

A case study on Information and Communication Technology (ICT) Scheme at Odisha: Assessment of its policy and implementation

Ansuman Sar, Satya Narayan Misra

Abstract: Indian education system is governed by Ministry of Human Resource Development (MHRD) at center and by various departments at the states. A significant amount of fund is allocated for usage of technology in education under key Government schemes. Schemes such as ICT @ Schools have potential for fostering academic growth and upgrading skills of students, which help immensely in their future employability. Several such schemes exist which pertain to technology in education and executed either directly by the state or through private entities. A policy for implementation of ICT was thought out and designed at national level. One of the states, Odisha has significant ICT-related interventions in education system through e Content delivery and ICT based teachers' training and monitoring. The current research study evaluates the ICT policy and assesses its implementation at School level in terms of effectiveness towards mass education of the state of Odisha. It recommends suitable measures for improvement in monitoring, implementation based on outcomes of the survey.

Keywords: ICT, teachers' training, e Content, policy, implementation.

I. INTRODUCTION

Qualitative aspects of education are colligated with educators who have interpersonal connection with learners. Education has the capability for resolution of socio-economic issues in developing nations. Due to infrastructural as well as socio-economic issues, quality education is not accessible to all; especially to those in remote regions. Information and Communication Technology (ICT) has tremendous capability to eliminate the obstacles, which are causing hindrances in mass education. "ICTs 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 of resources, building of capacities, as well as management of the educational system" [1]. ICT @ School scheme of Ministry of Human

Resource Development, Government of India covers supply, installation, maintenance and commissioning of Projection System, Interactive White Board, Computer Hardware, Connected Accessories, installation of Software, other allied accessories and deployment of human resource. With the objective of bringing technology enabled learning to Government schools in the state, Odisha (a state situated at eastern part of India) launched ICT @ School program in the state in 2014. Initiatives have been taken to integrate technology in teaching and learning process through ICT @ School scheme for students of Class IX and X at 4000 Government and Government aided high schools in the state through a Build-Own-Operate-Transfer i.e. BOOT mode. BOOT is a public-private partnership (PPP) model where selected vendor also called as implementing partner invests and implement the ICT project under contract and transfers the ownership to Government upon completion of the project. Besides the necessary infrastructure, a dedicated human resource called school coordinator is deployed on contractual basis for 5 years at ICT Schools to give required support related to technology [2]. An assessment of the scheme implementation in 10 percent sample schools (n=400) in seven sample districts has been conducted with a view to point out gaps in implementation of the scheme, if any, which could be used by the policy makers in future for more efficient and effective implementation of the scheme in the state. The assessment focused on physical reporting of ICT laboratories, classroom transactions, teachers' perception and students' views on ICT intervention and policy gaps.

II. LITERATURE REVIEW

ICT is considered as a "major tool for building knowledge societies" and, like a change at the school education level that could provide novel design for development of mass quality education [3]. In developing nations, scope of robust monitoring and evaluation framework to assess the outcomes of ICT interventions is not adequate. After adoption of ICT in learning and teaching process, content related to education has a platform for exchange of knowledge. Lack of efficiency pertaining learning outcomes, if any, may not be attributed to ICT, instead the quality of assimilation by learners or the societal factors involved in it should be analyzed [4]. The major problem in mass education in India is deficiency in quality learning materials, educators, unavailability infrastructure, related to education and dropouts [5].

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Modern usage of ICT has the potential to figure out this issue.

“The National Policy on ICT in School Education promotes research, evaluation and experimentation in ICT tools and ICT enabled practices in order to inform, guide and utilize the potentials of ICT in school education.

The policy has stressed that there is a need to employ educational technology to improve the quality of education” [6]. As India is the second most populous country in the world and major part of the population is young, hence has a large formal education system. Accessibility for education in India is influenced by geographical, social and economic factors [7]. The aim of National Policy on ICT in School & Mass Education intends for developing the young population to take part in sustainment of knowledge-led economy of the country. In practice, Government sponsored schemes, if not implemented properly, seldom have significant impact towards improvement of fundamental skills of high school students. About 25 percent of learners at secondary level are unable understand the script of their mother language and only 43 percent are able to simple division [8]. Hence, there is a need to understand and review the existing policy and gaps during its implementation for further course of action at academic and administrative level in terms of sustainability of such initiative in long run. For the research study, on desk, online and Government archives were accessed to understand the scheme in totality and to develop clarity on the various macro and micro aspects of the program. In addition, various secondary resources available with Government Line Departments, NGOs and academic circuits were referred to get a clear vision on the ideologue of the initiative. Following rigorous secondary review, an optimized test for quality highly efficient rapid field assessment has been carried out to visualize the overall picture of the existing status of ICTs in the surveyed schools. In this all, the stakeholders were kept informed and taken into confidence. All the relevant documents on the project in India and Odisha has been collected and reviewed for this specific assessment.

III. RESEARCH GAPS

It is undeniable that, ICT has the inherent capacity to contribute to the growth of teaching and learning processes. But at the same time, we need to take into practical considerations of various constraints that exist during delivery of service at School level. There are issues pertaining to infrastructure especially in rural areas; such as unavailability of uninterrupted power supply, inaccessible broadband internet connectivity, seepage problems, flood related issues and theft cases etc. 32 percent of the Secondary Schools in India are yet to get electricity and 75 percent schools do not have access to telecommunication services [9]. In addition to that, there are resistance among the teachers towards technology-driven education. Furthermore, institutional challenges are encountered at official hierarchies, which may dilute the very objective of the program. Institutional issues include inclusion & use of ICT timetable in School Curriculum framework, delay in various decision making processes e.g. approval concerning deployment of newly recruited human resource and repair work pertaining to school infrastructure etc. Also, there is a need to understand and review the existing policy and gaps during its implementation.

IV. RATIONALE OF CURRENT STUDY

This is evident that, adoption of ICT has potential to improve the quality of education. However, there are various challenges faced during its implementation. Challenges include both infrastructural and institutional issues faced at ground level. ICT implementation is contingent upon many factors constituting structural transformation, teaching pedagogy and technology integration in education. Numerous efforts have been made at international and national level to determine the influence of ICT’s intervention and integration in classroom teaching. However, little research studies are available with reference to ICT intervention at Secondary School level from Odisha’s Perspective. Government spends huge amount of financial resources for implementation of ICT at secondary schools. Therefore, it is imperative to have a comprehensive research to analyze the implementation gaps and evaluate the outcome of intervention of ICT. The proposed current study will strive for a holistic research approach to understand the objectives and analyze the policy and will make comparative study of performance of students. It will also assess the perceptual mapping of stakeholders, as institutional support is inevitable for implementation of such large project meant for socio-economic development.

V. OBJECTIVES

The objectives of the study are mentioned below.

- To examine the quality of outcomes of the scheme.
- To evaluate scheme efficiency and effectiveness.
- To evaluate the efficiency/effectiveness of the existing monitoring mechanism.
- To recommend suitable measures for improvement, if any, in scheme implementation process.
- To recommend a suitable and workable monitoring and evaluation (M&E) framework for undertaking concurrent evaluation of all schools in future.

VI. APPROACH AND METHODOLOGY

It is undeniable that, ICT has the inherent capacity to contribute to the growth of teaching and learning processes. There are issues pertaining to infrastructure especially in rural areas; such as unavailability of uninterrupted power supply, inaccessible broadband internet connectivity, seepage problems, flood related issues and theft cases etc. The study was conducted in seven sample districts covering 400 sample schools, 4,000 student respondents and 400 teacher respondents. Seven districts were selected for assessment following multi-stage stratified random sampling method. One district each was selected from each of the six administrative zones for implementation of ICT project in the state except for Zone 6. As Zone 6 covers maximum number of districts, to have better representation two districts were selected from this zone. The districts within a zone were ranked based on composite score involving gross enrolment ratio and retention rate of secondary schools, and transition rate from Class VIII to IX based on U-DISE 2015-16 data [10]. The lowest performing district(s) from each zone were selected as the sample. Seven districts were covered considering the number of sample schools and better coverage in terms of districts for arriving at a holistic representation of the efficacy of this scheme across districts.



The list of 4,000 Government and Government aided schools were collected from School & Mass Education Department, Government of Odisha, India. The blocks were chosen at random keeping into view the distance of the block from the district headquarter.

Both proximate and distant blocks were chosen to derive an inclusive picture of the scheme implementation in the said districts. Schools were chosen using random sampling method.

VII. DATA COLLECTION

Questionnaire method was used as survey tools for collection of both qualitative and quantitative responses from the respondents. As stated under the scope of the study, information on physical reporting of ICT laboratories was collected including functionality of equipment's, specification verification of equipment's in the ICT laboratories and use of ICT tools during class room transactions. In addition, we also collected responses from teachers and students about their perception/opinion on scheme implementation and benefits. Along with observation checklists, lead questions were framed to map the responses of both the teachers and students on this scheme. Questionnaires were also framed to highlight the existing monitoring framework of the scheme involving different stakeholders at different levels. Responses of different stakeholders also include their feedback to further strengthen the quality of the scheme. Photo documentation was an integral part of the survey. Additionally, to the questionnaires, a list of queries for qualitative responses were added to strengthen the quality of data collection and findings thereof. Each field investigator being aware of the nature of work, carried sheets to record additional information from the stakeholders just in case there were important information that needed to be captured but was beyond the scope of the questionnaire. Students' responses have been elicited to map the subjects covered under e-content classes, frequency and regularity of classes, value addition to their learning process and the synergy created through group learning. The students have also rated the quality of classroom transactions and stated their opinion to make the e-content classes more stimulating and student-friendly.

Table I: Sample Students

Districts	Sample Students	Sample Schools
Angul	467	47
Bargarh	67	50
Kendrapada	790	79
Koraput	360	32
Mayurbhanj	1060	106
Nabarangpur	8	20
Puri	658	66
Grand Total	3410	400

Source: Primary Data

The total number of students as the base sample for the study, was 3410, out of which 53.78% are girls and 46.22% are boys.

Table II: Gender Profile of the Students

DISTRICTS	MALE %	FEMALE %	SAMPLE SCHOOLS
Angul	47.75 %	52.25%	467
Bargarh	53.73 %	46.27%	67
Kendrapada	43.67 %	56.33%	790
Koraput	52.22 %	47.78%	360
Mayurbhanj	44.81 %	55.19%	1060
Nabarangpur	37.50 %	62.50%	8
Puri	46.50 %	53.50%	658
Grand Total	46.22 %	53.78%	3410

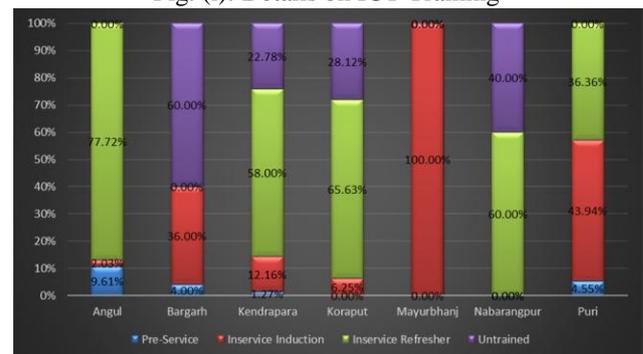
Source: Primary Data

VIII. FINDINGS OF THE STUDY

A. Quality of outputs of the scheme and suggestions for further improvement

Quality of outputs has been measured in terms of coverage and quality of training schemes, quality of e Content classes, improvement in pedagogy and value addition to the learning process of students. The findings are based on the quantitative and qualitative responses from students and teachers associated with e Content classes. In all the 7 Districts, 83.75 percent of teachers have undertaken ICT training and only 16.25 percent of teachers haven't undertaken any trainings. 28.63 percent of the teachers have received In-Service Induction training whereas only 42.53 percent have been covered under In-Service Refresher training. 16.25 percent of the teachers who have not received any training should be on the priority list to be trained.

Fig. (i): Details on ICT Training



Source: Primary Data

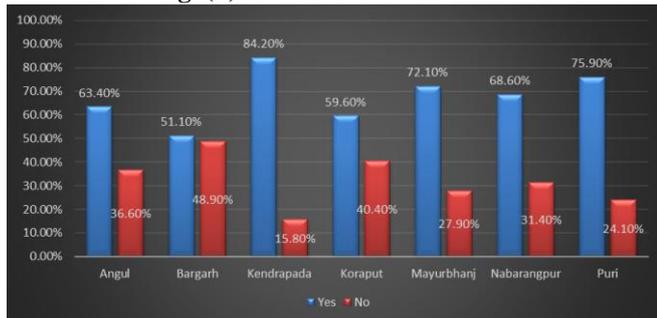
The Refresher training on ICT, which is proposed to be imparted by vendors (private partners), should be provided so that teachers can be capacitated further to handle computers and facilitate e Content classes without any external technical support. 32 percent of teachers in Puri District has suggested that the overall trainings imparted to them on ICTs based teaching scheme- is excellent whereas 6 percent of the teachers has termed it as poor.



Similarly, in Angul district 42 percent of teachers for sample schools have suggested that the training schemes were good. Frequency of e Content classes varies from school to school across districts. Some schools have reported to having conducting e-classes twice a week, some six times a week and some ten times a week. Number of times the classes are conducted depends on the prerogative of the Head Teachers.

98.18 percent of sample schools in Puri District covers almost all the major subjects (Mathematics, Science, Social Studies, Mother Language, and English) whereas only 16.94 percent of sample schools in Koraput District covers all the major subjects. Only 11.14 percent of sample schools in Kendrapada district covers more than 1 subject.

Fig. (ii): Status of e Content classes



Source: Primary Data

The graph above reflects on the status on e-content classes as perceived by the students in the sample schools. 63.40% of students in Angul district stated that the e-content classes are held regularly whereas only 36.60% of students of the same district suggested that the classes are not held regularly. Students have conversed that peer learning through group discussions and group assessment has improved communication between them creating a more positive schooling atmosphere for them. Overall, the scheme has enhanced the cognitive competencies of students by providing the rich environment and motivation for teaching learning process and by offering new possibilities for learners and teachers to push learning beyond the confines of the classroom.

Fig. (iii): Rating of e Content classes



Source: Primary Data

The above graph discusses on the rate participation and sharing of e-content of the students in the classroom transaction. Only 0.18% of sample students across the 7 districts suggested that rate of participation is very low amongst the students whereas 9.02% of sample students suggested that the rate participation is excellent. Majority of the students interviewed have stated that peer assessment has instilled a sense of confidence and collaboration among them. With contemporary teaching, which emphasizes on

promoting competency and performance, integration of information and communication technology through e Content development has helped to revitalize teachers and students. The survey findings apparently show that ICT environment has improved students' and teachers' learning experience and made them enable to use the time spent at ICT labs for knowledge acquisition intensively.

B. Evaluation of efficiency and effectiveness of the scheme:

The scheme efficiency and effectiveness of the scheme, majorly depends on the functionality of ICT labs in sample schools. All the 400 sample schools taken for evaluation have been supplied with ICT infrastructure. As per the Installation and Commissioning Report, 100 percent equipment are received by schools and verified by concerned Head Teachers and other Government representatives. As per survey, out of 400 schools, 99.85 percent of schools presently has the facility of electrification whereas 88 percent of schools has modem for broadband connection. 99.75 percent of the schools has regular supply of electrification for functioning of the ICT labs whereas 98 percent of schools has got servo stabilizer. 98 percent of the sample schools has gotten fire extinguisher fitting whereas 100 percent of sample schools has monitors and LAN connection. Overall 98.3 percent of labs in sample schools are fully functional. School Coordinators are hired and trained by the vendors. Though, they have been certified through Computer Certification programs, some of the School Coordinators deployed in these sample schools have very low capacity.

IX. LIMITATIONS OF THE STUDY

As survey in the first phase was conducted during summer vacation, desired number of students (1020 students) could not be covered under the study. Despite of communication from Government and recurrent follow-up with district offices, students were not present in schools to participate in the survey. In some sample schools, teachers on roster duty were present when the survey team reached the respective schools. Some of them hardly had any idea about e Content classes. On request of the survey team, the relevant subject teachers were called to discuss with surveyors. The timeline of the student being stringent, this delayed the survey process to a certain extent. Therefore, there has been a slight revision in the sample data and the respondents covered as presented in the table.

Table III: Actual Sample Size of the Study

Sample Districts	Total no. of schools under ICT @ School scheme	No. of sample schools covered	Sample respondents	
			Students	Teachers
Mayurbhanj	273	106	1060	106

Kendrapara	203	79	790	79
Puri	170	66	658	66
Bargarh	128	50	67	50
Angul	121	47	470	47
Koraput	82	32	360	32
Nabrangpur	52	20	8	20
Total		400	3410	400

X. RECOMMENDATIONS

During survey, it was evident that approximately 30% teachers facilitating e Content classes need further training to be well versed with use of computers and its accessories. This situation can be attributed to inevitability for further capacity development or lack of positive attitude among some teachers to integrate modern technology to their pedagogic process. Due to lack of capacities, they are reliant on the concerned School Coordinator who provides technical support for facilitation of e Content classes. So further capacity building scheme should be imparted to 100 percent subject teachers so that they become self-sufficient to manage e Content classes on their own. Considering the essence of the scheme, after 5 years, the School Coordinators should be disengaged and removed and the teachers should take charge of e Content classes without external support. The implementing partners should be instructed to come out with 18-24 months exit plan with clear exit strategy. It has been observed that there is lack of clarity among teachers on the different trainings imparted to them. To clear this ambiguity, a database should be prepared by Department to track the participation of teachers in different training programs and to fix the priority list of trainees. This database can be updated bi-annually and accordingly training calendar should be prepared so that 100% teachers are covered in pre-service and in-service trainings. It would be helpful if e Content classes are made a part of the curriculum by School & Mass Education Department so that the entire process can be standardized.

Improvement of physical infrastructure in terms of spacious labs and more computers to precede any further implementation of the scheme in other schools. Performance appraisal system to be institutionalized before extension of contract of School Coordinators. Training to be imparted to School Coordinators for upgradation of their technical skills.

1) *Evaluation of efficiency and effectiveness of the existing monitoring mechanism:*

The accent of the current monitoring system is skewed towards functionality of ICT labs and assets thereof. This is just one aspect of this well-designed scheme. A holistic M & E framework should be envisaged to evaluate the qualitative outcomes of this scheme e.g. quality of trainings, post-training usage of ICT tools by teachers trained, improvement in classroom transactions and enhancement in scholastic achievement of students. During the survey, it has been observed that some Government officials have also visited the ICT labs. This has resulted in greater impact in effective functioning of the ICT labs. A District Level Monitoring Plan should be developed and implemented for strengthening the monitoring by district and block level officials of School and Mass Education Department. This will result in a positive reinforcement on the ICT scheme.

2) *Recommendation of suitable measures for improvement, if any, in scheme implementation process:*

It is suggested that considering the need for spacious labs and more computers, the improvement of physical infrastructure in school should precede any further implementation of ICT scheme in other schools. The maintenance of computer or repair of computer for any fault should be improved. As suggested by School Coordinators, there should be a technical person for a cluster of school for repair and maintenance of computers in schools. The training and use of multimedia content as teaching pedagogy should be further improved through more teachers becoming well versed with the content, use, knowledge and application of digital materials. It was found that the academic value of multimedia content should be improved for the students and impact should be more if the same is introduced at the earlier stages. The availability of computers at the household level may be of great success for the students. A timetable for ICT lab and a thorough ICT syllabus needs to be prescribed from department level. A scheme to annually award District level officials in whose districts ICT scheme is functioning well can be instituted. The ownership of the ICT scheme should move down to the Block and the Cluster level rather than the District level, while there should be better support for the scheme.

XI. CONCLUSION

It is evident from the research study that some major steps are required to taken for effective use of ICT which requires not only the revision of policy but also changes at implementation level. All the subject teachers who are facilitating e Content classes should teachers' training program on IT. Presently as they are not properly capacitated, they are dependent on the School Coordinators for providing technical support during the e Content classes. On being trained, they can facilitate e Content classes effectively without any external support. A refresher training is required to be given to teachers every year for capacitating them to manage e Content classes with greater efficiency and comfort. Institutional issues such as inclusion & use of ICT timetable in School Curriculum framework is required to be addressed.

The size of the ICT laboratory (Capacity of 40 students) is not sufficient to accommodate all the students of a single class (around 100) and there is no provision for taking the class in batches. The quality of teaching and learning is depreciated due to overcapacity and dearth of space. The problem further gets gravitated, as there is no clear-cut instruction for distribution of period in the school timetable for ICT based teaching. More computers are needed to accommodate the need of larger number of students. This will help the teachers to facilitate the classes with ease and enable students to learn better. Broadband connectivity may be provided to more numbers of schools where it is feasible. The e Content questions should be provided in hard copies for practice of students at their home. A full-time regular computer teacher should be appointed in every school running e Content courses.

If the language of the e Content is changed from Odia to local vernacular, it will enable the students especially the ones residing in tribal districts to grasp the content more easily. Feedback should be solicited from subject teachers facilitating e Content at regular intervals and accordingly e Content should be revised to make it more context specific and inclusive.

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