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Access to ICT in Communicating and Disseminating the Socio-Economic Needs: A Case of Andhra Pradesh and Telangana

Shaheen*, Anantha Kumar KandarpiVittal**
***Assistant Professor, Institute of Public Enterprise, Osmania University Campus, Hyderabad**
****Assistant Professor, Institute of Public Enterprise, Osmania University Campus, Hyderabad**
Corresponding Author Email Id:shahmsc@ipeindia.org

Dr. Mishra has studied, researched and taught at the University of Rajasthan, London Business School, SDA Bocconi, University of Bradford, International Center for Promotion of Enterprises. He is a Visiting Professor at Maison Des Sciences De L' Hommes, Faculty of Economics University of Ljubljana, and UiTM, Malaysia. Handled assignments from UNDESA; OECD; ADB; Cabinet Secretariat, GoI; Commonwealth Secretariat; various ministries of GoI; state governments and public enterprises. He has guided doctoral research and taught at the MBA programmes in several universities in India and abroad. His areas of interest include Corporate Governance, Corporate Social Responsibility, Enterprise Management, and Public Policy.

Dr.Shaheen is currently an Assistant Professor in the Faculty of Information Technology at the Institute of Public Enterprise in India. She received her Bachelors Degree in Computer Science from Kakatiya University and Post Graduate Degree in Computer Science from Osmania University. She is awarded Ph. D. (CSE) from AcharyaNagarjuna University for herthesis on "Half Logistic Software Reliability: Two Step Approach".

Shaheen**,** a statistician by interest and technocrat by qualification has 10+yrs of research experience. Her research activities are twofold: first research activity is related to monitoring software reliability using Statistical Process Control techniques while second research theme is related to Data Science and its applications.

Dr. K.V Anantha Kumar,BE, MBA ,was awarded Ph.D for his research work on "Marketing Strategies of Life Insurance Corporation of India- A comparative study".He has put in more than 18 years of experience in teaching Quantitative and Marketing papers for Post Graduate students.He has participated and presented papers in number of conferences and has publications to his credit. Dr.Ananthhas been on the editorial board of "DRISHTIKON: A MANAGEMENT JOURNAL".His areas of Interest include Micro Insurance, Customer Relationship Management and Evaluation Studies. His expertise also lies in coaching for National Level Competitive exam.

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Abstract

Several cities across the globe have been making efforts towards developing smart cities, while this concept is evolving and progressing in India.Information and communication technologies (ICTs) in several fields such as economy, environment, mobility and governance transform the way in which cities organise policymaking and urban growth.In contemporary India, with the digital divide and diversity, the novel Information and Communication Technologies facilitate easier creation, communication, dissemination and management of information.Emerging trends of ICT revolutionised the development process by influencing its manifold dimensions in meeting the social and economic needs of the society. In the backdrop of these developments, this article discusses the potential of most enthralling phenomena ICT technologies, majorly the internet and mobile telephony which facilitate low cost, speedy communication and dissemination of information and its impact on improving the education and healthcare issues confronting the Nation. It also discusses the key benefits and challenges of integrating ICT in education and healthcare.In this context, this research study attempts to expel various roles of ICT, fosters to generate new knowledge with positive impact on social and economic development that will better serve socio-economic challenges.

Keywords

Information and Communication Technologies; ICT in education and health; socio-economic challenges

Research Highlights

The present study attempts to understand and explore the effectiveness of ICTs towards addressing socio-economic development needs in the States of Andhra Pradesh and Telangana.

The results of the present study indicate the following:

- Majority of the respondents perceived that few technologies like desktop computer, internet access, and mobile connectivity are accessible at their respective educational institutes. However, modern ICT infrastructure is limited in their access because of the cost associated with it.
- There is an increasing recognition for continuous learning opportunities through innovative platforms tailored to the individual schedules of the student community.
- MS Office, discussion boards/ interactive whiteboards, internet/ youtube videos, and computer based assessments are majorly preferred ICT media by teachers.
- ICT integration in teaching has a positive impact on learning process and outcomes.
- Willingness of teachers to adopt new technologies and embracing new learning models is essential.
- ICT usage in curriculum delivery will mitigate the challenge of stumpy student listening skills thereby enhancing the quality of learning and student engagement.
- Urban respondents appreciate ICTs usage in delivering health services over rural respondents because of the ease of availability of latest technology. Awareness programs can be undertaken for creating "Digital mind set" and make them understand entire platform of services built around ease of use.
- Success of curriculum delivery is associated with availability of modern technological equipment.
- Respondents perceive ICTs to be social acceptable, affordable and reliable.
- Improvement in communication is the most efficient predictor of e-health services and solutions.
- Lack of computer knowledge and technology availability, denial of internet access, difficulty in integrating technology hinders the progress of e-health services.
- Highly recommend to develop interventions, apps and tools that make patients less stressed and more productive.

Introduction

Information and Communication Technologies (ICTs) are pivotal for globalization of higher education since early 1990s.(MOSPI2010)[1] in its report emphasizes that the degree of contribution of the ICT to economies and societies vary according to their stage of development (developed, developing or underdeveloped), nature of political economy, availability of appropriate complementary infrastructure, etc. It also states that, irrespective of these inherent differentials, ICT acts as a catalyst of change, which reduces the socio-economic and political inequalities between rich and poor, educated and uneducated, rural and urban, and men and women across all countries.(TahirHameed2007)[2], in his paper has made it

[1]MOSPI Report.(2010). Value Addition & Employment Generation in the ICT Sector in India.Ministry of Statistics & Programme Implementation.National Statistics Organization.Central Statistics Office.Government of India.

2TahirHameed. (2007). ICT as an Enabler of Socio-economic Development.School of Engineering, Information and Communications University. pp. 305-732.

imperative that usage of ICTs for business activities enables faster access and enhanced productivity thereby resulting in integrated socio-economic development which is affordable, accessible, and relevant. According to (Sylvester OziomaAnie2011)[3] ICT acts as a catalyst and it has positively contributed to the socio-economic development in Nigeria and West African countries.(NeveedBaqir et al. 2011)[4]examined the role of ICT in the socio-economic development of the nation thereby concluding that ICT has the potential to affect many aspects of economic and societal activity such as employment,productivity, education, and healthcare etc. (Schaefer-Preuss 2011)[5] in his opening remarks at the Information and Communication Technology week in Manila, states, technology as a propellant. Integrating ICT components in socio-economic development strategies, especially in education, health, agriculture and employment transforms the landscape of social and economic development.It is argued that focus should be on the processes of ICT in teaching and learning rather than on the end product (Pedro 2001)[6].Pedagogical issues, organisational and human development aspects must be efficiently linked, which play a more effective role in teaching and learning in Norwegian higher education (Bjorn Stensaker et al. 2007)[7].(SalehiandSalehi2012)[8]submits that integration of new ICT infrastructure is still in its infancy in comparison with the use of older technologies such as radio and television, due to the limited infrastructure of ICTs and the high costs of access to internet in developing countries. Several studies claim that using ICT improves education and provides more teaching and learning supports for the teachers and learners (Young 2003; Salehi&Salehi 2011; Yunus, SalehiandChenzi 2012)[9].According to (Suggs 2006)[10], use of ICTs is growing in many areas of health communication, including consumer, patient, and provider education; decision and social support; health promotion; knowledge transfer; and the delivery of services.(Martinez et al. 2001)[11] in their paper elaborate on the nascent stage of the approaches implemented, with insufficient studies to establish their relevance, applicability or cost effectiveness.According to several studies

3 Sylvester OziomaAnie (2011). The Economic and Social Benefits of ICT Policies in Nigeria.Library Philosophy and Practice (e-journal).Page 457.ISSN 1522-0222.

4Baqir. M. Neveed. Palvia.Prashant.Nemati.Hamid.and Casey. Kathleen. (2011). Defining ICT and Socio-economic Development. AMCIS 2011 Proceedings.Paper 364.

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Salehi.H. and Salehi.Z. (2011).Washback Effect of High-stakes Tests on ICT Usage: Teachers' Perceptions. Australian Journal of Basic and Applied Sciences.5(12). PP. 1976-1984.
Yunus. M. M. Salehi. H. and Chenzi.C. (2012).Integrating Social Networking Tools into ESL Writing Classroom: Strengths and weaknesses.English Language Teaching.5(8). PP. 42-48. http://dx.doi.org/10.5539/elt.v5n8p42.

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integration of technology into healthcare has created both advantages and disadvantages for patients, providers, and healthcare systems alike (Stefane 2010)[12], (Kendall Ho. 2008)[13], and (Myers M. R. 2003)[14]. On reviewing the anecdotal evidences from past years, they suggest lack of adequate security measures resulting in numerous data breaches, leave patients exposed to economic threats, mental anguish, and possible social stigma (Health Privacy Project 2007)[15]. According to (Hasan and Yurcik 2006)[16], disclosure of medical data is the second highest reported breach and the patients concern. (Aqil Burney et al. 2010)[17] in their paper review the role of ICT in health care and submits that significant shortage of resources both financial as well as trained human resource are the limiting factors for the adoption of these sophisticated systems. They also suggest stringent guidelines for an effective healthcare policy encourage PPPs for implementing high-tech patient management systems, develop hardware and software standards to integrate different components to operate systematically and smoothly to name a few.ICT development is a strategic issue for India but does not benefit all of its population (AlexandreGrondeau 2007)[18]. (Ramachandraiah 2003)[19] in his research paper emphasises the need to move away from electronic development to information centred approach integrated with development objectives. He also laid emphasis for a greater thrust in the policy framework in Andhra Pradesh towards making IT an enabler and equaliser in opportunities and development.

It is supported by the literature that ICTs have entered the lives of citizens majorly in administrative tasks at educational institutes and healthcare organizations, but not in instructional tasks. Studies in the literature review pointed out that, ICTs are seemingly essential to achieve good governance that is vital for sustainable development.

Present Study

The prime objective of this research paper is to assess, identify, and explore effectiveness of Information and Communication Technology (ICT) towards addressing social and economic development needs with emphasis laid on education and health indicators. The present paper also focuses on the factors perceived apparently to impinge on effective usage of ICT in communicating and disseminating the socio-economic needs. It also identifies the areas that are fundamental for advancement of knowledge and relevant for immediate implementation such as cell phones, wireless technologies and applications those make computing affordable, accessible and relevant. Finally, it examines stable, sustainable models of trusted infrastructure provision and suggests authentic

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18 AlexandreGrondeau. (2007). Formation and emergence of ICT clusters in India: the case of Bangalore and Hyderabad. GeoJournal.Vol. 68. No. 1, pp. 31-40.

19 Ramachandraiah C. (2003). Information Technology and Social Development.Economic and Political Weekly.Vol. 38.No. 12/13.pp.1192-1197.

governance and sustainability ICT principles and strategies. Based on the objectives of the research study the following questions are attempted in this research paper:

1. What technologies are currently in place in delivering the education and health needs?
2. What is the level of access to ICT infrastructure in communicating and disseminating the education and health needs?
3. What are the perceived barriers to impinge effective usage of ICT in delivering its services?
4. What are the perceived benefits of ICT for immediate implementation?

Methodology

Residents of Andhra Pradesh and Telangana States form the universe of the study.Cross-sectional study is undertaken to assess the effectiveness of ICT and its role in improving the Socio-Economic needs. Study population is selected, using purposive sampling technique keeping in view the specific objectives of the study and operational feasibility. For collecting primary data, two sets of exhaustive structured questionnaires in English are administered o the participant's in order to measure the socio-economic needs. Care was taken to ensure that respondents from diversified financial and educational backgrounds are included. Respondents include136youth from states of Andhra Pradesh and Telangana,who are pursuing/ completed their higher education in last 5 years and visited healthcare facility in the past one year. Questionnaire included three sections, which measured ICTs relevance to education and health sectors. Section I consisted of demographic information dealing with gender, age, marital status and area of domicile of the respondent. Section II included tasks eliciting the views of the respondents towards the use of ICTs for educational purposes(kind of ICT used by teacher in the classroom, extent of integration of ICT in teaching delivery, measuring learning process outcomes, effectiveness of quality learning etc.). Section III brings forth the views of the respondents towards e-health (view on e-health communities, impact of e-health socially and financially, affordability, usefulness in health care delivery etc.).The demographic information collected through the survey conducted by administering questionnaire forms has been evaluated and tabulated in Table 1.

Demographic Information		**Total**	
		Frequency	**Percent**
Age	≤ 20 years	76	56
	20 – 30 years	49	36
	≥ 30 years	11	8
Gender	Male	80	58.4
	Female	56	40.9
Marital Status	Married	84	62
	Unmarried	52	38
Area of Domicile	Rural	42	30.7
	Urban	94	68.6

Table 1: Demographic Information of the Respondents

Data Collection and Analysis

For the purpose of this publication, only information relating to the responses of direct relevance to the present research questions is reported. In this study the responses collected through primary survey are summarized, analyzed and reported without taking any view on them. Primary data collected are coded and statistically analyzed using SPSS software version 21 for windows. For the categorical/ qualitative variables, percentages and proportions are estimated. The extent to which the independent variables influence the dependent variable also is analyzed, using appropriate statistical tools like chi-square test, ANOVA, and binary logistic regression etc., thereby drawing meaningful interpretations.

Limitations

Although, this study is carefully accomplished, it is not devoid of inherent shortcomings. The responses are restricted to youth who are pursuing/ completed their higher education in last 5 years and visited healthcare facility in the past one year. This study is limited only tofew areas of Andhra Pradesh and Telangana States. Keeping in view the time and budgetary constraints, the sample size is restricted to only 136respondents as against 70.4% of provincial population with 34,776,389 occupants and 29.6% of urban population with 14,610,410 people in Andhra Pradesh and 35,193,978 (2011 census)total population in the State of Telangana.

Findings

Educational Conditions in Andhra Pradesh and Telangana

Notional belief is that good quality education is highly appropriate for providing employment and thereby improving the quality of life, level of individual & family well being and the access to basic social and financial services. The role of ICT in education is changing the ways and the speed of acquiring information in this fast changing societies and sectors.

The focus of this section is on developing indicators, gathering and analysing data on students' use, competence, and attitudes towards ICT. Teacher's influence, school/ college's impactand the success factors using ICTs in education are the other factors investigated in this module.In this section, educational conditions and the participation of residents of AP and Telangana States on various indicators (educational levels, access to ICT infrastructure, quality of infrastructure available, etc.)are recorded and analyzed. The main areas of investigation are:

1. What is the quality of physical and technological infrastructure available in your college?
2. Is usage of ICT effective in training and learning in/ out of the classroom?
3. What is the teachers' attitude and competency in adopting ICT pedagogy?
4. What is students' perception of digital learning?

Task 1: Quality of Physical and Technological Infrastructure available in higher education Institutions

The purpose of this question is to assess the availability of ICT infrastructure in higher education institutionsof Andhra Pradesh and Telangana States.

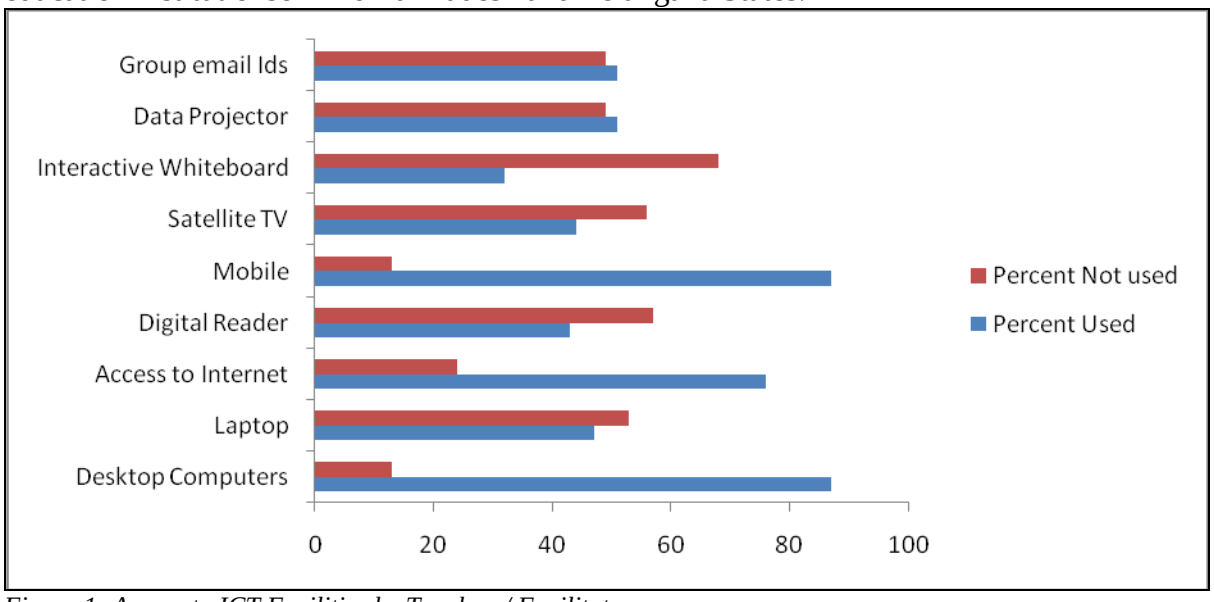

Figure 1: Access to ICT Facilities by Teachers/ Facilitators

Data depicted in Figure 1 reveals that higher education institutions use ICT for teaching. Fully 87 per cent of the respondents surveyed confirmed the availability of the desktop computers, 76 per cent access to internet and 87 per cent mobile access. Nearly half of the surveyed respondents report their Institutions have limited access to latest infrastructure (digital reader, satellite TV and interactive whiteboards) because of the limited exposure teachers/ facilitators have towards its usage. Results signal increasing recognition among student community for continuous learning opportunities through innovative platforms tailored to their individual schedules.

Task 2: Usage of educational multimedia during teaching delivery

New pedagogy for curriculum delivery is on rise. An attempt is made to measure the competency level of the teachers and their attitudes in adopting ICT pedagogy in curriculum delivery.

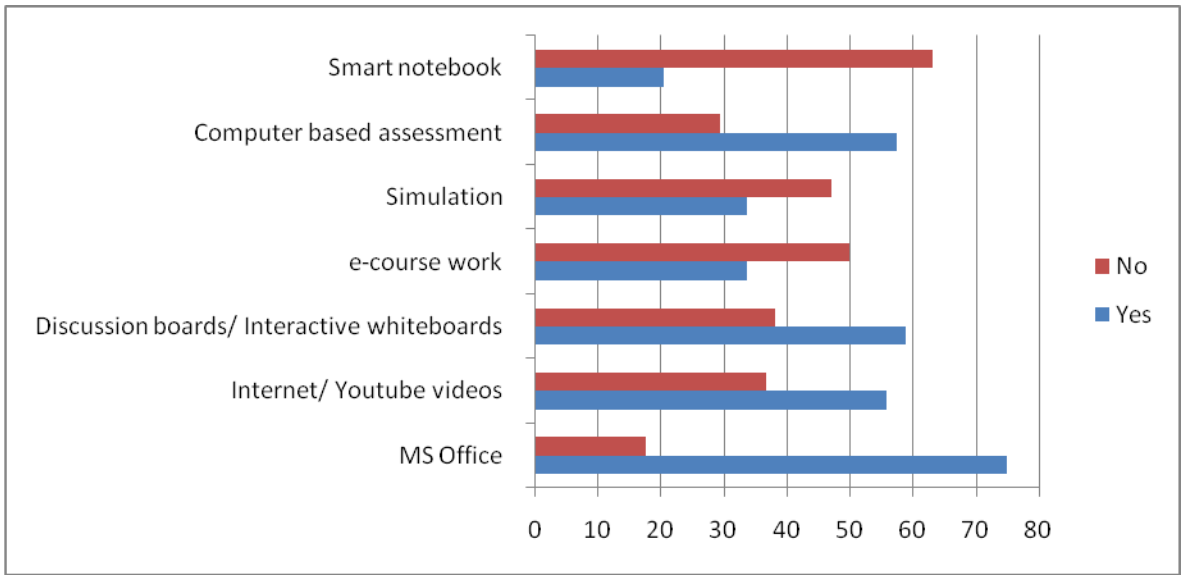

Figure 2: Teachers Attitude and their Competency in Adopting ICT Pedagogy

Data presented in Figure 2 reveals that MS Office, discussion boards/ interactive whiteboards, internet/ youtube videos, and computer based assessments are majorly preferred ICT media by teachers. Data reveals that smart notebooks, exposure to simulations, and assigning e-course work are least implemented/ preferred because of the high cost associated with the infrastructure and non-availability of latest technologies in the institutions.

Task 3: Impact of ICT Integration on Teaching, Learning Process and Outcomes

Chi-square method is used to test the impact of ICT integration on learning process and outcomes. The model results are depicted in Table 2. Our findings suggest that ICT integration has a positive impact on the learning process and outcomes and there is a need to raise the integration of ICTs with teaching in terms of rigor, evidence and more scientific approaches. This is likely to involve training teachers with the latest available ICTs for curriculum delivery. Willingness of the teachers to adopt new technologies and embracing new learning models is equally essential.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	123.854[a]	6	.002
Likelihood Ratio	107.238	6	.000
Linear-by-Linear Association	66.329	1	.000
N of Valid Cases	136		

Table 2: Impact of ICT integration on learning outcomes

Task 4: ICT incorporation in curriculum and its Effectiveness in Quality Learning

Chi-square method is used to test the association between ICT incorporation in the curriculum and its effectiveness in quality learning. Our findings suggest that ICT usage in curriculum delivery results in enhanced learning quality and the results are significant as presented in Table 3.Incorporating innovative and advanced technologies in curriculum delivery will enable in mitigating the challenge of stumpy student listening skills thereby leading to a high level of student engagement.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.998[a]	6	.043
Likelihood Ratio	16.057	6	.013
Linear-by-Linear Association	.074	1	.785
N of Valid Cases	136		

Table 3: Impact of ICT integration on learning outcomes

Task 5: Success of curriculum delivery is associated with availability of latest ICT infrastructure

1. The explained variation in the dependent variable based on our model ranges from 28.1 per cent to 38.1 per cent.
2. The Wald test ("**Wald**" column) is used to determine statistical significance for each of the independent variables. Results show that digital reader (p = .011) and group email IDs (p = .033) added significantly to the model/prediction, whereas the other variables desktop computer, laptop, access to internet, mobile, satellite TV, interactive whiteboard and data projector did not add significantly to the model.
3. **Variables in the Equation** table on applying binary logistic regression enables in predicting the probability of an event occurring based on a one unit change in an independent variable when all other independent variables are kept constant. Table shows that the success of curriculum delivery is greater if interactive whiteboards (13.486 times) and data projectors (19.6 times)are made available in the higher education institutions.
4. A logistic regression was performed to ascertain the effects of availability of latest ICT infrastructure (desktop computer, laptop, access to internet, digital reader, mobile, satellite TV, interactive whiteboard, data projector, group email IDs) on the rate of success in curriculum delivery. The logistic regression model was statistically significant with $\chi 2$ = 34.6 and$p$< .0005. The model explained 38.1% (Nagelkerke*R square*) of the variance in success of curriculum delivery and correctly classified 71.0% of cases. Availability of latest ICTs like whiteboards and data projectors is associated with an increased success rate in curriculum delivery.

Healthcare Status in Andhra Pradesh and Telangana

Health is one of the most important indicators for human development and social well being of an individual or a household. Improving the health of individuals and/or communities, strengthening healthcare infrastructure, disease prevention and detection are crucial to the economic and social development of an individual and a nation. ICT is widely used in health care management. Although there are many ICT solutions available like electronic patient records, electronic health records, telemedicine and remote diagnostic support, Facilitated collaboration and cooperation, Dietary management, Management of logistics of patient care, Disease surveillance management, Clinical data exchange, Improved efficiency etc., they are neither well known nor much preferred/ used in rural areas of India.

Against this backdrop, this present module focuses on examining the factors perceived to influence the use of ICT in healthcare delivery, and records data pertaining to accessing e-health solutions, facilities and equipment available, services provided by the clinic/ hospital, quality of healthcare services, clinics/ hospitals competence in handling sophisticated infrastructure, and also individuals' awareness levels to ICT etc. The main areas of investigation include:

1. What is the level of understanding on e-health solutions?
2. What are the perceived benefits and barriers to ICT implementation in rural healthcare centres?
3. What is the level of access to ICT infrastructure?
4. What are the perceptions on the quality of physical and technological infrastructure available to the patients?

Task 6: Area of Domicile and respondents level of understanding of e-health solutions

This sub-question presents the views of respondents based on their area of domicile and their level of understanding of the e-health solutions.

Level of Understanding e-health Solutions	Areaofdomicile		Total
	Rural	Urban	
Excellent	6	10	16
Good	22	58	80
Average	12	24	36
Poor	1	1	2
Very Poor	1	1	2
Total	42	94	136

Table 4: Area of Domicile vs. Level of Understanding of e-health Solutions

The respondents of the study are asked to ascertain their level of understanding of e-health solutions against their area of domicile. ICT usage to access e-health services is equally prominent in both rural and urban households as presented in Table 4.However, urban respondents have appreciated ICTs usage in delivering health services more than rural respondents because of the availability of latest technology at ease.

Task 7: Area of Domicile against Acceptability of e-health Solutions

This sub-question presents the views of respondents on the level of acceptability, quality of services rendered and reliability of the e-health solutions depending on the location of their dwelling units.As shown in Table 5, these factors are analyzed using percentage analysis.

	Socially Acceptable	Quality	Reliable	Affordable	Compatible	Useful	Satisfactory
Strongly agree	30	30	36	24	23	40	30
Agree	67	54	56	75	66	59	58
Neutral	20	44	30	24	34	32	36
Disagree	15	5	12	13	13	5	11
Strongly Disagree	4	3	2	0	0	0	1
Positive Responses	86%	94%	90%	90%	90%	96%	91%
Negative Responses	14%	6%	10%	10%	10%	4%	9%

Table 5: Respondents views on e-health Solutions

The responses of the study disclose that acceptance of ICT for delivering health services is socially acceptable, reliable, affordable, compatible, useful, satisfactory and quality of services are appreciated. High positive percentages for these factors indicate therespondent's preparedness to adopt latest technologies for health services.

Task 8: e-health indicators for its acceptance by society

This sub-question presents the views of respondents and their level of understanding of the e-health solutions.

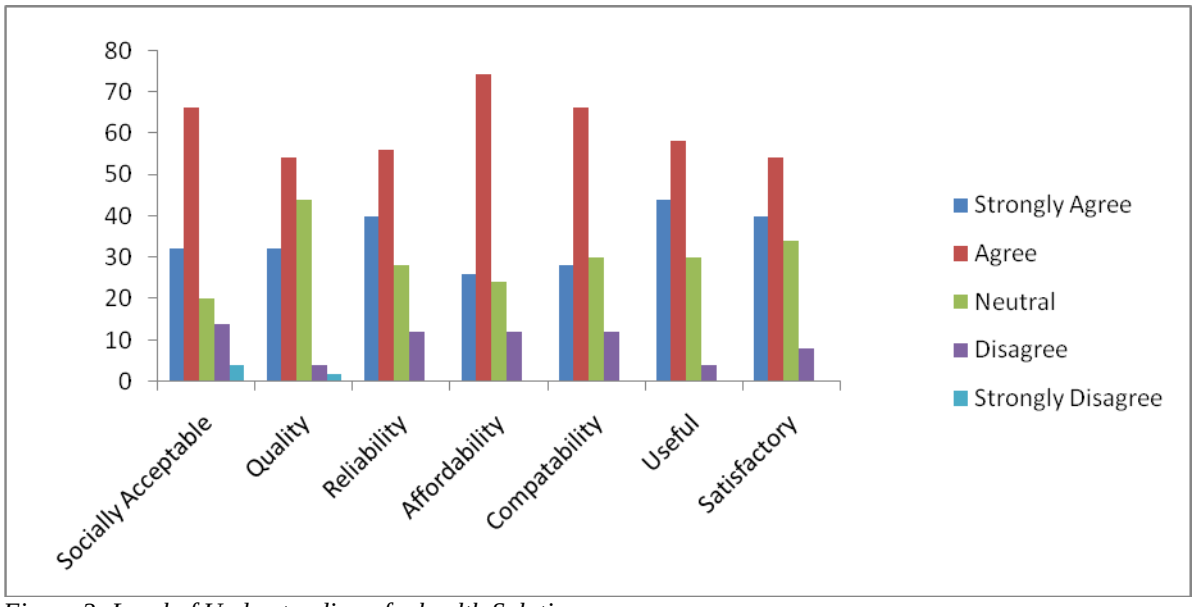

Figure 3: Level of Understanding of e-health Solutions

As depicted in Figure 3, majority of the respondents are of the view that ICTs should be affordable, compatible, socially acceptable, useful, and reliable not compromising the quality of the services provided. These results are impressive statistically and also confirm what we already know from the theoretical perspective.

Task 9: Perceived benefits and barriers to ICT implementation

An attempt is made to present the perceived views of respondents on the positive impact and limitations of e-health solutions. It also reviews how ICT implementation results in reduced operating costs of clinical services from the data collected.

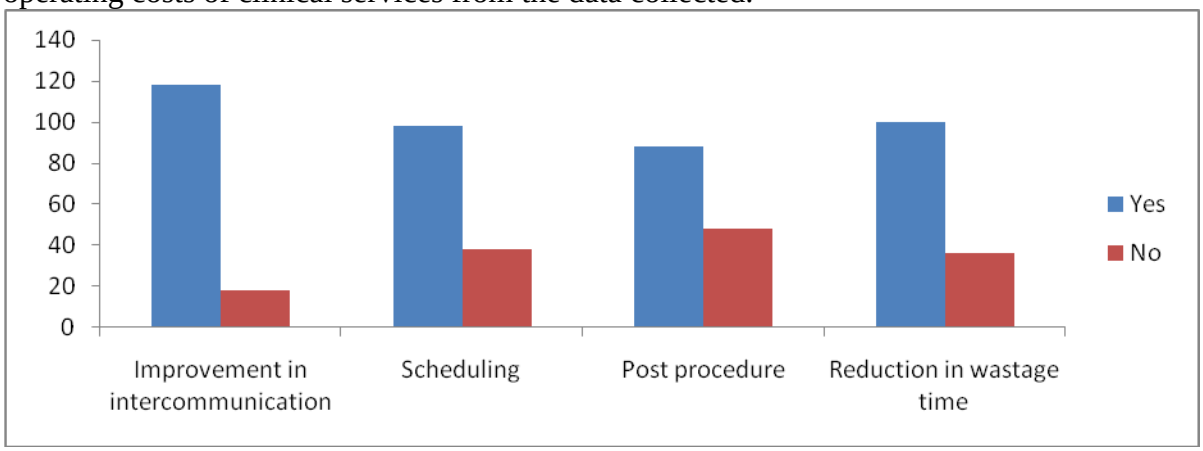

Figure 4: Perceived Benefits of ICT Implementation in Delivering e-health Services

On analyzing advantages of e-health services through its four predictors (improved communication, improved scheduling of appointments, improved follow-up and reduction in waiting time) improved communication is the most efficient predictor of e-health services. The graph depicted in Figure 4 shows hopeful signs and majority of the respondents are comfortable in embracing new e-health services provided through ICTs.

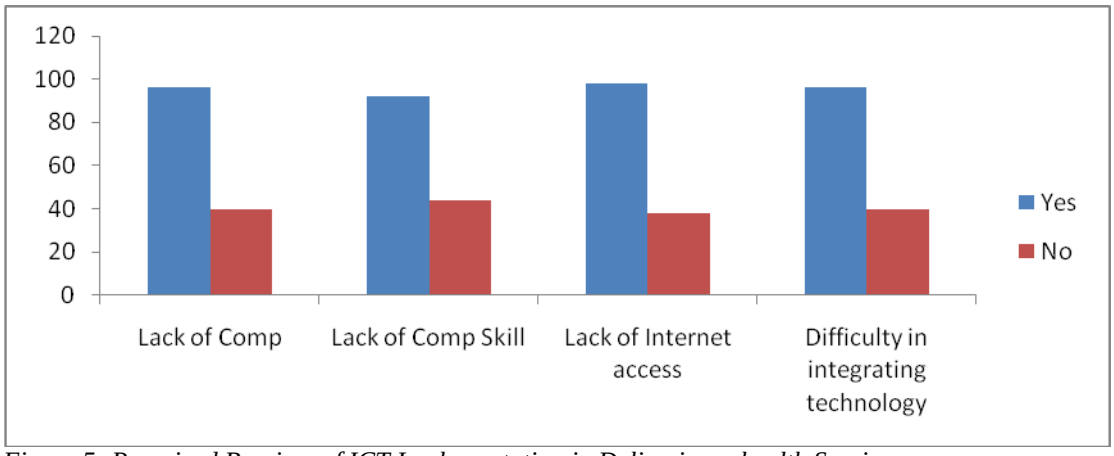

Figure 5: Perceived Barriers of ICT Implementation in Delivering e-health Services

Medical units still face tremendous challenges in realizing their vision of providing e-health services 24/7 at the door step of the individual. Though data shows a marked and steady improvement in utilizing e-health services, this survey also aimed at examining the limitations of e-health services through four predictors namelylack of computer equipment, computer skills, denial of internet access and difficulty in integrating technology. All the four predictors have nearly equal prominence as indicated in Figure 5. It is noted that there is a need for upgrading the skills, and capabilities of the patients by training and supporting them in accessing e-health services. Patients are struggling to deal with complicated technologies, grappling with demanding processes resulting in stress levels. Instead of building complicated processes, it is highly recommended to develop interventions, apps and tools that make patients less stressed and more productive.

Task 10: Level of understanding of e-health services and its affordability

It investigates level of understanding of e-health services and measures the frequency of its usage with specific reference to affordability.

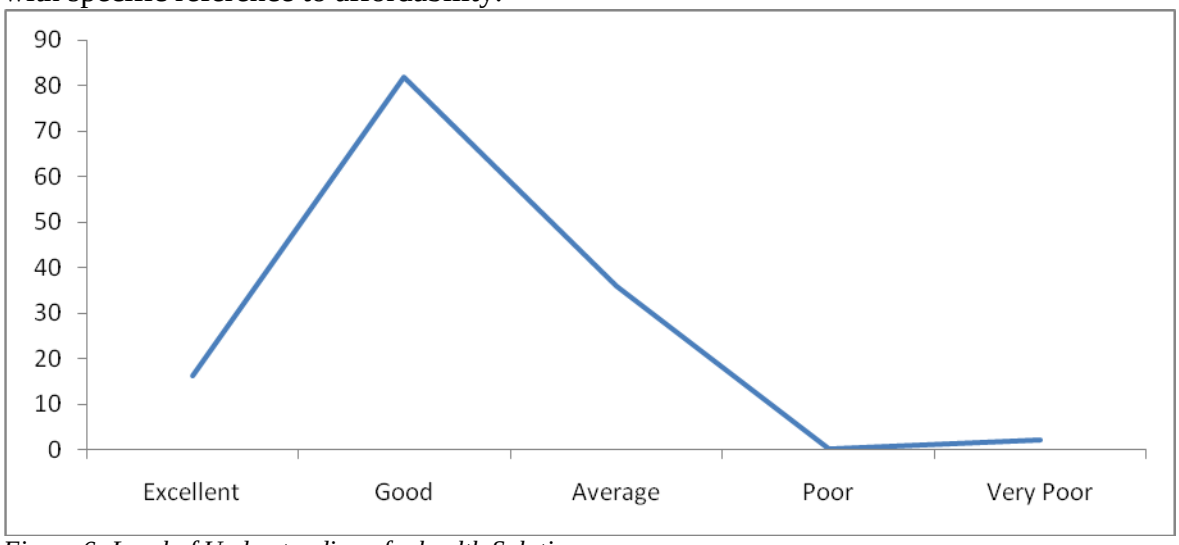

Figure 6: Level of Understanding of e-health Solutions

Analysis of data as presented in Figure 6indicates that respondents have fair level of understanding of e-health services and the frequency of usageis significant.Though practice is significant, it is recommended to offer e-health services at affordable prices so that it is accessible to all income groups. Awareness programs have to be undertaken for creating "Digital mind set" and make them understand entire platform of services built around easeof use.

Task 11: The following factors (quality, reliability, affordability, compatibility, usefulness and affordability) are positively associated with the readiness of a patient for e-health solutions

A logistic regression was performed to ascertain the factors that have a positive impact on an individual's readiness for e-health solutions. The logistic regression model was statistically significant with $\chi 2 = 10.586$ and $p < .0158$. The model explained 18.6 per cent (Nagelkerke*R square*) of the variance in patience readiness for accepting e-health solutions and correctly classified 86.8 per cent of cases. Results show that compatibility, usefulness and level of understanding of ICTs added significantly to the model/prediction while affordability and quality have a less significance.

Conclusion and Way Forward

ICT based solutions facilitate in meeting both the current and future challenges with special reference to education and healthcare sectors. Figure 7depicts the benefits of ICT in these sectors with special reference to states of Andhra Pradesh and Telangana. The list is only indicative not illustrative.

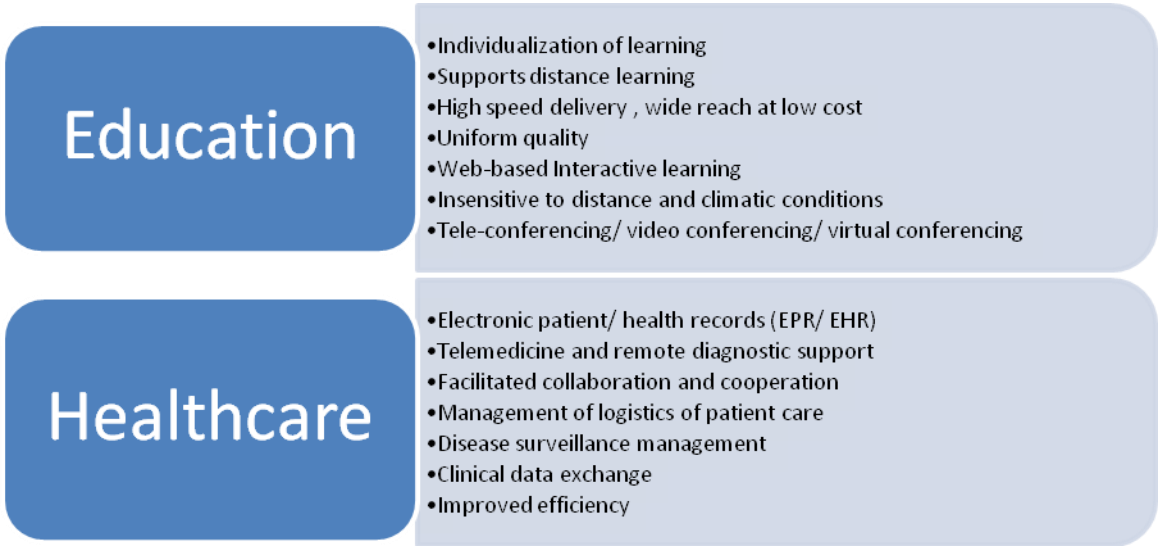

Figure 7: Fields of Applications of ICT Technologies

However, shortcomings are also reported across the sectors. Inspection of structural and psychological factors, seem to impose some restrictions on effective use of ICT applications majorly in rural healthcare services. Furthermore, ICT related shortcomings need to be given special attention by improving basic infrastructure, strengthening knowledge domains, organizing training programs and formulating policies for technology support.The rapid progress in future demands of health care requires intensified cooperation and strong networking of stakeholders.The key challenges of ICT integration into educational system relates to policy, conception, planning, implementation, capacity building and financing. ICT integration in education should correspond with the teacher's professional development. For effective ICT integration, management of the educational institutions must be competent and have a thorough understanding of the technical, academic, financial, and social dimensions of ICT usage in education sector.Extensive potential of ICTs to generate employment for young people cannot be realised unless a country has a range of supporting strategies in place, including an enabling environment.

Overcoming the above mentioned challenges will help education and healthcare systems benefit the most from this technology.As a suggestion for future studies, secondary data and on-field observations could also be included along with administering questionnaires and conducting personal interviews which can be utilized to triangulate the obtained data for carrying out extensive research and have more valid and reliable data.

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