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A Study of the problems associated with ICT adaptability in Developing Countries in the context of Distance Education

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"Education never ends, Watson. It is a series of lessons with the greatest for the last" The Adventure of the Red circle by Arthur.C.Doyle

Communication technologies have come to play a vibrant role in democratizing Education not only in the Developed but also in the Developing Countries. How ever, in spreading the use of Information and communication technology some major difficulties are felt by the policy makers as well as the implementers. These difficulties are felt both at the growth and application stages of communication technology. Yaverbaum and Reisman highlights the importance of three aspects in the application of new information and communication technology. They are People, software and hardware. Different permutations and combinations with regard to the three variables create different implications for the growth and application of Information and communication Technology (James C Taylor, "Computer assisted Distance Education: A pedagogic and professional Development Perspective"). Among these, they stated that the most difficult aspect to address would invariably be the human element. Pete Thomas and Dean Taylor state that as access to Information and communication technologies become more extensive, their use is extended from the activities related to internal administrative aspects towards more of interaction with students (James C Taylor, "Computer assisted Distance Education: A pedagogic and professional Development Perspective"). Such a scenario throws up new challenges before technologists in terms of both technical and human aspects. Hidetoshi Kato states that in the years to come communication technologies will play a major role in deciding learning outcomes.(Kato, Hidetoshi(1995) "Technology and Distance education", Indian Journal Of Open Learning,pp.11-14)

The problems associated with the growth of ICT that have been focused upon in this paper are Political factors, Economic factors, Cultural factors and technological factors. Among the major problems associated with application of ICTs the focus will be laid on Socio-political factors, Human and Administrative factors, Economic factors and Technical factors. Further, the paper based on various case studies derives important conclusions and also provides pertinent suggestions to ensure the smooth growth and effective application of ICT in the Third World.

Why use ICT?

Information and communication technology has come to be regarded as the mainstay of all Distance education methods. Dr.Ramanujam succinctly put the importance of Information and communication technologies in the current scheme of Distance education forward in the following words.

> ***"The spread of Information and Communication Technology (ICT) has revolutionized the access to education in general and the Distance Open Learning (DOL) in particular. ICT's role in the expansion of DOL need not be overemphasized. It is common knowledge that every Distance Teaching Institution is fast adapting itself to technology based teaching and learning in order to keep abreast of the changes taking place in educational technology"(http://depfolang.kubsu.ru/ramanujam.html)***

Educational technologists have cited may reasons as to why an education system based on ICT can more effectively result in positive pedagogic outcomes than one based only on conventional techniques.

One of the prominent reasons why ICT has come to hold an important place in ODL is that Distance learning is basically a Guided Didactic Conversational process (Borje Holmberg) in which the institution has to be in constant touch with the student. The high degree of interactivity exhibited by ICTs is an indispensable aspect in facilitating Guided Didactic Process. ICTs can transmit information to the students through a wide variety of media in a way that promotes informed discussion as well as provides guidance.

The autonomous learner of ODL institutes needs to be continuously attended by the Distance Learning Institute. This was termed by David Stewart as "Continuity of Concern". The ODL institutes will not be able to express their continuity of concern to their students with out the appropriate use of modern ICTs. Modern ICTs like teleconferencing can reach the farthest corners of the world discounting the traditional limitations of space and topography. Such a scheme will be able to effectively tackle the problems of students at all levels and at all stages.

The use of new ICT is extremely compatible with the "Industrial Form of Learning"(Otto Peters) that is propounded by ODL institutes. The emphasis on systematization by such institutes makes it highly imperative that each stage of the learning process is associated with skill that has to be pandered to by using a different learning device. This has prompted the cognitive theorists like Skinner to propound the usage of teaching machines. Such machines greatly reinforce the stimuli provided by the learning process.

Thus one must agree that for enhancing the pedagogic utility of ODL systems, a proper mix of new ICTs should be framed.

What are the problems associated with the Growth of Communication technologies in Developing Countries?

There are many problems that hinder the growth of new ICTs in Developing countries. Some of these factors are enumerated below.

Policy Structure of the Government:

The growth of any communication technology in a society and hence its applicability for Distance Education depends to a very great extent on the degree to which policy makers recognize the importance of ICTs in promoting a knowledge based society. Many Developing Countries like India have realized the importance of giving a boost to New Information and Communication Technologies for the general betterment of the society. The New Information Technology Act 2000 passed by the Indian Parliament is a step in the right direction. Many Countries have bestowed tax incentives on Communication technology based industries. Some Countries that have paid relatively scarce attention to the area of information technology are lagging behind in the field of spreading education using the latest technology. The failure of Distance Education in many African Countries can be attributed to this. Not only are policies important but also their implementation deserves greater attention. The road to failure is often paved with good intentions. Many structural factors make the implementation of technology a daunting task. At the planning stage the enormity of such factors are often not recognized.

Infrastructural Bottlenecks and High User Charges:

The lack of appropriate infrastructure for enabling the use of ICT for Distance Education is a serious bottleneck. The aspect of Internet access in Developing Countries is a case in view. The figures for the level of Internet penetration in various countries are given below.

Internet Penetration in Asia by Country, 1999 (Millions)

Adult Population	*Adult Population*	*Internet Users*	*Percentage of Internet users*
Singapore	**2.66**	**1.06**	**39.92**
Hong Kong	**5.34**	**.075**	**14.06**
Japan	**102.64**	**10.3**	**10.44**
Taiwan	**16.09**	**1.8**	**11.19**
S.Korea	**34.2**	**0.9**	**2.63**
Malaysia	**12.58**	**0.16**	**1.27**
China	**869.93**	**2.47**	**0.28**
Philippines	**44.69**	**0.12**	**0.27**
Thailand	**42.72**	**0.11**	**0.26**
India	**598.88**	**0.27**	**0.05**
Vietnam	**46.25**	**0.01**	**0.02**

Source: Technology - Pedagogy Combine: Need for Quality in Distance- Open Learning (http://depfolang.kubsu.ru/ramanujam.html)

The low levels of Internet penetration in India are clearly visible from the data presented in the table. The percentage of Internet users is just .05%, which compares unfavorably with countries like Thailand (.26%) and China (.27%). The same scenario holds true for most basic infrastructure needed to make ICT usage more viable in Developing countries. Further the waiting time for obtaining access to basic ICT is also very long. Even after liberalization, the average waiting time for obtaining telephone access in India is more that 8 months in India. Access to even the most basic of electronic devices like the Television is also highly limited in countries like India. In India the TV penetration is only 80 per 1000.Coupled with these is the fact that, for most modern information and communication technologies, the user charges are very high that makes their use for Distance Education a very costly affair. A case in view is that of the cost of Internet connectivity for Indian homes. It still costs as much as Rs.30 per hour for Internet access in Indian homes. Such prohibitive costs make the use of such technology for imparting Distance Education, a luxury.

Political Factors

The perceptions and attitudes of a political system greatly affect the acceptance and growth of technology in any society. The same holds true for all the ICTs relevant to Distance Education. A political system conscious of the payoffs of ICT for the enhancement of the educational profile of a country will frame appropriate policies for the adoption and dissemination of ICT through out the length and breadth of the country. As A.W.Bates states while talking about his criteria of Media Selection, Novelty of an ICT should be the least important criteria that should guide the political society in deciding upon the ICT that should be selected. Rather than being guided by the fashion of the day, ICT should always be selected in accordance with its end result, that is the extent to which it can bring about positive pedagogic out comes.

"Mere 'buying' of technology will not become a policy, because any

> ***unprofessional decision at some level will be enough to buy technology. In such a case technology will become a disabling rather than an enabling tool'"Technology-Pedagogy Combine: Need for Quality in Distance-Open Learning (http://depfolang.kubsu.ru/ramanujam.html)'***

The growth of ICTs will be generally welcomed in a democratic society, because, ICTs are known to democratize societies through wider dissemination of information. However, in a society in which an autocratic form of government prevails, growth of ICTs may not be viewed with favour because, greater access to information may encourage interest in creating more democratic space in the society.

Economic Factors

In Distance Education, cost is an important factor that guides the adoption and growth of Communication Technology in a country. Developing Countries often lack the initial allocation as well as matching funds to make feasible investments in ICTs. Many countries often acquire costly technology without making provisions for building sufficient infrastructure to run them.

> ***Thomas (1987) states that there are four major factors that can affect the growth of Communication Technologies in a Country. They are***
>
> ***- Financial Strength of the society***
> ***- Attitude of policy makers- Budget Allocation for the technology***
> ***- Cost-efficiency of the technology***
>
> ***.(IGNOU," Growth of Communication Technology", Communication Technology for Distance Education,ES-318, pp.34)***

Most Developing countries are constrained by resource scarcities. Even where the importance of ICTs is recognized, allocation for the development of these is at best paltry. Due to this, many developing countries are forced to depend on mostly traditional means of communication. These are limited in their efficiency.

The Developing countries are vitally dependent on substantial foreign assistance to ensure the development of ICTs. Often it is found that it is very difficult to invite the attention of donors on ICTs. These countries are perennially short of Foreign Exchange for acquiring latest technologies. Most of the Developing Countries are undergoing Structural Adjustment Programmes under the auspices of the IMF.

Cost-efficiency of an ICT is another major factor that is important that determines its growth. Developing countries have to ensure that such a technology is adopted that is easily accessible to the target group and also fulfills all the functions that are expected of it. Such a scenario essentially implies that a costly technology need not always be the best technology. However, it is often seen that Developing Countries often invest in the latest technologies without considering whether the target audience is effectively reached or whether the target audience is interested in the technology. The latter is the case of UGC's countrywide classroom scheme whose utilization rate is as low as 10%.

Cultural Factors

> ***Contractor, Fulk, Monge and Singhal (1986) state that culture is a complex whole that includes knowledge, beliefs, arts, morals, laws, customs and any other capability and habit acquired by a human being as a member of the society (IGNOU," Growth of Communication Technology", Communication Technology for Distance Education, ES-318, pp.36)***

Language is one of the major factors that hinder the easy assilimilation of ICTs by many developing countries. This hinders transfer of technology. The radio and TV programmes, computer software and the printed texts are produced in different countries bearing different cultural backgrounds. As such, such tools may fail to impress students of another country. For example, a zoology text can safely give the example of a koala in Australia, but the same cannot be replicated in India.

With regard to cultural patterns there are two groups of policy makers. Policy makers can be Pro-implementation or Anti- implementation. It is precisely the cultural moorings of a society that makes people either in favour of implementing technology or to reject it. Japanese have over the years built up a reputation of being quick to adapt and implement new technology. This can be linked to the way in which a new culture of receptivity to new ideas was built up after centuries of stagnation when commodore Perry forced the Japanese to open up their society. Again, in recent times it has been seen that the culture of class room teaching and learning has been so strongly built into the psyche of the teaching community that they often exhibit resistance in the way of implementing technological change that forces a change in the role of the teacher from being a store house of all learning to a manager of the teaching-learning process.

Technological Factors:

Very often, technology becomes the determining factor in the growth of ICT in any society. One would be justified in applying the Bates criteria for media selection as an appropriate parameter for selecting appropriate technology for educational purposes.

> ***Bates Criteria for Media Selection***
> ***Bates states that the following are the major criterion that have to be taken into consideration while selecting appropriate media for Educational purposes***
>
> ***A - ACCESS TO THE MEDIA***
> ***C - COST OF THE PROPOSED MEDIA***
> ***T - TEACHING FUNCTIONS OF THE MEDIA IN RELATION TO LEARNING GOALS***
> ***I - INTERACTIVENESS AND USER-FRIENDLINESS***
> ***O - ORGANISATIONAL ISSUES***
> ***N - NOVELTY OF THE MEDIA***
> ***S - SPEED WITH WHICH CHANGE CAN BE BROUGHT ABOUT IN THE MEDIA***
> ***(IGNOU, "Media in Distance Educatio ", Communication Technology for Distance Education, , (2001), ES-318.***

With regard to the acceptance of a particular technology, the factors such as access, cost, teaching functions, interactive ness and user-friendliness, organizational issues and speed afforded to change are important issues. In the case of Media selection, Bates regards Novelty of a media as the least important criterion on which a particular media should be selected or rejected. However, in the case of many third world countries, it is novelty of a media that attracts the attention of policy makers. For example, in the late70s and 80s, the novelty of TV as a medium influenced the UGC to initiate the Country-Wide Class room programme for the benefit of the college students. However much care was not taken to ensure whether, the programme could generate enough interest in the student community to make the programme a success. Moreover, at the time of its initiation, access to TV sets was also a major problem. Even today the tele-density in India stands at a low 80 per 1000. The end result was that UGC's CWC generated a utilization rate of less than 10%.

Apart from the factors mentioned above, once a technology is selected, there are certain other factors that need the concern of policy makers. Handling of New technology needs care and technical proficiency. For this training is an important aspect. Many developing countries lack enough personnel to train manpower in new technology. Moreover,

constant retraining of manpower to acquaint them with changing technology is also important. These often act as constraints before the smooth growth of ICT.

Maintenance of equipment also needs sufficient care. Frequent snags may render equipments unusable. Maintenance as a function also needs sufficiently trained staff, high quality spare parts and machine friendly attitude from the users.

Growth of Communication Technology – A case Study of India:

In any Developing country, the factors mentioned in the previous section can play a major role in either progressing or depressing the growth of modern ICTs. In this regard the case of India is very illustrative. We shall examine the Indian case with the help of the case studies related to the use of two major ICTs namely Radio and Television.

The Relative successes and failures of various types of TV and Radio in the Indian Context:

1. Radio:

Radio broadcasts in India for educational purposes has taken the form of School broadcasts, adult education and community development projects, Farm and home broadcasts, university broadcasts and language learning projects.

Among school broadcasts, the programmes aired by the Central Institute of Educational Technology for primary classes was one of the best programmes of the genre.

Among the adult education and community development projects the "Radio-forums" that were tried out in 144 villages around Poona with the help of UNESCO. The programme was tried out in groups of 20 members each. These forums were expected to listen to thirty-minute radio programmes on agriculture and community development.

Farm and Home Broadcasts were initiated in a big way in 1966. The topics covered in these were related to agriculture and allied topics. The aim was to educate the farmers and to provide them information in innovative practices in their field. These programmes were very effective.

University Broadcasts in India have traditionally been of two types- 'general' and 'enrichment' oriented. The former includes topics of public interest while the latter is used to support correspondence education of various institutes. The University of Delhi works out details in association with AIR Delhi for providing education through radio. Again many Open universities in the country also use radio broadcasts. Even the CIEFL, Hyderabad is engaged in offers modules through radio mode.

Language learning Projects are also a popular form of using the medium of radio. The most prominent example of the same is called the "Radio-pilot project" aimed at covering 500 primary schools of Jaipur and Ajmer in order to teach Hindi language. These projects were successful in improving the vocabulary of students by a very large measure. Later on such an experiment was also repeated in Hoshangabad district of Madhya Pradesh (IGNOU, ES-318, Communication Technology for Distance Education, 2000, pp.42-44).
GyanVani project was launched by IGNOU is offered in FM channels in 40 cities around the country for the purpose of educational development. EMPC is the nodal agency for implementing the project. The EMPC is currently studying the possibilities of creating a global Gyanvani.

Interactive Radio Counselling is a recent conception in Indian Distance Education scheme. In this scheme various experts at AIR stations provide live Counselling across the country. They are conducted at 189 radio stations on Sundays for an hour. Reflecting on the Interactive Radio Counselling mechanism as adopted in IGNOU, S.S.Chaudhary. et.al reported that IRC was an effective input to accomplish course objectives(Bansal,kiron and Chaudhary,sonvir.S,1999, "Interactive radio for supporting distance education: an evaluative study", Indian Journal of open learning).Again, B.Sukumar states that IRCs provide a major forum on which the students, especially from the remote areas can interact with the teaching end and can get their doubts clarified. The study revealed that even though IRC is well accepted by the students, there needs to be more attention given to its various aspects to make it really effective.(Sukumar,B.(2001),IGNOU interactive Radio Counselling :a study,IJOL,10(1),pp.80-92)

Radio as an Information and communication technology is by far the most successful of all ICTs in India.

2.Television

Experiment with television as a medium began very early in India. The major programmes of significance in this regard were Secondary school TV programme, Delhi Agricultural Television Project: Krishi Darshan, Satellite Instructional TV Experiment (SITE), Indian National Satellite Project (INSAT) UGC's Higher Educational Television Project (HETV) and Gyan Darshan (TDCC).

A. Secondary school TV programme:

This programme was started in Delhi on an experimental basis in October 1961 to impart lectures in Physics, chemistry; English and Hindi for class 11.These were basically syllabus-based programmes. The aim of the programme was also to enable students without laboratory facilities to have a feel of the same in a detached environment (for science programmes).

B. Delhi Agricultural Television Project:

This project was initiated on January 26,1966 for providing information related to agriculture to farmers. It was provided in 80 villages in and around Delhi. The programme attained a fair degree of success.

C. Satellite Instructional TV Experiment (SITE):

This experiment was started in the year 1975, initially for a period of one year. The telecast concentrated on the broadcast of two types of programmes- 1. Development related programmes featuring health, agriculture etc and 2. School programmes in Hindi, Kannada, Telugu and Oriya.

D. Indian National Satellite Project (INSAT):

The INSAT series of satellites were a landmark in the history of Indian Educational technology. Educational Television broadcasts were inaugurated through the INSAT series of satellites on 15th August 1982 in Orissa and Andhra Pradesh. Later on it was extended to AP, Bihar, Gujarat, Maharashtra, Orissa and UP. The cover of the INSAT spans the whole of the country in today's date. One of the avowed objectives of the INSAT scheme was to bring the rural population into the national mainstream. The areas covered include most of the areas of interest to these populations.

E. UGC's Higher Educational Television Project (HETV):

The UGC's Countrywide classroom programme was inaugurated in 1984.The production of programmes under this scheme is undertaken by the Electronic Media Research Centres (EMRC) located at various spots in the country. Some of the programmes are also imported from other countries too. The aim of UGC through its CWC was to upgrade the quality of education in the country.

F. The Gyan Darshan Experiment:

A collaborative effort between the MHRD and IGNOU, the Gyan Darshan channel has come to stay as a major innovation in educational television. The EMPC is the coordinating and transmitting agency for the programmes. Regular transmission of programmes from EMPC started on January10, 2000. Cable operators are being encouraged to make available the programmes of Gyan Darshan to all their customers. This was for ensuring a countrywide reach. Currently Gyan Darshan is available for viewing both in India and abroad.

A Relative Analysis

A relative analysis of the performances of Radio and Television would indicate the factors that can lead to the success and failures of various media in Developing countries. It has been noticed that the experiments conducted with the medium of radio have been far more successful than those conducted with the medium of Television. The reasons are not far to seek. The extent of penetration of Radio is far greater than that of TV. Even today the penetration of TV is as low as 80 per 1000 compared to the widespread. On the other hand radios are easily accessible and with the transistor revolution radio as a technology has become very cheap. Another factor working in favour of Radio, as a medium is the low capital investment and operating costs of radio broadcast technologies. Again learners can easily listen to radio programmes even while they are doing manual work. Radio is in all its real sense an egalitarian medium of communication. The ease with which it is accessible to the poor and rich alike makes it the most ideal medium for information dissemination. Compared to the radio the TV has certain disadvantages that work against it as a medium of communication. The major problem with regard to making the TV a successful medium of communication is the high cost of programme production. Sonvir Choudhary states in that there are groups recommending the use of TV due to its glamour value and those opposing it due to the doubts over its viability of its access (Choudhary, s.v, 1992, "Television in distance education: the Indian scenario", Indian Journal of Open Learning, 1(1), pp.23-31). Thus there are major factors that have led to the relative success of a medium like radio over a medium like TV.

What hinders the wider application of ICTs in the Third World?

Political factors of various hues affect the application of ICT in various ways. The political will of the ruling elite can at times pave the way for the growth of a particular type of communication technology in a country. The current phase of buoyancy related to computer technology and information technology can be attributed to the energetic steps taken by the late Prime Minister Mr.Rajiv Gandhi and his scientific advisor, Mr. Sam Pitroda. They were also instrumental in initiating a series of Technology missions. Further, if there is decentralization of communication technologies, it will lead to making the country a well-informed one. Such a scenario can help the people to make well-informed choices about the political scenario. This may even result in a topsy-turvy period of transition.

Human and Administrative Factors can play a major role in the growth of ICTs in the third world. It is seen that if all sections of people do not have access to the technology being implemented then it will result in the creation of two classes of people – 'haves' and 'have-nots'. This may result in a sense of deprivation among the 'have-nots'. It may also result in many administrative problems. Implementation is a major issue. When new technologies like computers are implemented, resistance from ground level staff is a real possibility. Far more important than technological resistance is the attitude of the people towards the use of technology for educational purposes. Sonvir Choudhary and Shyam Behari in their Modasa experiment state that developing countries do not lag behind advanced countries in the use of technology for entertainment. With a little change in perception the same technologies can be used for education too. The authors proved this fact through their

experiment at Modasa, a village in Gujarat. (Choudhary,S,V and Behari Shyam,(1994) Modasa Experiment: Distance teaching through cable TV network system,Indian Journal of Open Learning 3(1),pp.24-28)

Economic factors also affect the application of new ICT in Distance Education. Developing countries have a constant paucity of funds especially for the application of new ICT in Distance education. Due to this people are unable to reap the benefits of modern technology. For example, one of the reasons for the lack of success of UGC's CWC was the lack of adequate TV sets for reception of the programmes.

Equipment Related factors are a major hurdle in the growth and application of communication technologies. The main aspect in this pertains to the import of various equipments. In many cases, maintenance of the same requires foreign technicians. In the case of dual use technologies, there may emerge many import restrictions. A major case in view is the import restrictions imposed on the export of cryogenics related rocket technology to India by USA in recent times.

The Human Element is also major importance in the growth and application of new ICT. In many cases, it is seen that the teachers act as a major roadblock against the implementation of new technology. They are not ready to accept any change in their role. With the advent of new ICT teachers are no longer the storehouse of all knowledge, but are more of managers of education.
Communication policies of various countries also play a major role in deciding the application of various communication technologies. These policies are a product of social pressure. Policy formulations are based on the kind of role the political elite want that media to play in the process of development of the country. In the Educational field policies should be formulated in such a way that the inter –regional disparities as well as the inter- strata disparities are overcome and equal access is made available to all the segments in their quest for education.

Suggestions and Recommendations:

The following suggestions and recommendations may be given for facilitating greater growth and adaptation of ICTs in Developing countries.

- **In keeping with the pattern of the globalised economy, greater impetus should be given for the cooperation between the government and the private sector to adapt and disseminate new technology in the field of education.**
- **Tax rebates should be extended to private institutions engaged in the field of research on ICT adaptability in Distance Education**
- **The government of these countries should invest at least a percentage of their GDP in research and adoption of new ICT.**
- **The Developed countries should accept it as their moral duty to transfer those ICT technologies to developing countries that can bring about vast changes in the educational profile of these countries.**
- **While choosing between different ICTs, the criterion of positive end use effect should prevail above the aspects of Novelty and fashion.**
- **The governments of these countries should concentrate on building up the base of high speed data transfer by initiating projects like the Sankhya vahini.**
- **Venture capitalist projects should be encouraged to make break thorough in the field of ICTs for educational purposes.**
- **It is as important to empower people with technologies as to make technologies accessible to them. Access without empowerment will stunt the growth of technologies.**

Summing Up:

The growth and application of new ICTs in the field of education in Developing countries is fraught with immense difficulties. However, the choice of the medium is of paramount importance in ensuring that the objectives of using a particular media are fulfilled. From the relative analysis of radio and TV as media in India, we can safely conclude that the major factors that decide the growth and application of a ICT in Distance education are the access to the media, its cost effectiveness, its user friendliness and its pedagogic value. Unless all these factors are taken proper care of, growth and application of ICTs in Education will continue to be as daunting a task as it ever was.

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