Smart Classroom for Teaching Learning at Secondary Level in West Bengal: An Exploratory Study

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ABSTRACT

The objectives of this paper are to study the availability of equipments and softwares in smart clasrrom and to find out the ICT training of teachers and use of different educational applications by teachers in teaching. Survey method was used with sample of 25 secondary schools selected from three districts (Darjeeling, Hooghly and Siliguri) of West Bengal, India randomly. Self developed and validated questionnaire consisting of 40 items based on availability of equipments, softwares, training of teachers and use of educational applications etc were used as tool for collecting data from school principals. The data were analyzed in terms of frequency count, percentage and average followed by qualitative descriptions. The study indicated that all secondary schools have desktop and projectors in smart classroom but 88% of schools do not have laptop and no schools have interactive board which is important for smart classroom. Half of the teachers are trained in using smart class and ICT for taking class and few schools have subject specific educational softwares. Majority of teachers does not use smart classroom every day for teaching learning. The study suggested that all schools must be equippied with proper digital devices and subject specific softwares. Teachers must be oriented or trained in smart class pedagogy for taking class as it fosters students cognitive capacities. Further, teachers must be encouraged and motivated by educational authority and school principal for using smart classroom facilities in regular teaching activities.

Keywords: ICT, Smart Classroom, Educational Softwares, KYAN, NROER, SWAYAM.

Highlights of this paper:
- This study assessed the availability and use of equipments and softwares/applications in smart classroom by teachers for teaching learning.
- It is observed that desktop and projectors are available in all sampled secondary schools but half of the teachers are not trained in the use of smart classroom equipments for teaching learning.
- The school authority must take necessary steps for orienting teachers in smart class pedagogy for the quality improvement of school education in general and students performance in particular.

1. CONCEPTUALISATION OF THE PROBLEM

Information and Communication Technology (ICT) with its immense potentiality has made possible to step forward in digital era. Any information becomes powerful when it is communicated through technology. Technology is very important in today's world because it serves a variety of purpose in the most important aspects of society like communication, education, scientific progress, healthcare and business. Countries, all over the world have identified the role and importance of ICT in education as a universal tool for teaching learning.

ICT in education refers to systematic application of different technological tools and devices in the field of admission, teaching learning, assessment, management etc. ICT in schools is an important component of the Rashtriya Madhyamik Shiksha Abhiyan (RMSA) in India, which was launched in December, 2004 and revised in 2010 to provide opportunities to secondary level students for capacity building on ICT skills and make them learn through computer aided learning process.

Different ICT tools are used to generate maximum benefit in the teaching learning processes in school education. ICT tools are digital infrastructures such as desktop/laptop, smart phones, printer, scanner, speakers, microphone projector, interactive whiteboard/smart board and modem used for teaching learning. Some other specific tools that can be used in education are audio editing, animation, screen casting, quiz generators, video editing and graphic tools.

Smart class is one of the unique and innovative discoveries of the 20th century. Smart was actually founded by David Martin in the year 1987 with the purpose to combine the smart interactive white board with the power of a computer. Smart class contains each subject content materials with a real teacher in virtual classroom, teaching chapters in an interesting way which makes studies as exciting as watching movies along with distinctive features like quiz, multiple choice questions series and mind map for revision purposes. The smart classroom and e-learning is a one stop resource for learners to get diverse ideas related to their interest and subject enquiries. Web-based multimedia e-learning environments has added new dimension in designing course content as well as generating new dimensions in the teaching learning processes at school level.

In common parlance, a smart classroom is a traditional classroom with multi-technology and media system installed. It emphasizes monitoring and coordinating features in infrastructure; the installed technologies are expected to make the classroom environment sensitive to meet the teaching learning needs. "Smart learning environment can be regarded as the technology supported learning environment that make adaptations and provide appropriate support (e.g., guidance, feedback, hints or tools) in the right places and at the right time based on individual learner's needs, which might be determined via analyzing their learning behaviours, performance and the online real world.

Smart classrooms are generally technologically and electronically enhanced classrooms in which teaching learning practices are manifested by the method of e-Learning. In smart classroom potential opportunities are created for active cognitive and social participation (Hennessey, 2007). Smart class teaching is a step towards development where student's achievement is highlighted (Menon, 2015). Smart class in India was launched in the

year 2004 by EDUCOMP in the schools like, Takshila, DPS Pitampura in Delhi and Cambridge-chain of schools. Presently majority of urban schools in India have provision of smart classrooms.

Government of West Bengal in 2007-08 has taken up the initiative for the implementation of computer education in schools. For this, the department of IT has funded to introduce computer based learning system title 'KYAN' (Vehicle of Knowledge) with a focused objective of bringing the benefits of ICT to the children from under privileged sections and from disadvantaged communities. The project was undertaken in 65 Govt. schools across two districts namely Bardhaman and Bankura of West Bengal, India covering 500 teachers and 40,000 students mostly from marginalized (SC/ST) sections of the society. KYAN was developed in collaboration with the Indian Institute of Technology (IIT), Mumbai, KYAN is designed as a device that contains a computer with in-built projector, subject related content, speakers, and has a wireless keyboard mouse and multimedia pen. The Govt. of West Bengal has recently provided smart classroom facilities to selected secondary schools for teaching learning.

2. NEED OF THE STUDY

A smart classroom is a classroom that has a teacher equipped with computer and audio-visual equipments, allowing the teacher to teach using a wide variety of media. These include smart interactive white board, DVD's, PowerPoint presentations and more, all displayed through a projector. With the help of school curriculum, smart class brings in technology right next to the blackboard for teachers in the classroom. This makes learning an enjoyable experience for the students while improving their overall academic performance in school.

Many researches have been done to examine the effectiveness of smart classroom in improving quality of teaching learning. Some of them are discussed in following paragraphs.

Varghes (2017) reported that there is significant effect of smart class on academic achievement. Students learn well by using technology and doing hands-on activities. Kumar and Kumar (2017) found that computer-aided teaching has enabled the teacher to innovate instructional design by presenting the educational content in an interactive and multi-sensory manner rather than the traditional single media format. Jha and Shenoy (2016) revealed that the use of digital technology is usually more successful as a supplement rather than as a replacement for traditional teaching. Dhrakshayani (2015) reported that smart class is a comprehensive solution designed to assist teachers in enhancing student's academic performance with simple, practical and meaningful use of technology. Menon (2015) revealed that students achieved higher score when taught in smart class as compared to conventional mode of instruction. Ropum and Arafat (2014) revealed that this improvement was possible not only for the smart teacher smart class portal but also for the setting up of other necessary devices and also due to training for the operation of the portal. Sugant and Anvekar (2014) found that 82% of teachers have been using digital classroom solutions for less than two years and 96.8% of teachers have been using digital classroom solutions for less than four years which helped in overall learning as well as knowledge delivery to children. Jena (2013) reported that smart class learning helped to develop cognitive dimension and reinforcement given to all students on every improvement. Oommen (2012) revealed that the lesson with PowerPoint was interesting holding the student's attention throughout the lesson and the students followed and understood and lesson with active class participation.

The above research studies indicate that many researches have been done on ICT and smart class and its use in teaching learning across different levels of school education and teacher education. It also reveals that ICT tools foster achievement, attention, skills, creativity and quality of teaching learning. However, no comprehensive research study found in the area focusing on the smart classroom in schools of West Bengal. On the other hand, the Government of West Bengal has equipped selected secondary schools with smart classroom across the state. It is

natural to examine the availability and use of smart classroom for teaching and learning. Hence this study is relevant.

3. OBJECTIVES

1. To study the availability of equipments and software in smart classroom.
2. To study the training and uses of different educational applications by teachers in smart classroom.

4. METHODOLOGY

Considering the nature of the problem, the investigators used survey method. The sample for the study consists of 25 secondary schools and 25 HMs/Principals from three districts of West Bengal, India. Initially three districts such as Hooghly, Darjeeling (Siliguri Educational district) and Jalpaiguri were selected randomly from total 23 districts of West Bengal. All the sampled school HMs/principals were involved as sample for this study. Self developed questionnaire based on aspects such as availability of equipments, training for teachers, use of educational applications and subject specific software etc. was used as tool for data collection. The tool was content validated by taking expert comments and suggestions during the process of the tool development. The data were collected by the investigators from selected schools. The collected data were analyzed in terms of frequency count and percentage and accordingly interpretations were made.

5. DATA ANALYSIS AND INTERPRETATION

The first objective of the study is to find out the availability and use of equipments and softwares in smart classroom by teachers. For this, data were collected from schools by using questionnaire, which is presented in terms of frequency, percentage and average in following tables.

Table-1. Availability of Equipments in Smart Classroom

Sl. No.	Digital Devices	Availability (F & %)
1	Desktop	25 (100%)
2	Laptop	3(12%)
3	Interactive whiteboard	0
4	Scanner	21(84%)
5	Printer	23(88%)
6	Projector	25(100%)
7	Speakers	20(80%)
8	Wireless Microphone	11(44%)
9	Modem	18(72%)
10	UPS	22(88%)
11	Multimedia Pen	22(88%)

Source: Data collected from sample schools.

The Table 1 reveals the availability of digital devices. It indicates that all schools have desktops and projector. Only 12% of schools have laptops which are funded by the school. No school has interactive boards which is an important and essential component in the smart classroom. 84% of schools have scanner, 88% schools have printer, 80% of schools have speakers, 44% of schools have wireless microphone, 72% of schools have modem, 88% of schools have UPS and 88% schools have multimedia pens.

It can be said that majority of schools have desktop, scanner, printer, projector, speakers, modem and multimedia pens. On the other hand interactive white board is not available in all schools and only 12% of schools have laptops.

Table-2. Size of Smart Classroom.

Sl.No.	Items	Average
1	Number of smart classroom in a school	1.28
2	Number of students can be accommodated in a smart classroom	65.6

Source: Data collected from sample schools.

Table 2 reveals that all the secondary schools have more than one smart classroom. The mean of the number of students who can be accommodated in a smart classroom is 65.6. Hence, it can be said that every school has a smart classroom and most of smart classrooms are big in size which can accommodate around 65 students.

Table-3. Availability of Subject Specific Software for Teaching.

Sl.No.	Subjects	Yes	No
1	Science	4 (16%)	21 (84%)
2	Mathematics	3 (12%)	22 (88%)
3	Social Science	1 (4%)	24 (96%)
4	English	3 (12%)	22 (88%)

Source: Data collected from sample schools.

The Table 3 points out that only in 16% of schools have subject specific software for teaching science, 12% of schools have subject specific software for teaching Mathematics, 4% of schools have subject specific software for teaching Social Science and 12% of schools subject specific software for teaching English is available. Thus, it can be concluded that the majority of schools do not have subject specific software for teaching Science, Mathematics, Social Science and English which is an essential requirement for smart teaching.

Table-4. Use of Educational Software and Applications.

Sl. No.	Name of Software/ Application	Availability of Software/Application		Use of Software/Application	
		Yes	No	Yes	No
1	English Mentor	0	25(100%)	0	25(100%)
2	Educomp	0	25(100%)	0	25(100%)
3	e-Pathshala	0	25(100%)	0	25(100%)
4	K Class	1(4%)	24(96%)	1(4%)	24(96%)
5	Discovery & Crocodile Simulation	0	25(100%)	0	25(100%)
6	BYJU's	0	25(100%)	0	25(100%)
7	SWAYAM	0	25(100%)	0	25(100%)
8	EDUSAT	0	25(100%)	0	25(100%)
9	Excel Infocom	0	25(100%)	0	25(100%)
10	EframeInfomedia	0	25(100%)	0	25(100%)
11	Classmates	0	25(100%)	0	25(100%)
12	Teachertube	0	25(100%)	0	25(100%)
13	Khan Academy	1(4%)	24(96%)	1(4%)	24(96%)

Source: Data collected from sample schools.

The Table 4 indicates that the enlisted educational software and applications like English Mentor, Educomp, e-Pathshala, Discovery & Crocodile Simulation, BYJU's, SWAYAM, EDUSAT, Excel Infocom, EframeInfomedia, Classmates, Teachertube are not available in any school. Only 4% of schools have K Class and Khan Academy.

It can be said that majority of the schools do not have educational software and applications like English Mentor, Educomp, e-Pathshala, Discovery and Crocodile Simulation, BYJU's, SWAYAM, EDUSAT, Excel Infocom, EframeInfomedia, Classmates, Teachertube. On the other hand 96% of schools do not have K Class and Khan Academy.

Table-5. ICT Training of Teachers.

Sl. No.	Subject	Average Number of Teachers in the Subject	Average Number of teachers Trained in ICT
1	Science	6.12	3.2
2	Mathematics	2.08	1.4
3	Social Science	4.4	2.12
4	English	3.4	1.8

Source: Data collected from sample schools.

The Table 5 reveals that the mean of the teachers trained in ICT in a school in Science is 3.2, in Mathematics is 1.4, in Social Science are 2.12 and in English is 1.8. It can be said that 50% of teacher teaching different subjects are trained in ICT or using smart classroom in teaching learning.

Table-6. Percentage of Schools Use Smart Classroom for Teaching.

Sl.No.	Subject	Every day	Weekly Once	Weekly Twice	Occasionally	Never
1	Science	12	32	36	20	0
2	Mathematics	12	32	36	16	4
3	Social Science	8	32	8	20	32
4	English	12	36	28	20	4

Source: Data collected from sample schools.

The Table 6 reveals that the percentage of schools in which teachers use smart classroom for teaching Science every day, weekly once, weekly twice and occasionally is 12%, 32%, 36%, 20% respectively. The percentage of schools in which teachers uses smart classroom for teaching Mathematics every day, weekly once, weekly twice, occasionally and never is 12%, 32%, 36%, 16% and 4% respectively. The percentage of schools in which teachers uses smart classroom for teaching Social Science every day, weekly once, weekly twice, occasionally and never is 8%, 32%, 8%, 20% and 32% respectively. The percentage of schools in which teachers uses smart classroom for teaching English every day, weekly once, weekly twice, occasionally and never is 12%, 36%, 28%, 20% and 4% respectively.

It can be concluded that all teachers are not using smart classroom every day for teaching and learning. In average, 12% of schools use smart classroom for teaching every day where as 36 % schools use smart classroom once in a week. It can be said that available facilities of smart classroom is not regularly used by teachers. Further, social sciences teachers are using smart classroom very less in comparison of other subjects.

6. MAJOR FINDINGS

- All the schools have desktop but no schools have interactive/ smart board. 88% of schools do not have laptops. All the schools have projector but 66% of schools do not have wireless microphone. All the schools have at least one smart class and can accommodate in average 65 students.

- 84% of schools do not have science related software, 88% of schools do not have mathematics related software, 96% of schools do not have social science related software and 88% of schools do not have English related software for teaching learning.

- Most of the schools do not use educational software and applications such as English Mentor, Educomp, e-Pathshala, K class, BYJU's, SWAYAM, Classmates, Teachertube, Khan Academy for teaching different subjects in Smart classroom.

- Half of the teachers in Science, Mathematics, Social Science and English are not trained for taking classes in smart classroom/ use ICT for teaching learning.

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- 88% of schools do not use smart classroom everyday for teaching Science, Mathematics and English and 68% of schools never use smart classroom for teaching Social Science.
- All teachers are taking classes in smart classroom in sporadically but no school has reflected the schedule of the smart class in the timetable.

7. DISCUSSION OF THE RESULT

Smart class is the recent innovation in the field of teaching learning across the levels of education. The Government of India as well as states has been equipping school with devices and software required for smart class. This study was intended to find out the availability and uses of equipments and software in smart class. The study indicated that all the smart class in West Bengal has desktop and projector and only 12% of schools have laptop but no schools have interactive white board. Majority of schools have printer, speakers, multimedia pen, modem etc. This is a very good sign for the quality improvement of school education as smart class provides content in interactive and multisensory mode (Kumar and Kumar, 2017). The smart class is helpful for teachers in enhancing students performance with use of technology (Jena, 2013; Ropum and Arafat, 2014; Dhrakshayani, 2015; Menon, 2015; Varghes, 2017). The study also revealed that few schools have laptop and no schools have interactive white board, which are essential for making teaching learning meaningful and lively. Hence Government must provide all these required devices, equipments and software to all secondary schools.

The important finding of this study is that half of the teachers are trained in teaching by using smart classroom or ICT. Without the capacity building of teachers, smart class room or ICT is not useful. Hence all the teachers must be oriented in taking class in smart class. Further, teachers must be encouraged and motivated to take class in smart class as it creates interest and meaningful learning among students. The head teacher must include the smart class in school time table so that all subject teachers can get equal opportunities for taking class in smart class. ICT has great potential for the professional development of teachers. Hence teacher must be sensitized about the ICT initiatives like epathshala, MOOC, SWAYAM, NROER etc.

8. EDUCATIONAL IMPLICATIONS

- The study reveals that all schools have desktop, projector, printer and scanner. But no schools have interactive board which plays an essential role in the teaching learning process in smart classroom in this digital era. Most of the schools do not use wireless microphone for teaching in the smart classroom. Many hardware components are found in poor condition. The HM/principal along with other teachers should regularly check the conditions of those equipments and take necessary actions. Government may take initiative to provide materials like interactive board, microphone to all schools and ensure thoroughly that all these materials are used by the teachers in the teaching learning process.
- All schools received at least two projectors. But only one projector has been installed in majority schools which is a reason behind irregularity of classes in smart classroom. It is necessary for the school authority to set up both the projectors along with other necessary equipments in two rooms for imparting lessons regularly with the help of available technology.
- All schools do not have a proper surface to display or use the multimedia pen. So in this case some schools are using multimedia pen on rough surface where it is difficult to write, some use it on putty wall in which

the multimedia pen might get damaged. So, the Government may provide a screen on which the teachers can display the digital contents to the students.

- Initiatives may be taken by the Government to train all teachers in pedagogy of smart class. The head of the institution should specify the smart classroom periods in the timetable so that all classes get equal opportunity and all subjects could be taught ever day or at least thrice in a week with the help of technology.

- Government may take initiative to recruit full time computer teachers for training, teaching and maintaining the smart classroom. The school authority may include some educational CD/DVD in their library so that important educational contents could be shared in the Smart classroom. Other than the content available in KYAN projector subject specific software should be used in the Smart classroom.

- The lesson in smart classroom needs to be delivered in a way in which the teacher uses the available digital devices and create a bridge between traditional methods and modern digitized technology so that utmost learning outcomes could be generated.

- Special and immediate measures should be taken to install or provide some e-content or e-resources for teaching Social Science, Hindi and Nepali. Moreover, all e-content needs to be translated in English for English medium schools and other vernaculars like for Hindi medium and Nepali medium schools in West Bengal.

- Teachers must be sensitized in the role of ICT for professional development by getting enrolled in MOOC and SWAYAM. Teachers may be encouraged to complete ICT related MOOC from different Institutions and Universities.

9. CONCLUSION

ICT has great potential for the improvement of quality of teaching and learning. This study has found that smart classroom project has been implemented in the secondary schools of West Bengal, India and some digital devices are provided to these schools. But half of the teachers are not oriented to use smart classroom for teaching different subjects. Further, majority of teachers are not aware about the free online resource material available on different subjects. The initiatives of NCERT and MHRD like ePathshala and NROER etc are not being used by the teachers and students. Hence, it is high time to orient teachers and HMs of all secondary schools on uses of ICT tools for teaching learning. Further, students of higher classes must be sensitized and encouraged to use free online resources including text, audio and video relating to school subjects.

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