



Integration of ICT in School Education: An Analytical Study in Burdwan District in West Bengal, India

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Abstract

This paper attempts to analyse the role and performance of Information and Communication Technology (ICT) in enhancing quality of school education in Burdwan district in West Bengal. The study covers 65 senior secondary schools encompassing 100 respondents of West Bengal. It has proven that adoption of ICT as a strategic management tool is a welcome sign for all the surveyed schools. The study result indicates that ICT was successful in predicting the future of new technology for the purpose of teaching-learning and transaction of curriculum and thereby enhancing quality of education. The 'Kendell's Coefficient of Concordance' shows a significant association between ICT and quality of education. The study result revealed a close association among the factors like 'relative advantage' of ICT and quality of education. It is interesting to note that no gender disparity exists of effects of ICT on quality of education. However, the magnitude of quality of education lies in its ability to organize ICT through establishment of proper infrastructure in the school. This study also showed how ICT has received extensive recognition as a strategy for upgradation of quality of education through acquired relative advantage, compatibility, demonstrability and image by overcoming the factors avoidance and complexities of new technology (ICT).

Keywords: ICT, concordance, new technology, quality of education.

Introduction

Education is considered as the keystone in each and every society. The development of any country depends largely on the quality of education. India is no exception. The ancient education system of India was primarily based on the 'Gurukul System'. But now-a-days Indian education has undergone various stages from the vedic age to the post independence period. Modern education is not restricted within the classroom. The recent development of technology has brought out the whole world outside the classroom. Information and Communication Technology (ICT) plays a crucial role in this respect. It is treated as the integral part for educational reforms and innovations at secondary and higher secondary level schools¹. The National Policy on Education (1986), as modified 1992, stressed upon employing educational technology to improve the quality of education. The policy statement led two major centrally sponsored schemes, namely, Educational Technology (ET) and Computer Literacy and studies in School (CLASS) paving the way for a more comprehensive Centrally sponsored scheme- Information for a more communication Technology (ICT in short) of schools in 2004.

ICT stands for information and communication technologies and are defined, for the purposes of this primer, as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." These technologies include computers, the Internet, e-mail, web based PC, Mobile phone, wireless sets, projectors, interactive boards, broadcasting technologies (radio and television) and different

interactive boards². Thus ICT is a system that gathers different information or data to communicate over some distance with the help of modern technology. The integration of ICT into education has been assumed as the potential of the new technological system. ICT is not only the backbone of the Information Age, but also an important catalyst and tool for inducing educational reforms that change our students into productive knowledge workers³.

It is generally argued that knowledge obtained by the students is formal and the level of grasping new concepts is very low. Therefore, we are facing a potentiality of application of ICT and thinking of how this alarm situation could be improved society's educational systems as constructivist's theory both teachers and students develop the necessary knowledge and skills sought in this digital age. Hence, most countries around the world are focusing on approaches to integrate of ICT in learning and teaching to improve the quality of education by emphasizing competencies such as critical thinking, decision making, and handling of dynamic situations, working as a member of team, communicating effectively⁴. Several studies have been conducted by different educationists^{3, 5-13} to evaluate the role of ICT on quality of education in secondary and higher secondary levels. All these studies though touched upon the issue of ICT in education, however to our knowledge no comprehensive attempt has yet been made to make the impact assessment of ICT in school education. An attempt has been made in this paper to analyse the impact of ICT in the enhancement of quality of school education in Burdwan district in West Bengal. For the sake of convenience, the whole paper is divided into four

sections. Section-I explains the objectives, hypotheses, materials and methods; section- II analyses the conceptual framework of the study; section – III includes results and discussion where as conclusion appears in section IV.

Objectives: The following objectives are formulated in our study: i. To find out the impact of ICTs in school education. ii. To compare the views of teachers educator regarding effect of ICT in improving quality of education. iii. To examine any disparity exists among male or female students about the applicability of ICT in school. iv. To suggest the best possible outcome regarding effectiveness of ICT in school education.

Hypotheses: The present study indented to examine the role of ICT on the quality of education of Burdwan district in West Bengal. For this, the hypotheses can be framed as follows: i. ICT has a tremendous potentiality to enhance the quality of education in secondary level. ii. There is no gender disparity exists about the role of ICT on education.

On the basis of above two hypotheses the specific hypothesis is H_0 : There exists no association between ICT and quality of education. The alternative hypothesis can be written as H_1 : There exists significant association between ICT and quality of education.

Material and Methods

The study is mainly analytical in nature. A well structured questionnaire has been used to collect primary data from 65 secondary schools in West Bengal during 2009-10. A sample size of 100 respondents is drawn in order to throw some light on the impact of ICT on quality of education (QE) in West Bengal. The measurement of QE has been done by using the descriptive statistics like mean and standard deviation. We have also estimated the determinants of QE using multiple regression model. The estimated Ordinary Least Square (OLS) equation of QE is of the form:

$$QE = a + b.RAD + c.COM + d.COP + e.IMG + f.DEM + g.AVOID$$

where RAD = Relative Advantage, COM = Compatibility, COP = Complexity, IMG = Image, DEM = Demonstrability, AVOID = Avoidance, a = Arbitrary Constants; b, c, d, e, f and g are regression coefficients.

We have estimated 'Kendell's Coefficient of Concordance' to examine relationship between ICT and quality of secondary school education. In order to assess the gender disparity of effect of ICT, t- test has also been used in our study.

The materials and techniques used for the study are as follows: structured questionnaire, 'T' table, χ^2 table, SPSS software of computer (11.0), excel package of computer, mean and standard deviation, concordance analysis, multiple regression model.

The Conceptual Framework: An attempt has been made to explain the various concepts and measurement of impact of ICT

in school education. Information and communication technology (ICT) are defined as all devices, tools, content, resources, forums and services, digital and those that can be converted into or delivered through digital forms, which can be deployed for realizing the goals of teaching, learning, enhancing access to and reach resources, building of capacities, as well as management of the educational system. ICT will not only include hardware devices connected to computers, and software applications, but also interactive digital content, internet and other satellite communication devices, radio and television services, web based content repositories, interactive forums, learning management systems and management information systems. They will also include processes for digitization, deployment and management of content, development and deployment of platforms and processes for capacity development and creation of forums for interaction and exchange¹⁴.

Measurement of Impact of ICT in School Education: A Multidimensional Analysis:

The term ICT is a multidimensional concept. It can be measured in different ways. In our study, we specifically utilized Roger's (1995) diffusion of innovations (DOI) theory in modified form to examine the role of ICT in school education. For this we have selected set variables for explaining the role of ICT in school education. These are – 'relative advantage', 'compatibility', 'complexity', 'demonstrability', 'image' and 'avoidance'¹⁵. The variables and their explanations can be expressed in terms of the table no -1.

Results and Discussion

This section presents analytical results of the data as collected in field survey. For the sake of simplicity, we have classified the whole results of the paper into four cases:

Case-1: Impact of ICT on quality of education: A concordance analysis

Case-2: Multiple regression model: The ordinary least squares method (OLS)

Case-3: Descriptive statistics: An analysis of mean and Standard deviation (S.D.)

Case-4: ICT and Gender analysis

Impact of ICT on Quality of Education: A Concordance Analysis:

The study has attempted to make an assessment of ICT on quality of secondary education on the basis of a set of selected indicators using 'Kendall's coefficient of concordance'. Actually Kendall's Concordance measures the fact that whether any significant association exists between ICT and the extent of quality of education. In our study, we have derived Kendall's coefficient statistic (W) and observed value of non-parametric 'chi-square' with the help of the field perception of ranking of several selected indicators assigned by the

respondents. The indicators are- Relative Advantage (RAD), Compatibility (COM), Complexity (COP), Image (IMG), Demonstrability (DEM), and Avoidance (AOID). The Concordance analysis can be explained in terms of the following table (table- 2).

It is to be noted (vide table- 2) that the observed value of chi-square (χ^2) i.e., 16.9 is greater than the table value at 5 % and 1 % level of significance (i.e., $\chi^2_{.05, d.f. 5} = 9.236$ and $\chi^2_{.01, d.f. 9} = 15.086$) for degrees of freedom 5, therefore the null hypothesis is rejected and the alternative hypothesis is accepted. So, we can conclude that there exists significant association between ICT and quality of secondary education of Burdwan district in West Bengal.

Multiple Regression Analysis: The regression analysis of ICT on quality of education shows (as evident from table-3, appendix) that the coefficient of the variable 'Relative advantage' is found to be positively associated with the quality of school education. This means that higher the extent of relative advantage of innovation in the form of ICT, higher would be the quality enhancement potentiality of school education. In fact, greater the extent of relative advantage of ICT, more effective operation of educational activities through appropriate curriculum, management, administration, teaching-learning strategies etc. The values of other variables like compatibility (0.935), demonstrability (2.614) image (2.327) have positive impact on quality of education through application of ICT with the exception of complexity (-0.127) and avoidance (-1.912). The latter is due to the increase in difficulties in application of innovation through ICT. This result is consistent

with the study of Koza¹⁰ (1989) in comparison of mathematics and reading levels and attitude toward learning of high risk secondary students through the computer aided instruction.

Again the estimated values of descriptive statistics especially mean and standard deviation (S.D.) of the respondents are explained in terms of table-4.

The mean score is found to be high in case of relative advantage compared to other attributes. It is interesting to note that average mean of all the respondents is more than 3 except in case of complexity (i.e., 1.1715) and avoidance (i.e., 1.9530) which means that most of the respondents are in favour of the introduction of new technology in school education (i.e., ICT).

ICT and Gender Analysis: Let us now examine whether any gender discrimination exists or not regarding the role of ICT on quality of secondary education. The calculated value of 't' are as follows (table-5).

The observed value of 't' is 0.04 is lower than the tabulated value of 't' at 5% and 1% level of significance for degrees of freedom 63. Therefore, the null prosthesis is accepted and the alternative hypothesis is rejected. Thus we can conclude that no disparity occurs among male or female in respect of effect of ICT on quality of secondary education of Burdwan district in West Bengal. This result is again consistent with the view of Bonk et al³ regarding the effects of Generative and Computerized Prompting Strategies on the development of Children's writing Awareness and Performance.

Table-1
Selected variables and their explanations influencing quality of education through ICT

Variables	Explanation
Relative Advantage	It indicates the degree to which an innovation will offer benefits surpassing those of its predecessor
Compatibility	It implies the level at which the new innovation acts in accordance with previously existing values, attitudes, experiences of using predecessors
Complexity	It indicates the degree to which an innovation is difficult to understand or use.
Demonstrability	This means the extent to which an innovation may be experimented with on a limited basis and observable to others
Image	It means positive image of school in short and long run due to introduction and implementation of ICT
Avoidance	It is defined as the degree of the potential version or avoidance reaction to an innovation like ICT

Table-2
Relationship between ICT and Quality of Education: Kendall's Coefficient of Concordance

Indicators / Estimators	RAD	COP	COM	DEM	IMG	AVOID
TR	145	160	241	172	104	354
AR	2.23	2.46	3.71	2.65	1.6	5.45
GA	18.09					
(AR _i -R)	-15.86	-15.63	-14.38	-15.44	-16.49	-12.64
(AR _i -R) ²	251.54	244.30	206.78	238.39	271.92	159.77
$\sum(AR_i-R)^2$	1372.7					
W	0.052					
χ^2	16.9					

Source: Author's calculation based on field level data, 2009-10, N.B.-Total Number of Respondents (P) = 65, number of indicators (n) = 6, TR = sum of rankings, AR = average rankings (TR/P), GA = grand average ($\sum TR/P$), $\chi^2 = p(n-i) \cdot W$

Table-3
Regression results showing impact of ICT on quality of education depending on selected variables

QE = a + b.RAD + c.COM + d.COP + e.IMG + f.DEM + g.AVOID			
Dependent Independent	Quality of Education		
	Co-efficient	t value	Level of significance
Constant	1281.326	1.017	-
RAD	0.084	2.510	0.01
COM	0.58	0.935	0.05
COP	-0.020	-0.127	0.05
DEM	0.081	2.624	0.01
IMG	0.053	2.327	0.01
AVOID	-0.004	-1.912	0.05

Source: Author’s calculation based on field level data, 2009-10, N.B.-Total number of observations (N) = 100, R² = 0.594, Scale: Strongly Agree = 1 and Strongly Disagree = 0

Table-4
Descriptive Statistics

Variables	Mean	S.D.
RAD	4.1674	1.05461
COP	3.4731	0.7334
COM	1.1725	0.3023
DEM	3.4532	0.7214
IMG	4.5034	1.0837
AVOID	1.9530	0.7052

Source: Author’s calculation based on field level data, 2009-10, N.B.-Total number of observations (N) = 100. Scale: Strongly Agree = 1 and Strongly Disagree = 0

Table-5
Calculation for value of ‘t’ assessing gender disparity

Variables	No. of Respondents given positive response		Calculated ‘t’ Value	Table Value
	Male	Female		
RAD	33	24	0.04	t _{0.05, 63} = 2.00 t _{0.01, 63} = 2.66
COP	30	27		
COM	06	09		
DEM	34	26		
IMG	31	25		
AVOID	05	07		

Source: Author’s calculation based on field level data, 2009-10

Conclusion

This paper highlights the role of ICT in enhancing quality of life of secondary level schools of Burdwan district in the state of West Bengal. The result reveals that there has been significant positive influence on quality of education through ICT by taking into consideration the factors – ‘relative advantage’, ‘compatibility’, ‘demonstrability’ and ‘image’ with some variation among the estimated ‘t’ values while in case of factors like ‘complexity’, and ‘avoidance’ the estimated values of coefficients are negative. This means that these two factors outweigh the positive impact of ICT on quality of education in certain extent. It is interesting to note that the calculated value of the factors like demonstrability and image has been found to

be satisfactory. This is because the application of ICT has been properly addressed in these schools which dominate the complexity and avoidance factors dampening quality of education associated with ICT. Finally, the ‘Concordance’ model proves significant association between ICT and quality of education. Again there is no variation regarding the effect of ICT on quality of education in terms of gender.

Note: *Kendall’s Coefficient of Concordance is a measure of the agreement among several (p) judges who are assessing a given set of n objects. The null hypothesis of Kendall’s test, Kendall’s Ho: The p judges produced independent rankings of the objects (n). Kendall’s ‘W’ statistic can be obtained from the either of the formulas:

$$W = \frac{12S}{p2(n3-n) - p.T}$$
$$\text{Or } W = \frac{12S' - 3p2n(n+1)2}{p2(n3-n) - p.T}$$

Where n is the number of objects, p is the number of judges, T is a correction factor for tied ranks.

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