites. The remainder, over half of whom are females, seek to enter the workforce with no substantial vocational preparation. There are as many as 100,000 young people in this category.

The Kirby report, the latest of those viewing the problems of technology, youth and education states that more than 60,000 through no fault of their own want work, but are without it; as many again want work, but have given up the search; over 100,000 young people completed their education but are denied the opportunity in the long accepted way, of obtaining work, further training and independence.

Large numbers of women are treated as second class citizens in the labour market; substantial numbers of those with disabilities and other disadvantages are left without hope of obtaining the stimulation and companionship through work; and numbers of older people are hurried into retirement which neither they nor the State is prepared to accept.

Previous labour-intensive industries are now moving into the high-technology era. It is estimated by the end of the 1980's nearly 40% of the jobs in the banking industry will have disappeared. In offices one word-processor eliminates four or five typist jobs. The growth in the market for word-processors is likely to escalate in growth to about 35% per year of the present demand.

Economic Readjustment

The need for economic readjustment will be caused by two sources. The first is the mismatching of skills where people are made redundant in certain fields and who do not possess the skills to hold down jobs which are created by new technology. The second is the need for readjustment caused by the unavailability of jobs for young people. In the short-term the solutions lie in job-creation and re-training. In the long term we will face the problems of our working patterns and our career patterns. A person will need considerable retraining of about three or four times in a working lifetime, if there are tasks to be retrained for.

Provision is necessary and required for life-long education. People should be enabled, if they so desire, to use education and knowledge as an end in itself through the establishment of an automatic entitlement for every citizen (for a certain number of years) of cost free education so that people can economically 'drop in' or 'drop out' of education at any time according to the needs and desires of the individual.

The problems that the new technology creates for economy and society occur because of the magnitude of the problem. The changes brought about by the new technology are not just a change of degree; they represent a change of kind.

The new technology is reducing the number of jobs in the economy because not only does it allow the substitution of capital for labour but because the actual process embodied in the new technology changes the nature of work so that some tasks and some jobs are directly eliminated.

The impact of the loss of employment opportunities is being felt by young people because employing organizations, both in the private and public sectors,

respond to the new circumstances by not engaging staff. This permits natural wastage to eliminate excess jobs. For young people job opportunities will continue to decline. This will mean that 'warehousing' of young people for longer periods at school will necessarily take place.

However, there are benefits that will accrue from the new technology: the present costs of the introduction of technology is being borne by the unemployed. It could well be that in the future we will have a six-hour working day; shorter working week (3-4 days); increased annual holidays; more regular holidays during the year; increased long-service leave; early retirement; paid sabbatical leave; more flexible hours; and more part-time work.

Whatever patterns are required there are five which are paramount:

1. That there will be increased demand for education in patterns which we have not previously known.
2. That research must be an area of great demand to permit our economic survival.
3. That the private sector will have to share an equitable load in maintaining our viability economically.
4. That the job market will be concentrated in the service industries. (Jones identifies - tertiary, quaternary and quinary sectors.)
5. For appropriate decision to be made information must be freely available and up to date.

Education and Society

The base obligation exhibited by all societies is the need to educate its young into the mores of the member society. Fundamental to the process of transmission is the means of communication. Among societies there are various means used for the process of transmission, but there remains a constant - a need for the transmission to occur. Prior to the invention of the printing press, the custodial role of knowledge preservation was entrusted to the cloistered and specialized religious societies. The communicating medium for transmission was by word of mouth. Great changes occurred within the educative process with the development of the printing press which, theoretically at least, made knowledge available on a much larger scale, than was previously possible.

Mass education, although aided by the development of the printing press, occurred from a different force. Society felt obligated to educate the young in the morality of society; thus it was necessary to educate them to acquire literacy.

The question arises: what could be the result of the emerging technology? First, it is necessary to construct a paradigm which could influence the actualization of its application in our society.

It is useful to understand some elementary assumptions. First, changes in people, societies and institutions are most commonly brought about by need fulfilment; the more completely the need is met the more lasting the change.

Changes in the needs of any one cause changes in the others. Current technological developments which more adequately fulfil people's needs to communicate and society's need for knowledge transmission, have enormous implications for institutional organizations. However, the final outcome could be quite different if other factors were considered, such as the need for moral consideration. The present certainty is one of change which is increasing at an exponential rate, which, in turn, will necessitate those persons within educational organizations to become familiar with the management of change

Knowledge of self is basic. Without it changes would be inconsistent and short lived. At the next highest level is acquisition of knowledge about the organization. Such knowledge permits dysfunction reduction emanating from introduced change. At the highest level is the welding of self-knowledge in harmonization with organizational knowledge in bringing about changes.

Technology and Education

There have been many technological developments which have had an impact on roles played by educational institutions. At their beginning computers were merely high speed number processors; they were both large and expensive. By the late seventies, with the introduction of the microcomputer, the size became considerably reduced and more powerful.

A development in the future is likely to be the consumer's access to educational programmes which would have the sophistication to be self-instructional for the learner. This then raises the important question: 'What happens to the teacher?' The answer is not known; but teachers should be exploring the industrial and educational implications of the threat to this presence.

Because of the portability of the instructional systems there is a 'saviour effect' for those people who reside in the remote and isolated areas. Such availability of access to education has a multiple attractiveness for those residents. In the first place they now would have an unlimited access to educational information; secondly children could remain at home thus reducing the high cost of boarding children in distant schools; thirdly, there would be a labour saving cost for those families whose children are able to assist on the family property.

Those are some of the 'benefits' to locals. However, there are both social, educational and economic costs to be considered in terms of the local family and the community as a whole.

It is not a gigantic step from this situation where smaller communities can become the norm in social organization with access to the best instructional techniques. Rising costs of transportation enhances the attractiveness of moving

information from place to place rather than people. Developments in networks, satellites and the use of existing telecommunications create additional possibilities. It is already common practice among the business community to send information electronically because of its speed and lower costs than other forms of communication. Network development creates the possibility not only to transfer information from a central data bank to users but also for the user to interact with this and for a record of the interaction to be kept. This transfer can occur using current telecommunication facilities. The recording facility could well take the place of the grading and sorting function of the current educational system. A further pressure for this decentralization could come from the change in work location of some adults. It might be possible, in the future, for certain people to work from their houses with computer links to their employer. Further, many adults will need to go through retraining processes a number of times during one's working life. Much of that retraining could well be received electronically. These will be the people who will become receptive to their children's initial 'training' being received in like manner.

The Expected Changes

The changes have enormous implications for educationalists. One of first tasks they will have to undertake is the identification of those aspects of current educational instruction which can be or will be because of societal pressure, better served by the use of electronic communication. It seems at this time that because some aspects can be transmitted more effectively by this means, subject to changes in the past will change at an increasing rate. Some aspects now covered in the curriculum will not be able to be covered electronically. Those concerned with physical, cultural and artistic pursuits have currently been identified as having components which require human input. To say, however, that computer technology will have no place in the instruction process of students studying what is currently called Art curriculum which could be better transmitted electronically.

From observations so far it seems that the use of microcomputers requires and produces new cognitive skills which have previously been ignored. Educational administrators will be expected to identify these and integrate them into a students' learning program. For example, letter writing and computation are not as common as before having been displaced by the use of telephoned and small calculators — respectively.

At present, a student has to attend an educational institution for a set period of time and receive certification for what has been studied and achieved at a level of mastery. Technological advances may provide a different framework by which both transmission and certification of courses could well be achieved and provide a situation where an individual's learning needs could be met in a different time frame. Educational institutions are costly and much of this

cost is in the repetitive transmissions of knowledge. This teaching situation is people intensive and therefore expensive. It is the role of the educational administrator to identify components of essential knowledge and plan for their most effective transmission. This also requires an awareness of variations to cater for the needs of the individual.

The indicators suggest that we are entering a time unprecedented rapid social, and consequently, educational change. The easy access to microcomputers and other technology which can emulate the functioning of the human brain and some of the physical functions of the body, opens numerous changes to the meeting of society's needs. This has implications for the nature and type of education and thus for educational institutions. Leaders in education will have to be able to determine what is essential to the development of the mind, body and emotion, and what is peripheral, and a consequence of current organization. One thing is certain, however, and that is that government, educators and administrators will need to address questions such as those related to the modes of institutional organization and those related to planning for change, at a level never before experienced.

The New Education for an Internationally Competitive Economy

Technological change is only one of many forces influencing individual's attitudes, values and employment opportunities. In our dynamic contemporary world, Australia must be quick to anticipate and respond to change. Therefore there is a need to educate the community about technology and the use of technologies in educational deliveries. Investment in human skill, ensuring equality of access and outcomes is the vital role of industry and educational institutions to provide relevant training, to enable Australia to be internationally competitive.

Technology implies much more than the tools and technical inventions of a society. It certainly involves the whole complex array of skills, techniques and processes by which a group maintains production and applies knowledge. Technological change is a significant aspect of the major social and economic changes that are affecting all aspects of Australian life such as the restructuring of the labour market, redundancy of certain skilled labour, growth in specialist applied technology and research, occupational mobility and a growing emphasis on generic skills.

Axiomatically, according to the many current newspaper reports, as previously indicated, Australia's economic growth in the future will depend on a revitalisation of manufacturing industry and growth in the tertiary and service sector which inevitably depends on more efficient information and technology systems through improved national skill base through education and vocation programmes. Stonier in his text, *The Wealth of Information: A Profile of the Post-Industrial Economy*, argues that,

a complex society cannot be run by people who receive only specialist training. All citizens must be exposed to a good general education (1983, p.62)

His theory is overwhelmingly justified if one wants to avoid the dangers of a 'technocratic' consciousness. Thus a sound general education is needed to ensure that those who move directly from school into workforce have broadly based skills.

Business corporations must invest substantial amounts in education to train employees and it is foolhardy to believe that the government can sponsor the majority of work-experience programmes. In many areas of technological innovation the exorbitant cost of updating equipment alone is leaving public education at a distinct disadvantage and reinforcing trends towards control of information for private profit. Education should demystify science and technology and generate a healthy scepticism about relying solely on experts to provide 'technofix' solutions to problems.

Society must become 'a learning society' to retain a degree of economic independence and a democratic way of life. As Fischer projected in his article on 'The New Immigration', that due to the ageing of Australia's population there would be a need to 'import skilled and professional labour from overseas (*The National Times*, May, 1986, p.6). Due to the massive structural change evident it is best to provide students with a strong general education and an ability to adapt to a changing work environment.

As Levin and Rumberger stated in their study of the educational implications of high technology,

(such) adaptation requires a sufficient store of information about culture, language, society and technology, as well as the ability to apply that information and acquire new knowledge (1983, p.27)

Consequently there needs to be a convergence of social and economic goals so that individuals can cope with changes in the work environment and accompanying social adaptation.

The higher participation rate, as stated earlier, 36% of the national cohort in 1982 and 45% in 1984, has generated a demand for senior secondary courses more related to the broad scope of life and work rather than to narrow tertiary entrance.

What, then needs to be done to achieve the educational goals identified as vital for social, economic and individual development? Learning to learn, an understanding of technology through 'hands-on' experience and this is achieved through strengthening the teaching of mathematics and the physical and biological sciences on which technologies are based. Stranks raises an interesting and noteworthy point,

the success of the future will depend on a proper understanding by our politicians, writers and artists (as well as) engineers, scientists and systems analysts (1983, p.76)

as any revolutionary change has depended upon throughout history.

Cooperation and encouragement for all to contribute to a cohesive society and an awareness that all are interdependent and vulnerable, to not only nuclear destruction, but also loss of dignity and identity, is also vitally necessary. Students should be encouraged to develop creativity whilst being introduced to other creative people.

Another area of investment is in the teaching arena. Educators are being asked not simply to add on new information, techniques and knowledge, but to make major changes in lesson content and classroom teaching practice.

Economic changes are accompanied by increases in leisure time and the ageing of the population, and these factors must be accommodated. The O.E.C.D. Review found that the Australian education system is currently producing a small minority of professional workers and highly skilled trade workers but also a large majority of unskilled and semi-skilled workers who learn their skills on the job (1985, p.1). There are over 2.6 million people in Australia between the ages of 15 and 24. About 2 million of them are employed or involved in education and training. But unfortunately, at June 1985, approximately 230,000 young people were recorded as unemployed and seeking full time work (ABS figures). *The Blackburn Report* advocated vocational courses toward the end of the senior schooling after a broad general education, whereas the Queensland report *Education 2000* recommended vocational courses beginning at Year 9. These two different approaches need reviewing and a beneficial compromise attained that will produce the future effects desired.

From 1982 and 1984 retention rates in secondary schools increased significantly. Additionally though, the T.A.F.E. sector would add about 11% of these figures and approximately 43% of the Year 12 students enter higher education (Ball, 1986, p.12). Although this is an encouraging trend, especially in terms of economic growth through higher education, Australia lags behind her major international competitors.

Japanese firms are spending approximately 2% of their GNP on training their employees. Sweden also has 2% of their workforce retraining at any one time whereas in Australia it is a pitiful 0.2% (New Scientists, 18th July, 1985). It is obvious that a stronger funding commitment is required.

The O.E.C.D. survey revealed that 'on a per capita basis Australia has nine times as many lawyers and seven times as many accountants as Japan but Japan has nine times the number of engineers and scientists combined Australia has only one-third the number of engineers per capita as Japan' (1985, p.62-63). When it is obvious that economic growth should be in the manufacturing and technological arena, the above professions related to initiating these projects

should be boosted before catering to subsidiary professions. Efficient production and sophisticated technology depends on the science but it is also related to the supply of managerial expertise as well. Obviously, in Australia, the labour market planning has not been successful in engineering despite the 1960's expansion of engineering schools and colleges.

The lowest skilled jobs will diminish worldwide and the industries with the highest growth rate, as emphasized by current newspaper reports, are likely to be personal and community services, restaurants, hotels and clubs to correspond to the increased leisure time; and also in public administration, construction, entertainment and welfare services to meet the more urgent needs. These short-term needs must be accompanied by the large scale long-term needs for structural change. Significant shifts will therefore be against blue-collar workers towards white-collar workers.

It becomes obvious then that Australia must keep ahead of developments to be competitive internationally with her trading partners. Mr Keating has strongly urged that Australia become less dependent on minerals and primary production for its export income and needed to generate a strong manufacturing and export industry base within the nation (*The Courier Mail*, June 17, 1986, p.3). This move is vital to ease the current trade deficit problem. The mineral boom of the 1970's is over with no real lasting benefit. Additionally the *Business Mail's* latest find was that Japanese steel companies will not be able to import Australia's coal but will be forced to pay higher prices by the strict government policy (*ibid*). This strongline stance means that self-sufficiency and survival should also be our targets in the international arena.

John Elliot in his interview for 'State of the Nation' maintains that,

Australia ought to be the Switzerland of Asia ... we have 15 million people, a stable political environment ... well-developed systems, communications ... the most highly educated group as a whole outside Japan ... we have to use Australia as a service region to Asia with technological services and financial services (ibid, p.7)

Acknowledgement of the economic goals is inextricable to the process of development of appropriate educational policies. Not only is technological change a force influencing individuals lives and employment opportunities but additionally the international scene renders it imperative to be infinitely competitive worldwide.

A sound general education is necessary to form the basis of an understanding of this dynamic structural change, but specialist skills must be added to allow economic objectives of the nation to be fulfilled. Higher retention rates are a significant factor to boost an economy but only if it has a positive investment in both productive and consumption capital.

Therefore in retrospect, after surveying the economic climate and prospects, it becomes apparent that action must be taken in the education sphere. Using the manpower-needs approach is a valuable method to evaluate the economic situation and then determine the needs required to fulfill these criteria.

The benefits of the present schooling system are easily judged by reviewing the unemployment statistics, the employers' comments and the individual's claim of loss of satisfaction and interest. And since education is itself a commodity, it also has to be sold. That is, sold by its relevance and appropriateness to the world today, as the individual sees it; either locally, nationally or internationally. It must accommodate all human differences. It should provide satisfaction so that individuals can appreciate the costs and alternatives choices foregone. In other words, it must satisfy the 'private equilibrium'.

Enough has been stated about the plight of the economy and growth areas have been outlined. This is optimally achieved if an initial foresight is included in the beginning of the schooling years. Present programmes deserve credit but the 'new' education for an internationally competitive economy is certainly a major focal point of any future consideration. Intrinsic to this idea is the concern for a humane and scientifically responsible citizenry in a society of sophistication and paradox. To sum it up conclusive, policy-makers do have a great deal to consider in the economic/education field.

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TEACHING THE PHILOSOPHY OF EDUCATION

(Comment on earlier article)

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In 'Problems in Teaching Philosophy of Education', *Australian Journal of Teacher Education*, Vol II, No 1, 1986, M A B Degenhardt pinpoints the 'difficulty' in teaching this subject when he outlines an imaginary lecture on 'Discipline and Punishment'. At the end of this lecture, he says, the students 'will have learned that there is a general agreement on what punishment is, that there are three main theories of punishment ..., that all have strong points ... and that much more will need to be done towards the development of a satisfactory theory of punishment in education' (p.31). He concludes that the students leave wondering what all this tells them about what to do if children flick paper pellets during next week's poetry lesson.

I think it is fairly easy to re-arrange this lecture so that it will be both philosophical (given in accordance with 'open-ness of inquiry') and useful to the beginning teachers.

The first step is to reverse Degenhardt's material, put the wondering students first, and address their problem. From here on there are, of course, many ways of proceeding. I shall suggest one of them. Ask the students what they would do if confronted with the pellet-flicking. You can have them answer orally, or by jotting down their answers or simply by thinking what they would do. Now ask them to consider what their reaction really is. Are they attempting revenge on the naughty children? Are they trying to reform them? Are they using a deterrent? Or are they simply bewildered and reverting to what they think their teachers did to them? Or angry and blustering? There are other possibilities. By this time some of the students may be offering suggestions about teachers' motives. The lecturer, however, needs to pull the lecture back to its theme, so he or she now asks the class to consider whether all of the suggested ways of dealing with the disorder were punishment. This is the place for explaining that there are theories of punishment, and what they are. I think that we could postpone the question of whether the punishment of adults is of a different character from that of children. The lecture will be either too long or too compressed if we were to try to deal with this question too, though it could make a good essay topic or a problem to think about in preparation for the next lecture.

The lecturer can now discuss which, if any, of the punishments were or were meant to be educative. (I assume that the nature of education has already been