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# Global Analysis of Information Communication Technology as an Infrastructure and Training Tool

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## ABSTRACT

The main purpose of this study demonstrates the impact of Information Communication Technology (ICT) as infrastructure and training tool for better performance of corporate ,institutions and organization workforce .The question here is : How has Information Technology (IT) tools been used in training employees for proper management?; How will MIS tools assist to computerize departments?. Has the new technology improved the performance of workforce in organizations?
Our research has taken an effort to analyze the Information Communication Technology (ICT) and MIS operation in terms of service quality, accommodation of new types of generation and demand response. The Need for this research is to deliver promises i.e. being most efficient and cost-effective policies that oversee better workforce, formulate automotive in motor industry, workability in higher institution of learning and service delivery incorporate sector. The data is collected through primary and secondary data; conclusion has been drawn from case studies from various countries across the world.

**Keywords:** *MIS, Performance, Training, Employees, ICT (Information and communication technology)*

## 1. INTRODUCTION

Information and communication technologies (ICT) is defined as a "diverse set of technological tools and resources used to communicate and to create, disseminate, store, and manage information. ICT implies the technology which consists of electronic devices and associated human interactive materials that enable the user to employ them for a wide range of teaching - learning processes in addition to personal use , (Michael el at .,2014).

The main aim of the study is to globally analysis information communication technology as an infrastructure and training tool. Information system (IS) becomes a management information system (MIS), when it is applied to improve management by directors of the organization .Systems being an integration of ICT tools has three basic levels: operational, middle management and top management where the information is passed from bottom to top (Tripathi, 2011).But according to Wafula Kand Ocholla .D(2007).

Information-communication technologies (ICT) represent the main drivers of globalized societies based on knowledge in new global era. This king of technology has developed faster than any other technology in the world. Among other things, it enables the mobility of learning. The ICT influence on the modern society has been very strong and it has resulted in radical transformation in communication and information exchange around the world. The main role of ICT is to enable speedy information flow at very low costs, (Sanja Franc, 2010)

The common use of ICTs tends to refer to newer technologies of phone and internet, the term ICT is best used to include the more traditional communication media such as radio and television, Information Communication Technology (ICT) is an infrastructure and training tool for better performance of corporate ,institutions and organization workforce,(Michael el at .,2014). Digital convergence is gradually bringing devices to the market that include the traditional media (phones with radio, media centers with computing capability and television) which will increasingly blur the distinction between old and new ICTs,Wafula .K and Ocholla .D (2007).

Information systems can also help in the achievement of the enhancing livelihoods, improved efficiency in the delivery of services and allowing local stakeholders a voice in the planning process. Information systems advances brought about by the private sector can also complement initiatives undertaken by government or development-cooperation agencies to promote lower primary education, (Michael el at., 2013).

Objective of our research raises questions such as : How has Information Technology (IT) tools been used in training employees for proper management?;How will MIS tools assist to computerize departments?. Has the new technology improved performance of workforce in organizations? MIS plays the life blood role for an organization as no human can survive without it. Investment in MIS by the organization support it in core competencies, it also helps in production process, human resources records, financial records - controlling and monitoring of various activities which in turn impact the organization growth and development .It also provides sound basis for strategic decision making process.

Information systems are often implemented in order to increase the quality and quantity of work

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produced. However, when organizations implement new information systems, there is often a period of decreased performance and quality (Ramsay et al., 2000; Edmonson et al. 2003). This period of decreased performance may be attributed to a variety of influences including the learning curve phenomena.

### 1.1 Need for Information Management System

Information System is basically concerned with processing data into information. Data collection involves the use of Information Technology (IT) comprising: computers and telecommunications networks (Email, Voice Mail, Internet, telephone, etc.).Telecommunications provide the means for one-way or two-way communication and for the transmission of messages. Learning curve effects are evidenced by an initial increase in task time and/or decrease in performance, followed by gradual improvement with repeated usage (McAfee 2002). These effects are quantifiable and useful for measuring changes, such as time to complete a unit of work. However, this quantification does not address individual differences that might influence the learning curve. As discussed by Adler and Clark (1991), linking performance with cumulative experience only incorporates the end effects of learning. This does not explain individuality or the complex processes of first and second order learning such as training, managerial actions or process changes.

### 1.2 Information Technology (IT) As Tools for Training

MIS provides a valuable time saving benefit to training of workers hence workforce. (Ramsay et al., 2000; Edmonson et al. 2003). Employees do not have to collect data manually for filing and analysis. Instead, information can be entered quickly and easily into a computer program. As the amount of raw data grows too large for employees to analyze, business analysts can build programs to access the data and information in response to queries by management. With faster access to needed information, managers can make better decision-making process. (Ramsay et al., 2000; Edmonson et al. 2003).

According to Michael el at., (2014), these technologies include computers, the Internet, broadcasting technologies (radio and television) also known as telephony. ICT as a constitute of Information system is that technology which uses the information to meet ,Employees need or purposes that include processing and exchanging.

Management information system used in organization for its business operation, provides strong advancement in the field of information technology through which an organization can easily be achieved (Manish Kumar, 2011). MIS helps in decision support, venture management, resource and people management and data base retrieval application. The use of management information system in business organization support business processes, competitive strategies and business operation, which result and impact the performance of the work force of the specific organization, (Manish Kumar, 2011).

### 1.3 ICT as A Driver for Process Efficiency

According to IDC (2001), there is a growing need for networking skills within the workforce and in the use of ICT technologies in European Countries. Research shows that there will be a shortage of such skills for the next few years. The shortfall in networking skills with the use of ICT technologies is estimated to an average of 33 % for Germany and 28 % for France to for the period 1999 to 2004, According to IDC (2001).

A growing number of companies are using networking technology to interlink with their suppliers and partners, leading to the establishment by some manufacturers of Covisint (2001), an e-Marketplace for cost-effective procurement of supplies, (IDC, 2001, p. 2). In recent years, many companies have addressed the skills shortage by using less labor-intensive computing technology. The so-called ‘low-cost-automatisation’ and the software support of the organization of production were increasingly applied. However, the process of replacing work by the use of ICT seems to be no longer valid.

It has become commonplace that an increase in information technologies entails a parallel improvement of the competences of the employees. However, to reduce the requirement for skills by the use of well selected technology seems to come to an end on a not ultimately defined level and labor ,one has to be deeply qualified,(Spöttl and Becker, 2004).

### 1.4 ICT and E-Banking

According to Sosale &Sarna,(2006), the uptake of e-banking solutions by private and corporate clients has put increased pressure on the service offerings, the human resource setup and the business processes in bank branches. European banks are forced to rethink their approach to banking to better match the customer requirements for e-banking, especially in terms of everyday banking interaction which can be done online and access to customized financial advice in specific instances ,(Moreno, J.M, Sosale, S. & Sarna, N. 2006). Considering, the effort to analyze ICT as tools to train and run data.

Moreover, MIS operation in European banks will provide quality service; accommodation of new types of generation in the banking impetus and hence stimulate demand response towards customer attention i.e. being most efficient and cost-effective policies that oversee better workforce in European banks.

## 2. LITERATURE REVIEW

### 2.1 China and New Technology Impact on Workforce In Terms Of Migration

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A 2010 McKinsey report lists "massive urbanization and industrialization" as the primary challenge that should be better understood by global businesses that seek to operate in China. This includes the tremendous impact of migrant labor on key industries. The task force spent a significant amount of time to understand the impact of migration on EICC member companies and their employees, since ICT manufacturers are among the largest employers of migrant workers in China.

Nearly half of these new workers relocated to Guangdong Province, where the employment market is largely dominated by ICT manufacturer Some experts indicated that many migrant workers struggle with specific cultural stigmas and expectations that are attached to their decisions to leave home(So Sheung So, 2010). In particular, the cultural expectation that children will care for their parents creates a dilemma for many young Chinese who migrate, especially if they cannot generate enough income to send home. Research also indicated that migrants who return home without having achieved economic success are often stigmatized as having "failed," compounding the shame they may feel for having left in the first place, (Liu Kaiming, August 25, 2010)

Experts also educated the task force about the cultural tendency of Chinese citizens (especially men) to avoid sharing their concerns with others. Rather, personal problems are generally kept private, despite how difficult the problems may be. The task force considered several examples of how cultural, societal, and personal factors associated with individual well-being collide to place unbearable challenges on employees. Professor Shang-Jen Wei of Columbia Business School points out in a 2010 study that one-fifth of Chinese males are pushed "out of the marriage market" as a result,(McKinsey and company,2010).

### 2.2 Europe Uses Information And Communication Technologies

The implementation of a new ICT infrastructure has enabled National Irish Bank (NIB) to deliver its banking services to its customers in a more efficient manner.NIB operates within 4 regions in Ireland (Dublin, Midlands, North West and South), The efficiency gains experienced by customers are mainly related to the possibility of remote banking and digitalization of banking records. Renewing NIB virtually overnight was a considerable task which had been planned to the smallest detail as there was no room for mistakes. Although the overnight ICT shift was successful, the challenges and costs of training employees in how to use the new technology were considerable, with 450 Irish employees going through basic training in Danish branches. In the same manner, Danske Bank A/S tried to soften the transition by using e-learning, and by having 300 skilled Danske Bank employees temporarily brought in from Denmark and Sweden to provide on-location guidance on how to use the new IT platform and the new portfolio of financial products in the days subsequent to the In addition to serving regular private and business customers, the bank provides services such as investments and portfolio management. Implementation of the new IT-platform in NIB. A steep learning curve did however mean that the first three months were hard work for NIB employees, as acquiring the necessary IT skills and getting familiar with the new organizational practices were time-consuming.

The use of management information system in business organization support business processes, competitive strategies and business operation which result and impact the performance of the workforce of the specific organization. According to Nah and Lau (2001) systems is "a packaged business software system that enables a company to manage the efficient and effective use of resources (materials, human resources, finance, etc.) by providing a total, integrated solution for the organization's information-processing needs". This system facilitates, if well-implemented, the integration of all the functional information flows across the organization into a single package with a common database. Therefore, it allows easy and immediate access to information regarding inventory, product or customer data, and prior history information (Shehab et al., 2004).

By conducting focused techno-economic research and prospective analyses in domains relevant to Directorate aManagement Information System used in organization for its business operation (Manish Kumar, 2011). It provides strong advancement in the field of information technology through which an organization can easily achieve the strategic objectives. It helps in decision support venture management, resource and people management and data base retrieval application.

Investment in MIS by the organization support it in core competencies, it also help in production process, human resources records, financial records and controlling and monitoring of the various activities which in turn impact the organization growth and development and also provide sound basis for strategic decision making process. Proper implementation of the technology in the organization can help in three dimensions: one is management information system, employee's act, payroll structure or systems, control and monitoring of the employees and over all organization activities (Sinan Aral, 2010).

The overall management can be best managed and controlled and by the appropriate execution of the MIS tools. Each and every departments work with full strength. Sinan Aral, (2010) further says that the overall activities of the organization largely depends on main three things the proper use of equipped machinery, trained manpower, and good organization structure which in turn should be supported by best and sound supervision and control system, all these bustle can only be best organized and managed when there is more conscious management information system implemented not only

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that but also trained IT specialist employees to play an important role in the financial and payroll system of the organization where all the activities carrying on with best possible monitoring system,(Sinan Aral, 2010).

### 2.3 Insight From The (Nri) Networked Readiness Index 2012 On The World's Networked Readiness

World Economic Forum presents the latest findings of the NRI, putting them into a regional and income-group context while also looking at regional differences. The most important mechanisms to achieve employees performance in any organization is the technology development, (Kumar, 2006). It is a thing through which one organization not only motivates the employees but also try to achieve its stated goals and objectives. Through technological improvement organization committed to achieve its long-term objectives and to decide about future course of action.

Managers, researchers and strategy makers play very important role in the development of an organization but despite of all these the role of information technology for an organization is indispensable one,(Nigel, 2004). Because information technology make link between all the departments and make their inter relationship between the departments which integrates all into single framework. The organization performance with great extent associated with information technology.

Information technology is valuable for organization but the extent of dimension depends on various factors that is internal and external. He concluded that the use of extensive technology is crucial for the performance of employees and also for organization,(Nigel, 2004).The use of information technology in business impact in cost reduction and product differentiation and also its application is useful for competition, (Belleflamme, 2001).

The value of IT is also to business is less but not less application to data modeling and reproduction. Kauffman, (1996) has pointed up that all the managements level executives should be motivated for the investment in technology and to promote the IT program in the organization which in turn improve the overall performance of the employees and the organization will be able to do all the activities in splendid ways.

Robert accomplished that, with proper MIS training to employees may not only create value of the organization but also set and clear the unmeasured directions and dimension. He emphasized on the more investment in the field of technology that is management information system, (Belleflamme,2001). The organizations when it invests in the information technology or management information system not only invest but it also creates different type of opportunity with the organization which has direct impact on the employees performance and efficiency as well as on the profitability of the organization (Duliba, 1996).

Furthermore various scholars and researchers have found out that the impact of the technology or management information system not only brings possible changes in the profitability and performance but also in productivity, organization process, economy levels and industry. Information technology that is management information system enables organization to improve performance and efficiency and also make unique competitive impacts to yield more profit through effective production (Barney, 1991).

The management information system is very useful for business decision making not only for long term success but also for achieving short term objectives (John A. Martin and E.S. Over Man, 1988). The human resource performances will great extent accelerates through MIS. But often this system does not meet the desirable expectation of the management. The main reason behind that if there in not proper implementation of the system, then there will be no balancing of the cognitive and management hierarchies in the organization.

### 2.4 ICT Enables Training methods For Community Health Workers (Chws)

CHWs are increasingly envisioned as a trained and paid corps who give advice and treatments, and implement preventive measures. During the past 10 years, community health workers (CHWs) have emerged as a focal point of international discussions of primary health-care systems, Bhutta ZA(2010). Many national governments, including those of Brazil, Pakistan, Ethiopia, and India, are making CHWs a cornerstone of the scaling up of community health delivery. A key difference between the old and new CHW models is that workers are now viewed as an integral and formal part of the health system, with reporting lines, training, supervision, and feedback, Bhutta ZA(2010).

According to Darmstadt GL et al.,(2006), Several developments have stimulated efforts to develop a more substantial role for CHWs in primary health care; new mobile health technologies, household-administered rapid diagnostic tests, and expert support systems based on information and communications technologies (ICTs) are greatly enlarging the range of services that CHWs can effectively provide. New ICTs are also enabling improved training and supervision methods, and make the effectiveness of evidence-based community-based protocols delivered by CHWs easier to measure and show,(Darmstadt GL et al.,2006).

According to Millennium Development Goals (MDGs, 2000),Community health workers (CHWs) have emerged as a focal point of international discussions of primary health-care systems. Although lay community-based health workers have been active for at least 60 years, the Millennium Development Goals (MDGs) in 2000 prompted new discussion of how these workers can

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help to extend primary health care from facilities to communities.

A key difference between the old and new CHW models is that workers are now viewed as an integral and formal part of the health system, with reporting lines, training, supervision, and feedback.(Sachs, J. DMarch 29, 2013) Several developments have stimulated eff orts to develop a more substantial role for CHWs in primary health care; new mobile health technologies, household-administered rapid diagnostic tests, and expert support systems based on information and communications technologies (ICTs) are greatly enlarging the range of services that CHWs can effectively provide. New ICTs are also enabling improved training and supervision methods, and make the effectiveness of evidence-based community-based protocols delivered by CHWs easier to measure and show.(Sachs, J. DMarch 29, 2013)

CHWs have since been part of an international attempt to revise primary health-care delivery in low-income settings, and CHW programmes have been changed accordingly. Instead of being regarded as unpaid, lightly trained members of the community who focus mainly on health education and provide basic treatments, CHWs are increasingly envisioned as a trained and paid corps who give advice and treatments, and implement preventive measures,(Sachs, J. D,March 29, 2013). The CHW subsystem should be regarded as an integral part of WHO's six health system building blocks: service delivery, health workforce, information, medicines, financing, and governance. As identified by the CHW Technical Taskforce, the critical inputs for a CHW subsystem include: service delivery clarity and capability; health workforce management; information systems and data use; medical products, point-of-care diagnostics, and technology; fi nancing for CHWs; and leadership and governance of system quality.

According to Prof Sachs, J. D(March 29, 2013),many national governments, including those of Brazil, Pakistan, Ethiopia, and India, are making CHWs a cornerstone of the scaling up of community health delivery. With recognition that CHW subsystem financing must be tailored to a local context, the Technical Taskforce provided evidence of costs for sub-Saharan Africa. Working from a ratio of one CHW to 650 people, the costing exercise made the assumptions that each CHW was provided with a mobile phone and a backpack containing medications and diagnostics, as well as appropriate salary and management. According to the basis of this research , the average annual cost of deploying CHWs to the entire rural sub-Saharan African population by 2015, including system initiation and maintenance, would be around US$2·3 billion per year, or roughly $6·56 per head per year for the rural population covered by the CHW subsystem,(Sachs, J. DMarch 29, 2013).

### 2.5 The Future Fundamental Office

ICT practitioners can be employed wherever work processes are developed, mastered, supported or optimized by ICT. The working fields themselves are, however, not necessarily ICT dominated. They are generally oriented to the core business of automotive production and services, employing skilled workers with different occupational profiles. They have some ICT competences and make use of them as ICT practitioners.

Successful application of ICT boosts productivity and leads to a need for additional and better Qualified workers provided the market is able to absorb more products. In the past, however, Automatisation has often leaded to a reduction of persons employed in many fields of production. However, this can only be avoided if employees are able to successfully use ICT within their specific working fields. They also have to be adequately trained and qualified. So far we have shown that ICT in production is always applied with other technologies typical for the industry (Spöttl and Becker, 2004), therefore it would be inappropriate to deal exclusively with ICT-specific fields of application.

Employees have to be qualified for such a multitude of tasks. It is important to include the tools ICTworkers training and others – and the methods relevant for skilled work into the qualification processes. The process beginning with plant design and ending with the start-up of the plant should be in the centre of interest rather than the tools themselves without their links to the comprehensive context. One of the first outcomes is that ICT is highly relevant ,in workforce training though application orientation varies in different production plants or departments. ICT departments, sections or units are not isolated. Correspondingly employees must have ICT competences of different kinds, but focused on tasks to be performed in production, (Spöttl and Becker, 2004)

#### 2.5.1 The Fundamental Of Ict In Automotive Industry

Standard service normally requires work according to standardized manufacturer schedules, often linked to quality standards to be applied, with check-lists and manuals. A quality-oriented performance is needed, which offers a multitude of learning opportunities for apprentices. The repair shops use information systems for standard services to identify the vehicle condition, to determine spare parts and to implement work plans. They are based on highly complex ICT systems which are, in part, networked with the manufacturer,(Spöttl and Becker, 2004).

Most repair information provided by automotive manufacturers is currently available in digital form. Repair manuals are often no longer available as hard copies but are downloaded from expert systems. Future developments could result in new kinds of support systems based on Three-dimensional object presentations of the respective vehicle data (digital mockup).The paper-free workshop may become a real prospect. Skilled workers will take the required information from digital, close-to-development databases and handle technologies such as 'augmented reality, (Spöttl and Becker, 2004)

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According to, Hernandez et al., 2001,several kinds of manpower requires uses computer-aided and expert system aided diagnostic systems. Experience-based diagnosis is applied when diagnoses according to the manufacturer standards are not successful, cannot be carried through inPracticeor take too much time. Comprehensive information and manuals are required to enable skilled workers to develop their own strategies and approaches against the backdrop of their own experience. Information and communication technologies are applied for a variety of work tasks in the service sector.

ICT proficiency will be at the centre of required skills in the future, Integrating ICT literacy will be crucial, as it means harnessing technology to perform learning skills. It must encompass the use of ICT to manage complexity, solve problems and think critically, creatively and systematically towards the goal of acquiring thinking and problem-solving skills. Literacy must also comprise the use of ICT to access, manage, integrate, evaluate, create and communicate information in order to develop information and communication skills (21st Century Skills Partnership).

Finally, the role of ICT future learning should also be seen in the light of its contribution to emancipation, empowerment and self-fulfillment. Learning objectives such as social competence, critical thinking, and knowledge sharing and cooperation techniques will become more and more important as we move further into the knowledge society. As a result, it is clear that thinking about the future of learning cannot avoid asking the fundamental questions about the objectives of learning (Punie & Cabrera 2006).

### 2.6 ICT Infrastructure And Its Implications

#### 2.6.1 Internet Access

An important indicator of the general uptake of ICT in the BI relates to the use and availability of Internet. Internet access is a precondition for e-Business, as this is the main channel for e.g. e banking. The general availability of Internet allows for the analysis of overall ICT-readiness in the BI. 99% of banks (employee-weighted) have access to the Internet, and about 5 in 10 use a computer connected to the Internet at least weekly. The latter finding shows that ICT nowadays is not necessarily an integrated part of operating a bank. The case study on Glitnir Bank, serves to illustrate how a high availability of internet among customers, can be an important facilitator to inducing improved usage of online banking ,(Trucano, M. ,2010).

A slight increase in Internet availability can be observed by comparing the results (total) from the 2002 survey (95%) with the 2006 results (99%). This increase is most evident in ICT and e business in the banking industry the small and large credit institutions (CIs), which have both gone from a respectable availability to complete or nearly complete coverage.

The medium-sized banks had 100%availability of Internet access in 2002 and 99% in 2006 (the slight decrease might be explained by statistical uncertainty in the sample). The observations made in the sizebandof medium-sized banks shows, interestingly, that this size band in general has a higher frequency of Internet access. The different broadband connections used to access the Internet are not only used as the basis for advanced e-business applications, but also to support internal and external collaboration and to provide customer services over the Internet. Furthermore, broadband represents a faster way to connect to the Internet and is a technology which changes the way the Internet is used ,(Trucano, M. 2005).

According to , Moreno, J.M, Sosale, S. & Sarna, N. (2006).the application of networks is a vital part of an effective ICT-enabled system, which is especially true in the case of banks with a branch network. Local Area Network (LAN) may also be seen as a basic indicator of the minimum infrastructure required to enable companies to conduct e-banking at a substantial level 54. Wire-based LAN is currently the dominating technology. The survey shows that 9 in 10 companies use wire-based LAN, Georgiades. K. ( 2002) . The fact that LAN is a relatively low-tech and easily attainable ICT solution, would to some extent explain the wide coverage of this technology. Interestingly enough, the middle-sized CIs have a wider coverage of wire based LAN than large CIs, which however might be explained by their higher uptake of wireless LAN (W-LAN), Georgiades. K. ( 2002) .

#### 2.6.2 ICT Tools And World Bank

Within the World Bank, most people associate ICT use in the education sector predominantly with efforts to provide computers to schools, and to connect these schools to the Internet. While such associations are undoubtedly consistent with most World Bank support for investments in ICT use in education in the past, they are of limited utility when considering how a wide variety of ICT tools, services and approaches will be relevant to the needs of education sectors in countries going forward, Moreno, J.M, Sosale, S. & Sarna, N. (2006)..

An effort to catalogue the potential ‘options’ for potential uses of ICTs in education in 2010 should include attention to a broad range of devices, not limited to computers and laptops. Such a ‘catalogue of options’ circa 2010 may be of little relevance, however, when considering the potential relevance of ICT to education sector strategies through 2020, except to the extent that they point to the increased proliferation of a variety of ICT tools of potential relevance to the education sector in just the past few years (not only low-cost laptops, but also mobile phones, interactive whiteboards, IP TV, interactive response devices, tablet devices like the iPad, so-called ‘probe ware’ and other ‘connected’ scientific equipment used for learning, radio, television , gaming consoles and devices the list is quite long as a harbinger of things to come ,Moreno, J.M, Sosale, S. & Sarna, N. (2006).

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The increased diffusion of ICTs will offer potentially relevant 'solutions' to challenges not only at the core of the teaching and learning process itself, but also to challenges to the system such as (to cite just three examples) monitoring teacher attendance, transfer and payment of salaries and the apping of student populations and the educational resources meant to serve them e.g. schools. (Trucano, M. ,2005).

### 2.6.3 Smarter Workforce for Smarter Machines

We can sum up our argument so far by offering threePoints:The post-industrial mind craft economy and global society depend on smart machines and a smart workforce, using high-end technologies with even greater competence; Training and skill enhancement are part of a lifelong learning process; Adolescent schooling, techno-vocational education, and actual work need to be interrelated. These truths apply to technologically advanced societies and to developing countries alike. Indeed, nations moving from ancient to modern agrarian economies must be even more prepared for the accelerating pace of change, because their youth will have even more to learn and master over their working life span. Be-friending ICT in the initial stages of education will help young people come to terms with what lies ahead. In contrast, their relative training rate increases the turnover of older workers.

### 2.6.4 E-Assessment And E-Portfolio For Training Teachers

Training teachers to use digital technologies could also include the use of ICT for assessment of learning outcomes, although teachers are not the only actors concerned with assessment. Assessment is indeed central to educational practice and performance. Several Member States, such as the UK, are very committed to establishing an e-assessment strategy. This would include, according to a Future lab literature review by Ridgway et al (2004: 2-4),different components such as ICT support for current paper-based assessment systems; online and on-demand testing; and fully implemented ICT-based tests for the assessment of, for instance, ICT capabilities.

There is good research evidence to show that well designed assessment systems lead to improved student performance. Studies have found that e-assessment can be justified in anumber of ways. It can help examination by avoiding the melt down of the current research based systems through the use of spreadsheets, calculators or computer algebra in paper-based examinations. It can also help examination management by using electronic data exchange to smooth communications between schools and examinations authorities; by digitalizing student work and related logistics; by improving the technical quality of tests and by providing more accurate results. Another advantage is the added flexibility for part-time or modular learners through on-demand testing. It can also facilitate assessment readjustment tonew objectives, for example by providing on-demand tests with immediate feedback, and perhaps diagnostic feedback. Another advantage is that the use of interactive and simulation based media-rich learning content paves the way for new methods of testing specific skills such as problem-solving and problem-processing skills, meta-cognitive skills, creativity and communication skills, and the ability to work productively in groups (Ridgway et al 2004:17-19).

An e-portfolio or electronic portfolio is a digitalized record of a person's learning achievements including skills, experiences and other achievements. It offers a means of encompassing the full spectrum of student competences in a number of school subjects and of avoiding assessing only traditional academic competences. Many different uses of e-portfolios are possible. Ridgway et al (2004: 24-25) identify three distinct, but not mutually exclusive, uses for portfolios: as a repository for student work; a stimulus for reflective activity which could involve others and as a showcase enabling students to represent their 'best work'.

The use of e-portfolios in higher education in the Netherlands (Driessen& Bodewes 2006) observed that Dutch empirical studies focused mainly on the investigation of the impact of e-portfolios as a reflective activity. The impact appears to be quite positive, both for teachers and students. This can also pave the way for continuous use of e-portfolios within the framework of lifelong learning Some studies highlight, however, that teacher guidance is crucial for the use of portfolios by students and that teachers are sometimes more enthusiastic about them than students.

To address this issue, it is important for trainee to have a sense of ownership of their portfolios.
It could be possible to reinforce their sense of ownership by looking at how computer gamers develop their virtual identities, which contain actualized records of their performance and their game competences. In a review of studies on the net-generation and the way digital youngsters learn ,Veen & Jacobs (2005:52) have pointed to the need to investigate such links and to better understand how similarities between learning through game and formal learning can be further exploited. The impact of e-portfolios on the other dimensions of learning such as performance and assessment has, according to the literature review, hardly been researched in the Netherlands (Driessen & Bodewes 2006). Other problems and challenges related to the use of portfolios in education are discussed by Rubens & Heinze (sd).

### 2.6.4 ICT Prolongs Retirement For Workers

On UK data, Borghans and Ter Weel (2002) find no evidence of such phenomenon. In contrast, Friedberg (2003) finds partial evidence of skills obsolescence in the USA, with technological change in a worker's environment having a negative impact on computer use, but only for workers close to retirement. For Germany, Schleife (2006) finds a strong and negative correlation between workers' age and computer use. Koning and

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Gelderblom (2006) find similar results for the Netherlands.

If workers who are less able to adapt to new technologies and innovative work practices have already retired or been laid-off, the effect of age will be underestimated when looking at how it correlates with computer use. On U.S. data, Bartel and Sicherman (1993) show that workers in industries with a higher rate of technological change tend to retire later. However, unexpected changes in the rate of technological change induce workers to retire earlier. Similar results are obtained by Haegeland et al (2007) for Norway. A last strand of papers have taken a different view and investigated the impact of the introduction of ICT and innovative work practices on firm's labor demand for older workers (Aubert et al, 2006, Beckmann, 2007, Ronningen, 2007).

The impact of ICT and innovative work practices on the age structure of employment inflows and outflows appears to be quite varied according to the type of innovation under study. The adoption of the Internet increases hiring's without affecting separations, whereas the introduction of network-interconnected computers and the reduction in the number of hierarchical layers do not seem to affect the aggregate level of inflows and outflows. As regards the increase in the amount of responsibility awarded to operators, it contributes to reduce turnover as a whole given its negative effect on both hiring's and separations.

The same holds for training of younger and middle-aged workers which is negatively correlated both with inflows and outflows. As regards the relative rate of training of older workers, it is also associated with a reduction in inflows, but does not seem to be significantly correlated with outflows. As regards training investments made by firms, they strongly affect hiring's and separations of the age groups which are directly affected by the training. The relative rate of training of workers aged 25 years old and below reduces outflows more than average in the corresponding age group (i.e. workers aged 20-29), without affecting inflows.

In parallel it negatively affects older workers by increasing their rate of turnover (increase in hiring's and in separations). Regarding training of middle-aged workers (25-44 years old) it reduces outflows in the 30-39 age group more than average as well as the rate of turnover of workers aged 40- 49. In contrast, it negatively affects older workers as compared to younger age groups, to the extent that it does not affect their outflows while substantially reducing those of middle-aged workers.

## 2.7 Emerging Contours Of Future Learning Enabled By Ict Globally

A new vision of "ICT and learning" is needed that takes into account the shifts and trends (e.g. Globalization, migration, demographics, technological progress) that are transforming the way people work, learn, enjoy themselves and make sense of their world. Preferably, this vision would be realized through a proactive strategy that envisages and anticipates future learning needs and requirements, rather than an adaptive strategy which simply reacts to new requirements as they arise (Punie & Cabrera 2006).

### 2.7.1 ICT As Accommodation To New Types Of Technology For Future Generation

A number of statements have been made by renowned experts in educational disciplines and systems, which call for revolutionary changes in the way we learn and teach at the moment. There is no doubt that the role of ICT as an enabler of these changes is stronger nowadays than ever. ICT can definitely help in organizing and providing structure for the teacher's material to students, and in following progress of a given learning, in authenticating, searching and prioritizing the material.

This research consider ICTaccommodation to new types of technology It can simulate and visualize structures of physical, chemical, biological and engineering models and interact in real time with them in learning history and/or future trends. It can also help the handicapped population. ICT can be invaluable to the multilingual population, with automated translators for teachers, students and parents. Telepresence could reproduce a sense of being there so that what is learned transfers to the real world (Visions 2020: Ruzena Bajcsy).

In colleges and lifelong learning activities, student projects will be monitored with real time assessment monitors. Students will be evaluated on work in progress, their deliverables, their timeliness, their ability to work in teams, and their communication styles that have been monitored in the process. Virtual mentors will continuously adapt student interactions with their lifelong digital profiles, and check the effectiveness of their work against determined goals. Future tools will include super simulations and sensors, intelligent laboratory objects and project management software including voice technology to facilitate communication.

Among the tools which could be used as aids to acquiring new and complex skills, gaming could be a prime one. In the medical field, the simulation and modeling of the various physiological processes are already gaining the attention of scientists and medical experts, as these simulators can teach complex skills and provide objective measures of performance (Visions 2020: Gerald Higgins). One approach for refreshing and sustaining technical skills is to allow medics and other healthcare personnel to practice procedures in simulated environments that reproduce many of the difficulties found in real emergency situations. Another example is the on-demand, adaptive case-based simulation for medical training.

The case of science learning and teaching deserves special attention, as the intersection of scientific disciplines with ICT will be at the core of educational

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systems in the near future. Scientists will need to be completely computationally literate, and they will simply be unable to practice science if they are not. This therefore has important implications for education policy right now,(Punie & Cabrera 2006). The output of computer scientists today barely meets the needs of the public and industrial computing sectors, let alone those required for future science sectors.

Education policy makers need urgently to re-consider what needs to be done to produce the kinds of scientists we shall need in the next decade and beyond, not just at the undergraduate and postgraduate training level, but also at school level since today's children are tomorrow's scientists. For children, we should make teaching of computing more than just 'IT' classes. We should make the basic principles of computer science, such as abstraction and codification, a core part of the science curriculum. Computer science (again, not just 'computing') should be a key element of the undergraduate science curriculum and the concept of 'computational thinking' should be built into their education,(Punie & Cabrera 2006).

Computational research methods should be included in PhD student training (2020 Science). As a general statement, it might be said that ICT proficiency will be at the centre of required skills in the future. Integrating ICT literacy will be crucial, as it means harnessing technology to perform learning skills. It must encompass the use of ICT to manage complexity, solve problems and think critically, creatively and systematically towards the goal of acquiring thinking and problem-solving skills. Literacy must also comprise the use of ICT to access, manage, integrate, evaluate, create and communicate information in order to develop information and communication skills (21st Century Skills Partnership),(Punie & Cabrera 2006)..

### 2.7.2 World Summit On The Information Society (WSIS)

World Summit On the Information Society (WSIS) Plan of Action includes the building of an inclusive information society and the promotion of use of ICT towards achievement of internationally agreed development goals that are contained in the millennium declaration captured in WSIS Plan of Action. It seeks to address new challenges of the Information Society, at the national, regional and international levels. Specific targets for the WSIS Plan of Action to be achieved by 2015 include connecting villages with ICTs through establishment of community access points; linking universities, colleges, secondary schools and primary schools with ICT; connecting scientific and research centers with ICTs.

Other targets include connecting public libraries, cultural centers, museums, post offices and archives with ICT; linking health centers and hospitals with ICTs; fast tracking ICTs to all local and central government departments and establishing websites and email addresses; adapting all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances. Indeed the Plan aims at ensuring that the entire world population has access to television and radio services**,**(United Nations, 2000; 2012)

### 2.7.3 Nepad E-Schools Programme And ICT

New Partnership for Africa Development (NEPAD) was initiated to address challenges facing African countries and has identified ICT infrastructure as a priority area of action for inducement
of conditions for sustainable development. NEPAD policies and programmes related to ICTs are

Implemented by E-Africa Commission, which was established in 2002.In 2003, NEPAD prioritized efforts towards bridging of the digital divide between Africa and the developed world. This fast tracking of ICTs identified 6 areas of high priority. One of these isNEPAD e-Schools Programme whose objective is to integrate ICT in the delivery of education curriculum at secondary and primary school levels in order to improve access, quality and equity in education among member states. The implementation plan envisaged coverage of secondary schools in 5 years and primary schools in 10 years,(UNESCO,2003)

African public sector institutions more effectively use ICTs through NEPAD and the various G8 country initiatives to 'Bridge the Digital Divide' that have been formulated over the last few months. In particular: NEPAD has as one of its programme goals as 'Facilitating the Utilization of the ICT Infrastructure including e-government .Most countries surveyed have, or are in the process of, liberalizing their telecommunications policies to enable more competition and diversity of service providers in the industry. While this is having the effect of lowering the cost of access to information and telecommunication infrastructure, the costs of connectivity remain unaffordable for most education institutions. Furthermore, there are huge gaps between urban and rural areas in terms of access to ICT infrastructure.

However, it is worth noting that, with the development of ICT infrastructure, comes the problem of e-waste electronic or electrical equipment that has been discarded or has become obsolete. This includes old, end-of life computers, cell phones, TVs, and radios. E-waste is reportedly one of the fastest growing forms of waste around the world. The United Nations Environmental Program has estimated that up to 50 million metric tons of e-waste are generated every year. Recently, the United Nations has called for policies to protect African countries from unregulated imports of e-waste.

### 2.7.5 South Africa Government Holds The Ict Sector

The south African market of ICT structure creates the potential for conflicts of interest and even collusion ,(Steve E, Alison and Christoph S,2006).The

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neo-classical economists' appeal to perfect competition as the ideal model of economic competition is the counterpoint to complete state ownership or state-owned monopoly. Neo-classical theory argues that allocative efficiency is best achieved in a perfectly competitive market and that inefficiency is highest in monopolistic markets. Considering the( Figure1) below in the Government holdings in the ICT sector(Steve E, Alison and Christoph S,2006).

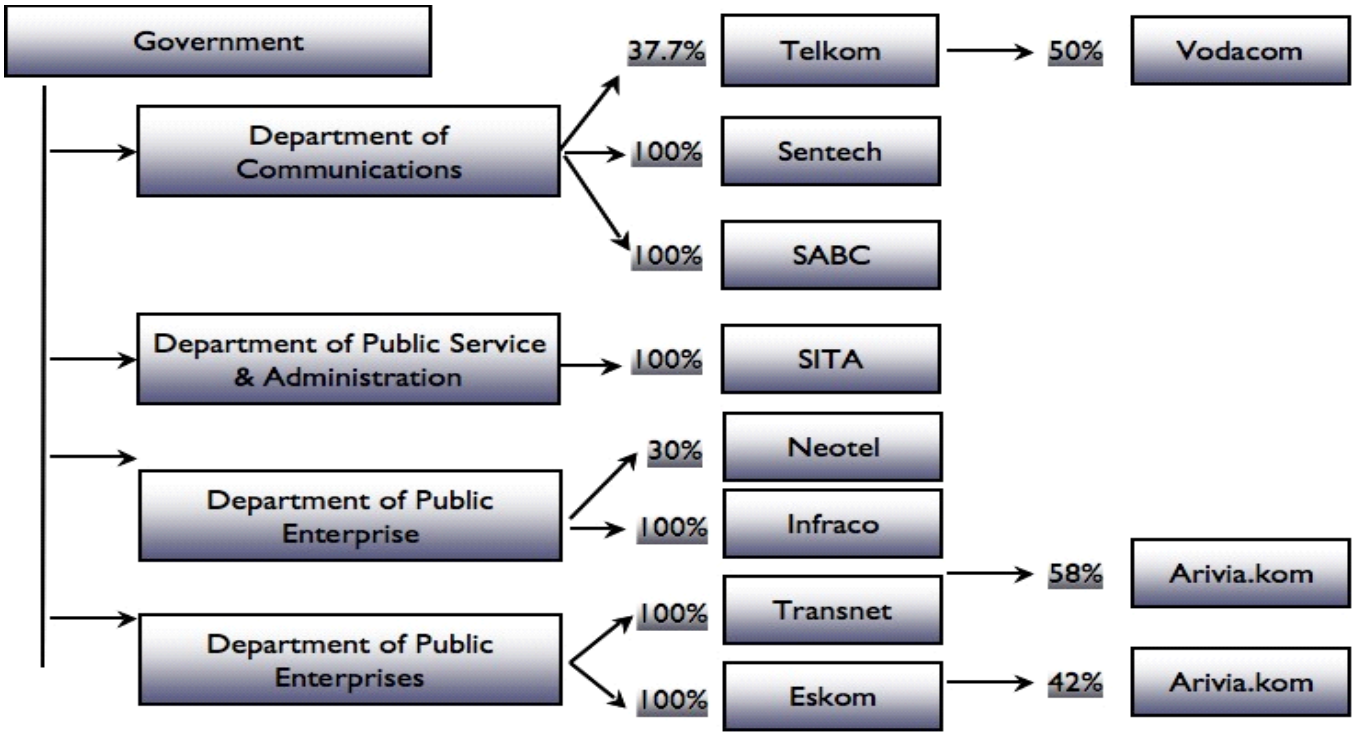


**Fig 1:** Government holdings in the ICT sector
**Source :** South African Telecommunications 2006

According to, Steve E .et al., (2006), the mobile sector is an oligopolistic market that must, by definition, suffer from some allocative inefficiency. some of these companies ( Above figure 1),also bid for and supply services to the government, to state-owned enterprises, and to related agencies. While South Africa's fixed-line sector (regardless of Neotel'spresence at this stage) is obviously inefficient, the mobile sector presents a more interesting case, because it is an oligopolistic market that, as a result, must suffer from some levels of allocative inefficiency.

In South Africa, Mindset Network and the Learning Channel specialize in the development of curriculum- aligned video content in a range of subject areas offered in South African schools. In Botswana, the Mochudi Media Centre also trains teachers in the development and use of video content. A recent development is South Africa's plan to introduce a dedicated Advanced Certificate of Education model on ICT integration that will be delivered by its higher education institutions and that will be compulsory for school principals. The e-Africa Commission that manages the NEPAD e-Schools initiative has also developed a comprehensive conceptual framework for teacher training and professional development in Africa.

The Educator Development Network of School Net South Africa is a good example of an on-line learning model that includes introductory training, materials comprising 20 different modules, virtual communities of up to 20 teachers, mentor support for groups and individuals, tracking and archiving through an established database, a Web portal of resources for teachers, and recognition of teacher progress by means of a certificate of completion for those teachers who complete six introductory modules and credits towards an Advanced Certificate of Education offered by the University of Kwazulu Natal.

### 2.8 Teacher Professional Development And Training Programmes

Research conducted by School Net Africa, the Commonwealth of Learning, and the International Institute for Communication and Development (2004) identified an estimated 61 different ICT-related teacher

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training and professional development programmes, projects, and courses under way in Africa. Since then, additional national and regional teacher professional development programmes have emerged. It is difficult to estimate the numbers of teachers with access to ICTs and who have been trained in their use for learning and teaching.

Teacher training often involves one-off, topic-led, short-term training programmes that aim to develop specific skills of teachers, but which do not necessarily comply with professional standards of competency development. Training programmes run by Mtandao Africa and the Global Teenager Project are among these. However, the systematized, initial, continuous, coherent, and modular process of professional development of African educators in accordance with professional competency standards and frameworks is making its way in many African countries through the use of ICTs.

### 2.9 ICTS A Strong Component Programme In Sub-Saharan Africa

UNESCO's Teacher Training Initiative for Sub-Saharan Africa (TTISSA) and the African Virtual University (AVU,2005) .Teacher Education Project feature among the most significant, multi-country regional programmespromoting teacher professional development and ICT integration. TTISSA is a high-priority programme on teacher professional development in Africa scheduled for 2006–2015 with a focus on supporting the 46 sub- Saharan countries on restructuring national teacher policies and teacher education. Its main aim is to increase the number of teachers and to improve the quality of teaching in Africa, and it considers the use of ICTs as a strong component of the programme, (African Virtual University , 2005).

In Kenya, the development of audio-based curriculum content is widespread under the leadership of the Kenya Institute of Education, (UNESCO ,2006). This role is also played by the Open Learning Systems Education Trust in South Africa, which produces audio content for use by teachers in a number of African countries. There is a growing trend towards the development of curriculum content in multimedia format, (UNESCO ,2006).

In Uganda, the work of Curriculum Net, a project of the National Curriculum Development Centre in partnership with the International Development Research Centre, invested in the development of local, digitized curriculum content in school-based subjects like mathematics in multimedia format. Organizations such as Learn things Africa specialize in the development of multimedia content in a range of subjects that have been used extensively in the NEPAD e-Schools Demo Project in a number of countries. Similarly, Mindset Network in South Africa has developed multimedia content directed by South Africa's National Curriculum Statement in new subjects like information technology for both primary and high school, (UNESCO ,2006)

### 2.10 Electricity And Telecommunication Facilities For Workforce Training

To support teaching and learning, as well as improve overall education management, a variety of ICT-assisted instructional approaches may be implemented, ranging from the use of radio or television to computers, Internet and newly-emerging mobile devices. While newer battery-operated ICTs are emerging, in addition to mobile devices that may be recharged off-site, the majority of ICTs including television, computers and the Internet continue to require a more stable energy source.

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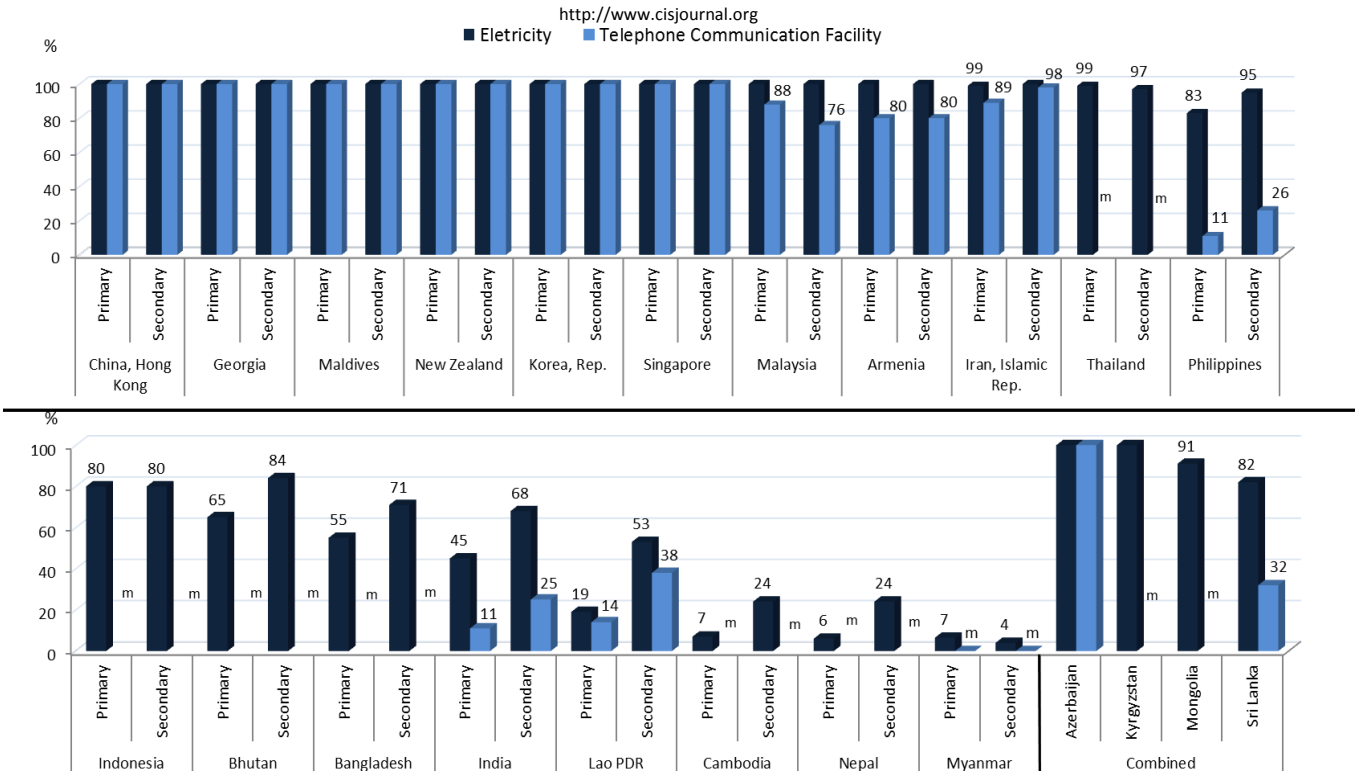


**Fig 2:** Proportion of educational institutions with basic electrical and telecommunications infrastructure by level of education, 2012

According to Figure 2, electricity is universally available in primary and secondary schools in developed countries and in many middle-income countries, demonstrating that basic electrical infrastructure is generally in place to integrate ICT in the classroom. This is the case in Armenia, Azerbaijan, Georgia and Kyrgyzstan in Central Asia; Hong Kong Special Administrative Region of China, Malaysia, New Zealand, the Republic of Korea and Singapore in East Asia; and in Maldives in South and West Asia. Given the availability of electricity in these countries, a lack of ICT in education cannot be attributed to the absence of a power supply but rather to a lack of policy imperative, an excessive regulatory environment, or gaps within schools' operational budgets.

Internet-assisted instruction (IAI) refers to an interactive learning method using content from the World Wide Web for pedagogical purposes. Given that connectivity is a prerequisite for the integration of IAI, an analysis of basic Internet connectivity is primordial in determining a country's level of preparedness. Countries vary widely in terms of their capacity to provide an Internet connection to all schools in all regions.

At the most basic level, the availability of electricity is a major concern for countries, particularly for some in East Asia and in South and West Asia where relatively few schools are reliably connected (World Bank, 2010). Moreover, Ministries of education, however, often have little or no control over school Internet connectivity as this depends to a great extent on the level of development of the national telecommunications infrastructure and access to a reliable power supply (World Bank, 2010).

### 2.11 Support Of Ict Tools With Telecommunication Facilities

To support teaching and learning, as well as improve overall education management, a variety of ICT-assisted instructional approaches may be implemented, ranging from the use of radio or television to computers, Internet and newly-emerging mobile devices. While newer battery-operated ICTs are emerging, in addition to mobile devices that may be recharged off-site, the majority of ICTs including television, computers and the Internet continue to require a more stable energy source. To summaries, the integration of ICT into schools requires electricity (e.g. grid/mains connection, wind, water, solar or fuel-powered generator, etc.) that is regularly and readily available.

Increasingly, the need for broadband connectivity and high bandwidth are necessary to effectively support instruction over the Internet, particularly for two-way synchronous communication (e.g. Telecommunication facilities are another basic element which help to build the educational and administrative capacity of schools. Defined as a fixed telephone line, cable connection, mobile phone or other sustainable communication technology that connects a school's terminal equipment to the public switched telephone network, or other telecommunication network, and which is intended for pedagogical or administrative

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purposes, telecommunication facilities can be used for communication between teachers with students, parents, various service providers to the schools, local education authorities, and other administrative organizations.

Telecommunication facilities may also provide the requisite infrastructure to provide various types of Internet connectivity. Fixed telephone lines can provide both narrowband and broadband Internet, while mobile telephones can provide varying levels of broadband connectivity through 3G or 4G technology. Generally, faster than mobile broadband Internet, wired connections (including ASDL, cable, fixed wireless, fiber optic cable, satellite, etc.) allow for upload and download broadband speeds that are faster.

Support instruction over the Internet, particularly for two-way synchronous communication (e.g. video conferencing), streaming videos, and using online applications and databases that have high-capacity requirements (Broadband Commission, 2013). Rural and remote areas, which frequently have greater dependency on broadband Internet given the unequal distribution of physical media (e.g. CD-ROM, DVD, etc.), present a significant challenge since they more frequently make use of analogue telephone lines with slow data transmission speeds unsuited to the transfer of information. While furnishing narrowband Internet in schools might be considered as a temporary solution to fill gaps, analogue dial-up connections may actually be more costly than a broadband connection in urban areas.

### 2.11.1 ASIA and ICT

Asia is not only the largest region by land mass; it is also the largest by population being home to approximately 60% of the world's population (UN Population Division, 2014). It extends from relatively small countries surrounding the Black and Caspian Seas in Central Asia, moving eastward to include the Indian subcontinent and still further spreading towards East Asia and the Pacific, including Indonesia and the Philippines. Given the absolute size, Asia – more than any other region – varies broadly in terms of history, culture, language and ethnicity,(UN Population Division, 2014). Especially noteworthy for integrating and sustaining ICT across several domains, including education, Asia also exhibits significant economic disparity,(OECD, 2011).

Given high levels of investment in their national networks, some OECD Member States in Asia have matched or outperformed international standards in the field of ICT-assisted instruction (OECD, 2011), while in other countries upgrades to national networks, tele-density improvements, enhanced national connectivity, and the introduction of new Internet Provider (IP) delivery technologies are creating a more favorable environment for the uptake of ICT.

Nevertheless, much progress remains to be made, and this is more true for some countries than others. In several least-developed countries (LDCs), Internet-based forms of teaching and learning and the essential infrastructure to support it are limited except for but a privileged few, driving countries to consider other forms of ICT. Beyond sub-regional differences, the internal digital divide of developing countries has also increased significantly as urban centers quickly adopt ICT while it remains out of reach for rural and remote regions. Bearing these caveats in mind, ICT in education in Asia can be viewed from two very different perspectivesOECD, 2011).

The first reflects a development discourse that stresses the role of ICT in eliminating the digital divide by reaching the unreached and providing support to those who cannot access essential infrastructure, trained teachers and other quality educational resources. The second perspective adheres to an e-learning paradigm and is a response to the emerging knowledge society where ways of teaching and learning are evolving at a rapid pace to foster learner-centric educational environments, which encourage collaboration, knowledge creation and knowledge sharing. While countries are admittedly at different stages of integrating ICT in education, ultimately both perspectives will be increasingly relevant for countries in Asia,(OECD, 2011).

### 2.11.2 ASIA Integrating Ict In Education

According to, (Kozma, 2003), 174 ICT-supported innovative classrooms in 28 countries in Asia. In 127 cases, there was an explicit connection between the innovation and national policies that promoted the use of ICT (Jones, 2003). But while the introduction of ICT policy is necessary for change, it is not sufficient to result in its implementation or impact (Tyack and Cuban, 1995). Within the framework of formal commitments, national plans to implement ICT objectives in education take on many forms including strategy papers, investment programmes, decrees and regulations that establish programmes with short- to medium-term targets (i.e. usually 5- to 10-year plans) aligned with longer-term goals and objectives. Moreover, countries vary in terms of how explicitly they formalize their plans. For example, formal, stand-alone plans on ICT in education, which may or may not be sector-wide, could be perceived as relatively transparent compared to National ICT Master Plans that include components on education or National Education Plans that include an ICT component.

According to (**Figure 3 )**: the majority of responding countries from East Asia have a stand-alone, sector-wide ICT in education plan and this includes developed and developing economies: Macao Special Administrative Region of China, Hong Kong Special Administrative Region of China, Japan, Malaysia, New Zealand, the Philippines, the Republic of Korea and Singapore, while in Cambodia a stand-alone plan addressing only upper secondary education exists.

Meanwhile for Indonesia, Myanmar, Thailand and Samoa, ICT is either mentioned in current education plans or education is mentioned in current national

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Master ICT Plans to cover several social spheres, including health, government and commerce, among others. At the present time, Lao People's Democratic Republic has no plan on ICT in education.

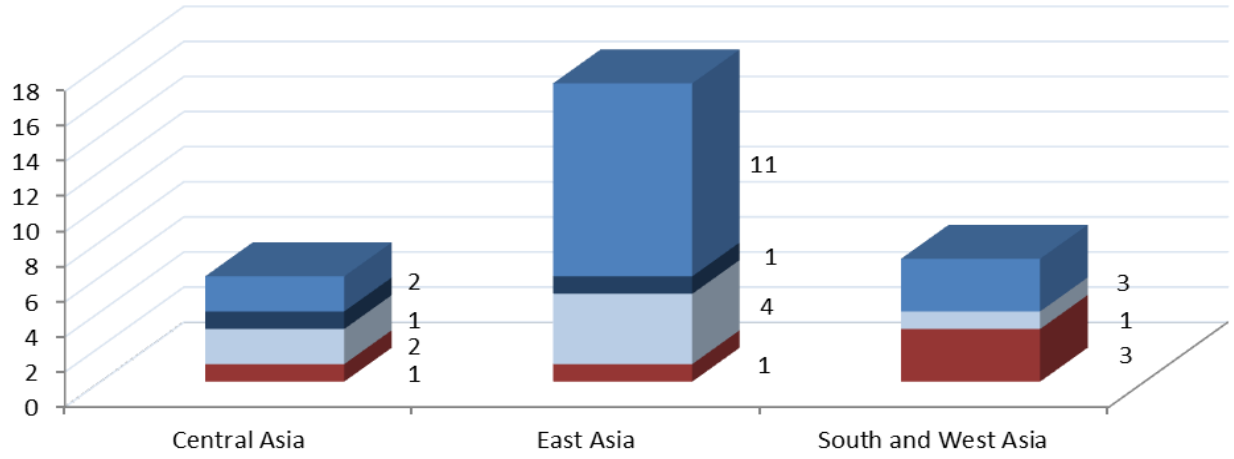


**Fig 3:** East Asia stand-alone sector on ICT in education plan
**Source:** UNESCO Institute for Statistics database; UNESCO Bangkok, 2011

In South and West Asia, Bangladesh, Nepal and Sri Lanka have national stand-alone, sector-wide ICT in education plans. In fact, in Bangladesh and Nepal, these plans were published as recently as 2013 (Bangladesh, 2013; Nepal, 2013). In contrast, the Islamic Republic of Iran opted to include ICT in education within its national Master ICT Plan, while Bhutan, with the support of the UNESCO New Delhi office, has recently prepared a draft plan. Maldives does not currently have a plan. Lastly, given its federal nature, India does not have a national plan for ICT in education as it is the responsibility of individual states to develop plans to carry out policy set at the federal level. More specifically, states have the responsibility to define norms, standards, guidelines and frameworks to implement the policy in an effective manner, and to facilitate and monitor policy implementation (India, 2012).

In Central Asia, Azerbaijan and Georgia (under the "Deer Leap" project) have stand-alone, sector-wide ICT in education plans, while Kyrgyzstan and Mongolia mention ICT in education in their national education plans. Kazakhstan has a stand-alone ICT in education plan; however, it only addresses upper secondary education. Lastly, Armenia does not currently have a national plan,(India, 2012).

### 2.12 Europe Integrating Ict For Workers And Adult Population

Based on the 5 project partner countries (Slovakia, Cyprus, UK, Austria, Greece) findings the blended courses for 50+ workers in Europe , HRD managers and educators were developed in four countries and tested in four languages – English, Slovak, German, and Greek. With such approach reinforcement contributed to Lifelong Learning and social cohesion, gender equality and personal fulfillment of 50+ workers, contributed to increased participation in lifelong learning by people of all ages, and supported the development of innovative ICT-based content. Project activities also contributed to creation of favorable environment for 50+ New workers through its dissemination and awareness raising activities focused at the indirect target groups: public administrators, labor offices, trade unions, social services providers.

Project Silver aimed at the creation of a sustainable continuous learning program for adult population and pursued the following objectives: train the elderly population with skills and resources necessary to benefit from ICT; renew traditional learning and teaching processes for students and teachers; implement social inclusion local policies with an approach involving various actors: schools, elderly centers and other organizations that work with the elderly.

Sliver targeted Target group; Schools ,Elderly Centers, About 1000 elderly, 500 student tutors and 50 teachers . In Europe, one person out of every five is older than 60. By 2050, the number of individuals above the age of 65 will increase by 70%, while those above 80 will increase by 170%. If adequate digital and functional literacy policies are not implemented, the ageing population will widen the digital divide and increase social inequality.

Our research considers European scenario as a significant factor as it holds true for Europe and other developed countries, too. The data on connectivity (Euro stat) and density of connections in Europe (Internet hosts per 1000 residents fromhttp://www.gandalf.it), present significant facts: the percentage of European families

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connected to the Internet in countries such as Romania (30%), Italy (42%) and Spain (51%) is lower than the European average (60%). Project Silver addressed both of these situations by implementing a system approach, which identified an innovative didactic ingredient, a trans/inter-disciplinary and generational element and aimed to solve this new form of illiteracy to contrast the risk of a social and communicative caesura between young and elderly.

In the context of the Community Action Programme for Continuous Learning, Italy, Spain, Romania and Belgium have experimented with a continuous learning programme for adults addressing no less than 100 elderly, 500 student tutors and 50 teachers. Moreover, aimed communication and diffusion activities have been implemented to reach an increasing number of Beneficiaries in every country. A strategic role for the diffusion of this initiative and the involvement of the population off over-sixties has been given to the European Federation of Pensioners and Elderly People .

## 3. RECOMMENDATIONS

Resources should be mobilized to purchase ICT equipment and educational materials. Technological connectivity and infrastructural facilities in educational institutes can be enhanced through the judicious utilization of the resources. The Education sector should be assisted by the scholars to develop ICT curricula at primary, secondary and tertiary level in order to encourage and generate participation in courses like Computer science, multimedia, communications, and engineering.

It is important to impart specific skills to the teachers and trainers in ICT-related subjects. The education sector should be supported by Kenyan central government for initiating such train-the-trainer programs. Opportunities for exposure to technology should be created for the pupilsd/students located in remote areas. Initiating Mobile Internet units to visit various schools, setting up networking academies that supports the institute to design, build and maintain computer networks, developing tele-centers and telephony that would remain operational during and after the school hours can act as an effective mechanism for enhancing technology specific skills forthe students.

Development co-operation seeking to adhere to good-practice principles should consider howICTs can support and enhance practices such as ownership and participation, cooperation and collaboration, and capacity-building. Co-operation with the private sector is particularly pertinent for increasing ICT access, but synergies with other sectors should be sought. Education Curriculum Planning tools – should include an analysis of the role of ICTs in Teaching methodology, delivery services, and seek to put in place a positive enabling proper learning environment.

Work toward the preparation and official international adoption of official computer-based fonts applicable to the educational and business languages of kenya. To ensure the implementation of ICT at the administrative level it is important to cooperate with the public agencies, through which the civil servants can be trained in ICT skills and applications. Public access to information and opportunities can be enhanced through educational radio program; distribution of written materials where appropriate; and establishment of kiosks at public locations (such as airports, ministry departments, and so on).

## 4. CONCLUSION

This research concludes that the role of ICT future learning should be seen in the light of its contribution to emancipation, empowerment and self-fulfillment. Moreover, when innovations and training only affect hiring's or separations, our results suggest that ICT and innovative work practices have a negative impact on older workers as compared to other age groups. Social competence, critical thinking, knowledge sharing and cooperation techniques will become more and more important as we move further into the knowledgeable society. As a result, it is clear that thinking about the future of learning cannot avoid asking the fundamental questions about the objectives of learning (Punie & Cabrera 2006).Training of middle-aged and older workers contributes to the reduction of the rate of turnover among the 40-49 year old group.

Overall, the analysis of employment flows confirm the results obtained when estimating the wage bill share model: ICT and innovative work practices negatively affect the employment prospects of older workers, whereas concentrating training investments on them helps stabilize their share in the wage bill in the next period

## REFERENCES

[1] Aagarwarl, (2005). The information system identify crisis: Focusing on high -visibility and high-impact research, MIS Quarterly, vol.29, no 3.

[2] Aceto, S., Dondi, C. & Kugemann, W.F. (eds.) (2004) "Technologies for the Knowledge Society &
Lifelong Learning. Key Findings & Suggestions for Action", POLE project report MENON Network EEIG, Brussels. http://www.education-observatories.net/eduobs

[3] Aceto, S., Dondi, C. & Kugemann, W.F. (eds.) (2004) "Technologies for the Knowledge Society &
Lifelong Learning. Key Findings & Suggestions for Action", POLE project report MENON Network EEIG, Brussels. http://www.education-observatories.net/eduobs.

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[4] African Virtual University . 2005. Nairobi, Kenya: African Virtual University. http://www.avu.org/about.asp.elearning initiative seeks to enhance the capacity of AVU's partner institutions to develop, deliver, and manage their own programmes.

[5] Age: Firm-Level Evidence", Economic Journal, 116, pp. 73-93.

[6] Analysis based on Individual Data", Labor, 20(2), pp. 325-48

[7] Alan D. Jagolinzer, (2006), Timing of Employee Stock Option Exercises and the Cost of Stock Option Grants, university of Pennsylvania.

[8] Aubert Patrick, Eve Caroli and Muriel Roger, 2006a, " New Technologies, Organization

[9] Barney. (1991). Firm Resources and Sustained competitive advantages, Journal of Management vol. no.17, 1, pp. 99-120.

[10] Bartel A. and Sicherman N, 1993, "Technological Change and Retirement Decisions of Older Workers", Journal of Labor Economics, 11(1), pp. 162-83.

[11] Beckmann M., 2007, "Age-biased technological and organizational change : Firm-level evidence and Management Implications", Discussion Paper n°05/07, Faculty of Business and Economics, University of Basel.

[12] Belleflamme, Paul (2001). Oligopolistic competition, IT use for product differentiation, and the productivity paradox. International Journal of Industrial Organization, 19(10), pp. 227-248.

[13] Dennis Campbell, (2002), Using the Balanced Scorecard as a Control System for Monitoring and Revising Corporate Strategy, Harvard Business School.8.

[14] Dehning B, and Richardson. (2002) Return of Investment Technology: A Research Synthesis, Journal of Information System, 16, 1, pp.7 -30.7.

[15] Dr. Liu Kaiming, Director of the Institute of Contemporary Observation (ICO) in Shenzhen told EICC members at a meeting on August 25, 2010 that city registry rules leave workers "trapped" at their places of employment.

[16] Erik Bryn Olsson, (2010), Assessing Three-Way Complementarities: Performance Pay, Monitoring and Information Technology: NBER

[17] EICC Code of Conduct Review process started in August 2011 and runs through April 2012; the Code of Conduct can be found at http://www.eicc.info/eicc_code.shtml.(EICC, August 2011)

[18] Georgiades, K. (undated, believed 2002) Technology in World Bank Education Projects. To help locate certain types of uses of ICTs within World Bank projects, the World Bank's EDSTATS project features database now highlights eight 'project features' that are ICT-related, based on a manual review of PADs for projects in the Bank's education sector portfolio.

[19] Haegeland Torbjorn, Dag Ronningen and Kjell Salvanes, 2007, "Adapt or withdraw?

[20] Evidence on technological changes and early retirement using matched worker-firm data", Statistics Norway, Research Department Discussion Paper n°509.

[21] India (2012). National policy on information and communication technology (ICT) in school education.

[22] New Delhi: Department of School Education and Literacy Ministry of Human Resource Development , Government of India.

[23] INTERNATIONAL LABOUR OFFICE GENEVA, NOVEMBER 2010, A Skilled Workforce for Strong, Sustainable and Balanced Growth, Copyright ,International Labor Organization(ILO, 2011)First published 2011(ILO, 2011).

[24] International Labor Conference, 97th Session, 2008,Skills for improved productivity, employment Growth and development,ISBN 978-92-2-119489-7 ISSN 0074-6681, First edition 2008

[25] J D Sachs Sachs,March 29, 2013 http://dx.doi.org/10.1016/ S0140-6736(12)62002-9 ,School of International and Public Affairs (P Singh MD) and Earth Institute (P Singh, Prof J D Sachs), Columbia University, New York, NY, USA

[26] Jones, R. (2003). Local and national ICT policies. In: R. Kozma (ed.), Technology, Innovation, and Educational Change: A Global Perspective. pp. 163-194.

[27] Koning Jaap and Arie Gelderblom, 2006, "ICT and older workers: no unwrinkled relationship", International Journal of Manpower, 27(5), pp. 467-90.

[28] Kozma, R. (1991). Learning with media. Review of Educational Research, 61, 179-221.

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[29] Kozma, R. (1994). Will media influence learning: Reframing the debate. Educational Technology Research and Development, 42(2), 7-19.

[30] Kozma, R. (2003) (ed.). Technology, Innovation, and Educational Change: A Global Perspective. Eugene: International Society for Technology in Education.

[31] Liu used the term "new age" to describe those born after 1989. These workers constitute 30 percent of the Chinese ICT workforce.

[32] Liu based his comments on research and surveys he has conducted in more than 500 factories in China (210 of which were in the Pearl River Delta). He presented his findings and recommendations to EICC on August 25, 2010.

[33] Liu reported that only 2% of rural children obtain higher education. See "China Starts Looking Beyond its Era of Breakneck Growth," Wall Street Journal, July 15, 2010.

[34] Michael .M. sanja, Dec, 2013,Impact of Enterprise Resource Planning System in Health Care International Journal of Academic Research in Business and Social Sciences.December,2013,Vol.3,No.12.ISSN:2222-6990,http://dx.doi.org/10.6007/IJARBSS/v3-i12/438.

[35] Manish Kumar, (2008).Management information system, M S Rahmaiah Institute of Technology Bangalore, Faculty member. www.slideshare.net/himanshulove3/management-information-system-1176769.

[36] McKinsey & Company, March 9, 2010. "How to Think About China Differently," by "Research Report on Chinese Migrant Workers," State Council, 2006.

[37] Moreno, J.M, Sosale, S. & Sarna, N. (2006) A Review of ICT Components in World Bank Education Projects (2001-2004)Trucano, M. (2005) ICT Components in World Bank Education Projects;

[38] Municipal Development Programme (MDP) Mr Matovu, Regional Director7th Floor HurudzaHouse14-15 Nelson Mandela Avenue Harare, Zimbbwe

[39] Ms. So Sheung So, Chief Executive of the Labor & Education Service Network (LESN) told EICC members on August 25, 2010 .vocational schools and NGOs.

[40] Nepal (2012). Country report on ICT in education. Kathmandu: Ministry of Education.

[41] Nepal (2013). Government of Nepal Ministry of Education. Information & Communication Technology (ICT) in Education, Master Plan 2013-2017. Kathmandu: Ministry of Education.

[42] OLPC (2010). Plan Ceibal: A Better Designed and Supported XO Laptop Implementation Program:http://www.olpcnews.com/countries/uruguay/plan_ceibal_a_better_designed.html

[43] Quality of Information and Communication Technology (ICT) Components in Bank Projects: A QAG Assessment (2006);

[44] Ronningen Dag, 2007, "Are technological change and organizational change biased Against older workers? Firm-level Evidence", Statistics Norway, Research Department Discussion Paper n°512.

[45] Ronningen Dag, 2007, "Are technological change and organizational change biased Against older workers? Firm-level Evidence", Statistics Norway, Research Department Discussion Paper n°512.

[46] Sanja Franc,2010,globalization, regionalization and information-communication Convergence of Africa, Received: 23. September 2010, Accepted: 29. December 2010,Faculty of Business and Economics, University of Zagreb Zagreb, Croatia

[47] Schleife Katrin, 2006, "Computer Use and Employment Status of Older Workers – An

[48] Schleife Katrin, 2008, "IT Training and Employability of Older Workers", ZEW Discussion Paper n° 08-021.

[49] Spöttl. G and Becker,2004,M ICT practitioner skills and training: automotive industry, Luxembourg: Office for Official Publications of the European Communities, European Centre for the Development of Vocational Training, Reproduction is authorized provided the source is acknowledged(http://europa.eu.int). ISBN 92-896-0306-2 ISSN 1562-6180

[50] Steve E, Alison ,and Christoph S(2006),South African Telecommunications Sector Performance Review 2006,LINK Centre Public Policy Research Paper No. 8,ICT Sector Performance Review 2006

[51] The best discussion of the costs of ICT use in education in developing countries is probably GeSCI. (2008) Deploying ICT in Schools: A framework for identifying and assessing technology options, their benefits, feasibility and total cost of ownership.

©2009-2014 CIS Journal. All rights reserved.


[52] These papers include: Trucano, M. (2010) Quick guide to identifying ICT components in World Bank Education projects

[53] Trucano, M. (2005) Knowledge Maps: ICT in Education; a list of noted research papers on this subject can be found in the Quick guide to some notable studies related to the evaluation and impact of ICT use in education (internal World Bank knowledgebase wiki, last updated 2010).

[54] TOPIC&URL_SECTION=201.html. This project demonstrated and tested the

[55] Tyack, D. and L. Cuban (1995). Tinkering toward Utopia. Cambridge: Harvard University Press.

[56] UN Population Division. (2014). UN Population Division database. New York: UN Population Division. http://www.un.org/en/development/desa/population/

[57] UNESCO (2011b). UNESCO ICT Competency Framework for Teachers. Paris: UNESCO.

[58] UNESCO Bangkok. (2011). ICT in Education in Asia-Pacific. Asia-Pacific Regional Forum on ICT Applications 19 May 2011.

[59] UNESCO Bangkok. (2012). Asia Pacific Ministerial Forum on ICT in Education 2012. Bangkok: UNESCO Bangkok.

[60] "UNESCO Preparing Standards for Integrating ICT into Teaching." November 1, 2006. ICT in Education.http://portal.unesco.org/ci/en/ev.phpURL_ID=23023&URL_DO=DO_TOPIC&URL_SECTION=201.html.

[61] UNESCO initiative designed to develop a common core syllabus defining various ICT competency skills for teachers that professional development providers can use to prepare learning materials is nearing completion.n"UNESCO to Sponsor Pilot Satellite Distance Learning Course on Telecasters in Africa." May 2004.

[62] UNESCO Daily News Service. http://portal.unesco.org/ci/en/ev.php-URL_ID=13920&URL_DO=DO_

[63] United Nations (2000). United Nations Millennium Declaration. United Nations General Assembly, Resolution A/RES/55/2, 18 September 2000.

[64] UNESCO(2003)cross-cutting. project on e-Governance Capacity Building http://www.unesco.org/webworld/e-governance

[65] United Nations (2012). Millennium Development Goals. http://www.un.org/millenniumgoals/global.shtml

[66] Willms, John Douglas (2006). Learning Divides: Ten Policy Questions About the Performance and Equity of Schools and Schooling Systems. UIS Working Paper No. 5. Montreal: UIS.

[67] World Bank (2010). Information and Communication Technology for Education in India and South Asia (Volume 1), Extend summary. Washington.D.C.: InfoDev/ Price Water House Coopers.