IMPLEMENTATION OF SMART CLASSROOMS AMONG SECONDARY SCHOOLS IN PUDUCHERRY UNION TERRITORY

By

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ABSTRACT

Technology based teaching has been supported for nearly five decades in India. The Universalisation of Secondary Education policy of our government (India) in its Rashtriya Madhyamik Shiksha Ashiyan (RMSA) programme introduced Smart classroom and provided amenities for operation. Support for the significance in teaching learning programme is clear through the mandates and program development yet the question still arises related to the rigor of this approach to teaching and learning. The researchers had the finding out its utility in reality. This study focuses on work done in the Pondicherry Union territory. A Stratified random sampling technique was used for analysis to identify participants to determine if rigor was evident and at what levels. Therefore, the findings may be of help to the policymakers to make necessary actions in future implementation.

Keywords: Smart Classrooms, Interactive Learning Environment, Secondary School, RMSA.

INTRODUCTION

In ancient days, students were in a Gurukul system of education where they were taught by the Gurus. With the passage of time and progress in life, the Gurukula was replaced by modernized culture. New methods of teaching have been introduced and today we witness one of the most talented gifts of science, known as smart classrooms. In the world of competition, quality is the mantra of every educational organisation. Clearly, technology is evident in every system in its operation and the success is supported through effective utilization.

In today's schools education system, the classrooms are designed on SMART program. It has an interactive whiteboard working on a computer platform (Betcher & Lee, 2009). The environment of the classroom is centred on technology where the teacher and the students interact through a SMART board. The learners' participation is the core aspect of the teaching program. This program encompasses infrastructure, methodology of transaction, hardware, and software.

The coordination of all the above aspects creates an optimal learning environment considered as a smart classroom. It involves all learning shareholders and the learning ecosystem, and the process of its collaborative interaction in physical and virtual space. Here, the teacher is the guide to each student in an evolving journey rather than standing in front delivering messages in a linear one way fashion.

Such technology focussed interactive learning environment ignites excitement among the students towards the concept of innovation. This digitalized classroom has not only made learning interesting, but also provides an opportunity for students to enhance their performances. Smart classrooms have technology assistance to make teaching-learning meaningful. In the present day, students come with skill in operating technology, which is logical for the teacher in smart classrooms to get students involved in a meaningful learning. Moreover, this environment suits every individual with different learning styles and helps them to understand

abstract concepts. It is interactive and builds rapport between teachers and students.

Smart classrooms generate a complete transformation in students. As a result, students gain understanding of the concepts in class faster and more accurately to improve their overall academic performance. Students are engaged in the learning process throughout and teachers get an instant and accurate assessment of learning outcomes achieved at the end of the class.

1. Operational Definitions of the Terms Used

1.1 Smart Classroom

Smart Classrooms (SmCs) are centred on technology based transactions, providing opportunities for more meaningful teaching and learning. It is a classroom of integrating learning with technology, such as computers, specialized software, audience response technology, assistive listening devices, networking, and audio/visual capabilities. Smart class is a digital initiative in changing the conventional approach and methodology that teachers use to teach to student-centred learning in an innovative manner using technology (Amin & Jan, 2018). In this research, the smart classrooms of Secondary Education at Puducherry were used to investigate the application and teaching approaches to support learning through technology.

1.2 Secondary Schools

A school having highest class up to 9th or 10th will be termed as Secondary School (NCERT, 2003). Secondary school indicates Ninth and Tenth standard/ class/grade (for 14 to 16-year-olds) in India (British Council, 2014). In this study, secondary schools from three different boards from Puducherry, Union territory are investigated to determine how Smart classrooms applications are being used to support learning.

1.3 RMSA

Rashtriya Madhyamik Shiksha Abhiyan is a Central Government Program launched in March, 2009 with the objective to enhance access to secondary education and to improve its quality. The implementation of the program started in 2009-2010. It aimed at achieving an enrolment increase of 75% from 52.26% in 2005-2006 at secondary stage of implementation of the scheme by providing a secondary school within a reasonable distance of local populations. The aim was to improve the quality of education at the secondary level by making all secondary schools conform to prescribed norms, removing gender, socio-economic and disability barriers, providing universal access at the secondary level of education by 2017, i.e., by the end of 12th Five Year Plan, and achieving universal retention by 2020 (MHRD, 2016).

2. Statement of the Problem

The problem was limited access to technology in classrooms at the secondary level across all groups of students. This study was to investigate the use of smart classrooms and its implementation in delivering instruction. Schools in the 21st century included products of technology including smart classrooms as a key component to support student learning. Most researches have shown that technology has been an effective way of communicating information. Many teachers have shifted away from the traditional lecture method and have integrated technology or smart classrooms in their teaching. Above all, RMSA 2009 had given a framework of curriculum focusing on smart classroom practice. On the basis of the policy implementation, the investigator wanted to determine the implementation level and support for student learning over nine years of time.

3. Need of the Study

The scheduled time framework of RMSA was 2009-2018. It has completed its first phase. As smart classrooms are designed for achieving the global challenges, there is a need to know about the reality of smart classroom.

4. Review of Literature

In 2008, an educational organization that works in 60 countries across the world, established a pilot study whereby smart classrooms were installed for use in six middle and senior high school in Israel. Formative evaluation accompanied the pilot study for two years in order to examine the effects of integrating technology into instruction on teachers, students and the school community (Bakkan, Uskov, Penumasta, & Dodda-Paneni, 2016; Bloom, 1956). The findings included student motivation and engagement in the learning process

increased when studying in smart classroom, based on teachers' perception of effects of professional development and enhanced technology skills (Manny-Ikan, Dagan, Tikochinski, & Zorman, 2011).

Pishva and Nishantha (2008) define a Smart Classroom as an intelligent classroom for teachers involved in distant education that enables teachers to use a real classroom type teaching approach to teach distant students. "Smart classrooms integrate voice-recognition, computer-vision, and other technologies, collectively referred to as intelligent agents, to provide a tele-education experience similar to a traditional classroom experience".

Amritbir (2001) had made a comparative study of schools with and without smart classrooms in relation to determine the achievement motivation of students. He says that as there is an increase in student modalities or sensory learning in this technique compared to traditional teaching, a large percentage of students in school with smart classrooms are highly motivated towards achievement (Chachra, 2015).

Glogorić, Uzelav, and Kraco (2000) have studied the significance of using Internet of Things (IoT) technology to build a smart classroom. They found out that the interactions of IoT technology with social and behavioural analysis for any normal classroom can be transformed into a smart classroom that actively listens and analyses voices, conversation, movements, behaviour, etc., in order to reach a conclusion about the classroom transactions and listeners' satisfaction.

Thus the researcher inferred from the reviews that a smart classroom is an essential component in this technology era.

5. Objectives of the Study

At the end of this study, the researcher will be able to,

- Identify the physical facilities available in a smart classroom.
- Identify the different teaching methods being used in smart classroom.
- Identify the uses of smart class in teaching learning process.
- Give an overview of the operation of smart classrooms in general and educational context in specific.
- Determine the frequency and application of smart board use.

6. Development of a Tool

Tool: A questionnaire for secondary school students on the operation of Smart classrooms (Developed by the investigator).

This questionnaire consists of items enveloping dimensions, such as – physical facilities and teaching strategies, use of smart classroom in teaching and learning process, Teacher's comfort level using smart board and other components of smart classroom and use of smart board in a week. Among the five, the three dimensions, such as use of smart classrooms in teaching learning process, teachers' comfort level using smart board, and other components of smart classroom and use of smart board in a week have five point likert scale. The dimensions Physical facilities, and Teaching Strategies are observed through options -'yes' or 'no' questions. It is tabulated in Table 1. All these 5 dimensions were used to achieve the objectives of this study. Initially, the tool had 10 items and the final draft had 7 items, after the establishment of validity construct by getting expert's opinion.

7. Population and Sample Selection

Population: The High school students from secondary schools in the Union Territory of Pondicherry were the participants.

7.1 Sampling Techniques

The population contains different subgroups. Therefore stratified random sampling technique was adopted and it is depicted in Table 2.

Sample/Sample size: The study was carried over from five schools and the size of the sample was 150 secondary school students. The sample includes two central board schools (KVS and JNV), two international board schools (Achariya Akyalava International School and The Study Lecole International School), and one state board school (Vivekananda Higher Secondary School) in Pondicherry.

From Table 2, it is inferred that among 150 secondary schools students, 40% of them are taken from the Government CBSE schools (Kendriya Vidyalaya, Jawahar Navodaya Vidyalaya), 40% of them are from International

Sl. No.	Dimensions	Components
1	Physical Facilities	Erase whiteboard Digital projector Wall projector Smart board Document Camera Laptop Computer
2	Teaching Methodology	Audio-visual Tools Real world learning through demonstration Brainstorming Story board telling Work together as a team using computer Puzzles and Games
3	Use of Smart Classroom in Teaching Learning Process	Send or read email messages. Search the internet to collect/ download/ upload/ browse material from your class Use smart class when working in a group Contribute to and or create blog or discussion forums for school work Teaching of lesson using website Recording the responses of the students on comprehension Enhancing students interaction in classroom Providing time for student's original presentation.
4	Teacher's comfort level using smart board and other components of smart classroom	
5	Frequency of smart board use by teachers in a week	

Table 1. Dimensions of the Smart Classroom to be Studied

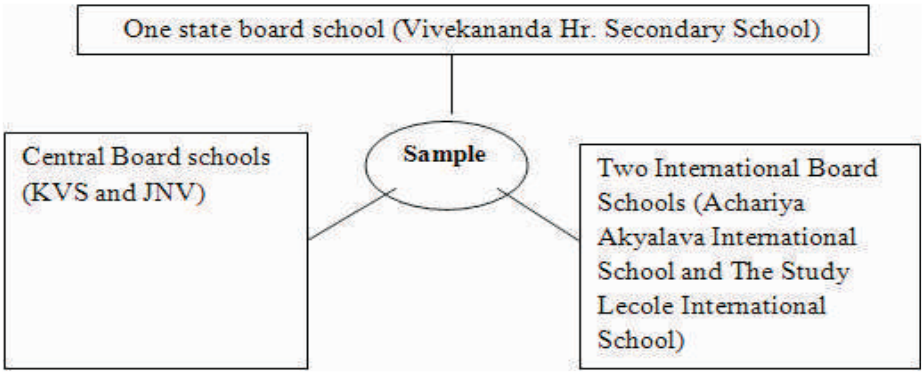

Figure 1. Stratified Random Sampling

Board of School	Government CBSE Schools		International Board Schools		State Board School
Name of the School	Kendriya Vidyalaya	Jawahar Navodaya Vidyalaya	The Study Le'cole International	Aklavya International School	Vivekananda Higher secondary School
Ownership	Government	Government (Residential)	Private	Private	Private
Frequency	40	20	30	30	30
Percentage	26.6	13.4	20	20	20

Table 2. Distribution of (Sample) Students based on the Boards of Schools

Board Schools (The Study Le'cole International School and Aklavya International School), and 20% of them are from State board school (Vivekananda Higher Secondary School).

8. Methodology and Duration of the Programme

In this study, the researcher used survey method by administering a questionnaire to the sample chosen. The duration of the study was for 15 days.

9. Data Analysis Process

In this research, the researcher analysed the data by using descriptive statistical techniques which are discussed in the following tables, based on the objectives.

9.1 Descriptive Analysis of Students' Responses on Smart Class Room Experiences

Objective 1: To identify the physical facilities available in a smart classroom

From Table 3, it is shown that among 150 secondary schools students, 66.7% of students gave positive response to having 'erase whiteboard' in their class, 100% of students with 'digital projector', 'smart board', and 'laptop computer' and there is no wall projector and 'document camera' in their classroom. The graphical representation of students' response from Table 3 is shown in Figure 2.

Objective 2: To identify the different teaching methods being used in a smart classroom

From Table 4, it is shown that among 150 secondary schools students, 89.3% of students gave positive response to the use of audio-visual tools by teachers in their classroom, 87.3% of students gave positive response to the use of real world learning through demonstration, 68.7% of students with brainstorming, 68% of students with Storyboard telling, 100% of students with work together as a team using computer, and 53.3% of students with puzzles and games. The graphical representation of teaching method in smart classroom is shown in Figure 3.

Physical Facilities	Frequency	Percentage
C.1 Erase Whiteboard	100	66.7
C.2 Digital Projector	150	100
C.3 Wall Projector	0	0
C.4 Smart Board	150	100
C.5 Document Camera	0	0
C.6 Laptop Computer	150	100

Table 3. Distribution of the Scores based on the Response of the Sample for the Dimension - Physical Facilities in Smart Classroom

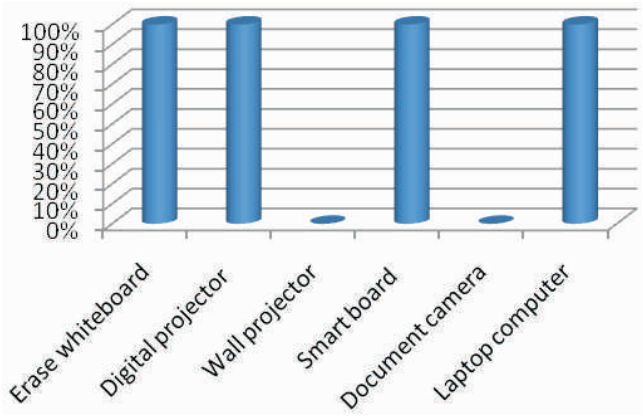

Figure 2. Physical Facilities in Smart Classroom

Teaching Methods	Frequency	Percentage
C.1 Audio-visual Tools	134	89.3
C.2 Real world learning through demonstration	131	87.3
C.3 Brainstorming	103	68.7
C.4 Story board Telling	102	68
C.5 Work together as a team using computer	150	100
C.6 Puzzles and Games	80	53.3

Table 4. Distribution of the Scores based on the Response of the Sample for the Dimension - Teaching Methods in Smart Classroom

Objective 3: To identify the uses of smart class in teaching learning process

From Table 5, the data gathered from each statement are given below.

From Statement 1 (Send or Read email messages), it is shown that among 150 secondary school students, a maximum of 65.3% of students said that they are using computer sometimes for the teaching learning process, 5% of students gave the response as they are using computer often, 22.7% of students rarely, and 6% students never. Figure 4 shows the graphical representation of using computer in teaching and learning process.

From statement 2 (Searching the internet to collect/ download/ upload/ browse materials by teachers and students), it is shown that among 150 secondary schools students, 9% of students gave the response that they are using smart class for searching the internet to collect/ download/ upload/ browse material all the time. 46.7% of students are using smart class often, 38.7% of students with

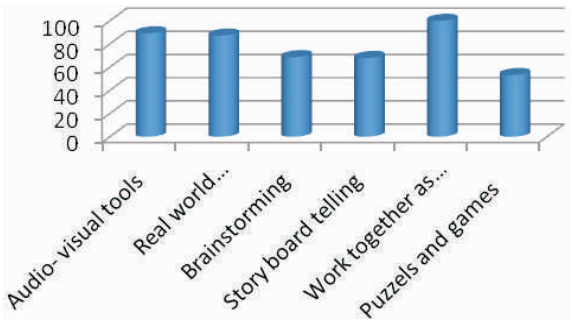

Figure 3. Teaching Method in Smart Class Rooms

Statement	Measurement	Never	Rarely	Sometimes	Often	All the time
Statement 1	Frequency	10	34	98	08	0
	Percentage	06	22.07	65.03	05	0
Statement 2	Frequency	0	13	58	70	09
	Percentage	0	08	38.07	46.07	06
Statement 3	Frequency	0	06	97	37	10
	Percentage	0	04	64.07	24.06	06
Statement 4	Frequency	50	76	17	07	0
	Percentage	33.3	50.7	11.3	4.06	0
Statement 5	Frequency	0	07	98	38	07
	Percentage	0	04.07	65.03	25.03	04.07
Statement 6	Frequency	07	08	119	12	04
	Percentage	04.06	05.03	79.03	08	02.07
Statement 7	Frequency	0	0	23	82	45
	Percentage	0	0	15.03	54.07	30
Statement 8	Frequency	0	0	10	84	56
	Percentage	0	0	06.07	56	37.03

Table 5. Distribution of Scores based on the Response of the Sample for the Third Dimension - The Use of Smart Class in Teaching and Learning Process

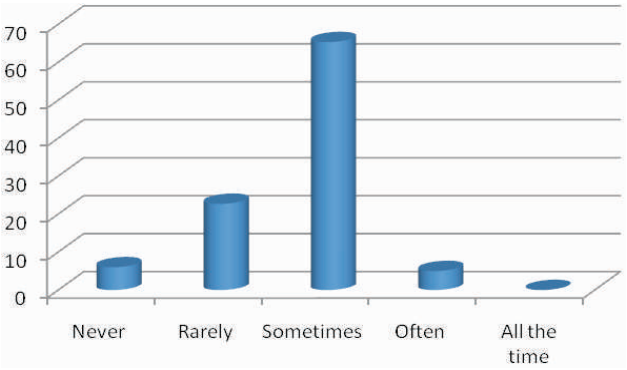

Figure 4. The Use of Computer in Teaching Learning Process

sometimes, and 8% of them with rarely. Figure 5 shows the response of the students and teachers while using the internet to collect/download/upload browse materials.

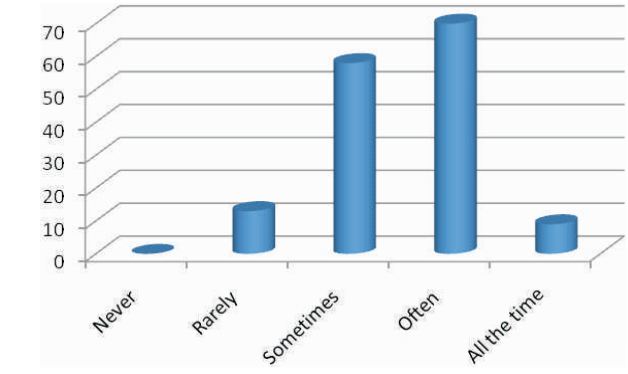

Figure 5. Searching the Internet to Collect/ Download/ Upload/ Browse Materials by Teachers and Students

From statement 3 (Use of smart class when working in a group), it is shown that among 150 secondary schools students, 6% of students gave the response that when working in a group they are using smart class for all the time, 24.6% of students are using smart class often, 64.7% of students with sometimes, and 4% of the students with rarely. Figure 6 shows the graphical representation of students' response in smart class when working in a group.

From statement 4 (Contribute to and or create blog or discussion forums for school work), it is shown that among 150 secondary schools students, 4.6% students gave the response that they are using smart class to contribute to and create blog or discussion forums for school work often.

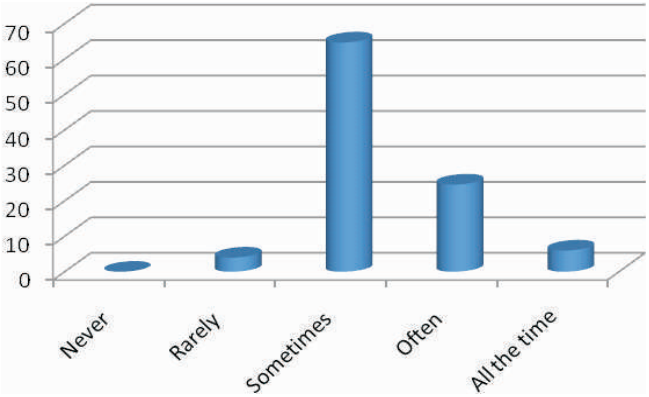

Figure 6. Use of Smart Class when Working in a Group

11.3% students are using smart class sometimes, 50.7% with rarely, and 33.3% with Never. Figure 7 shows the graphical representation of students' response to Contribute and or create blog or discussion forums for school work.

From statement 5 (Teaching of lesson using website), it is shown that among 150 secondary schools students, 4.7% of students gave the response that teachers are using smart class in their teaching- using website all the time, 25.3% of students with - often, 65.3% of students with - sometimes, and 4.7% of them with- rarely. Figure 8 shows the graphical representation of students' response about teachers using website while teaching the lesson.

From statement 6 (Recording the responses of the students on comprehension), it is shown that among 150 secondary schools students, 2.7% of students gave the response that teachers are using smart class in recording of responses of the students on comprehension - all the time, 8% students with- often, 79.3% of students with -sometimes, 5.3% of students with - rarely, and 4.6% of them with -never. Figure 9 shows the response of students on comprehension.

From statement 7 (Enhancing students interaction in classroom), it is shown that among 150 secondary schools students, 30% of students gave the response that teachers are using smart class in enhancing student's interaction in classroom- all the time, 54.7% of students with -often, and 15.3% of them with- sometimes. Figure 10 shows the interaction of students in classroom.

From statement 8 (Providing time for student's original presentation), it is shown that among 150 secondary schools students, 37.3% students gave the response that teachers are using smart class in providing time for student's original presentation- all the time, 56% with- often, and 6.7% with -sometimes as shown in Figure 11.

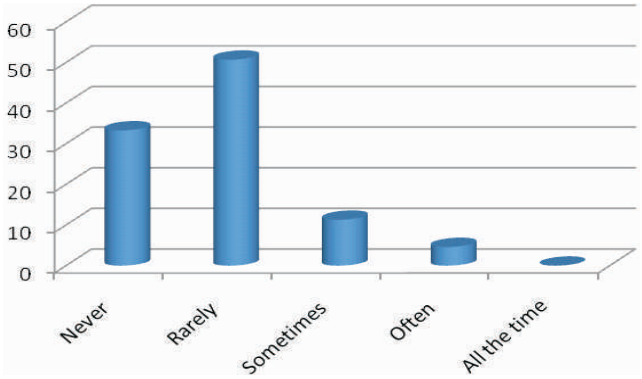

Figure 7. Contribute to and or Create Blog or Discussion Forums for School Work

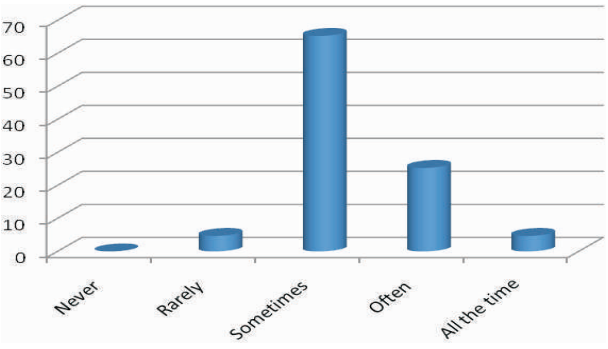

Figure 8. Teaching of Lesson using Website

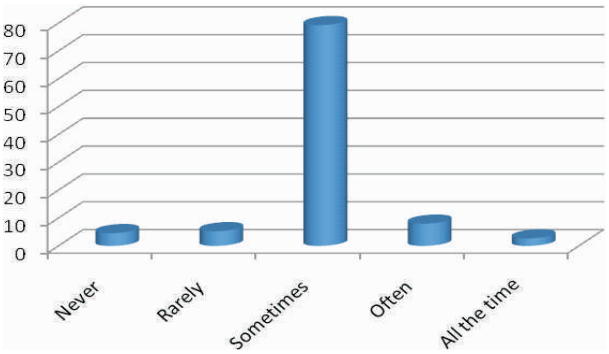

Figure 9. Recording the Responses of the Students on Comprehension

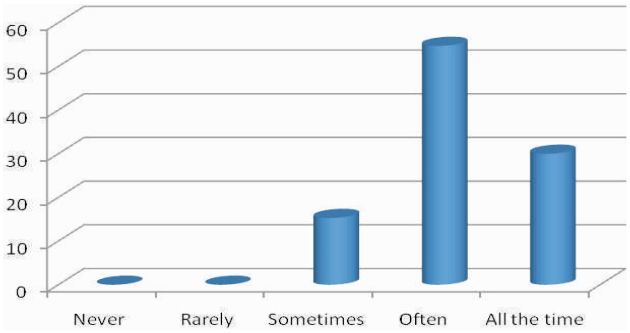

Figure 10. Enhancing Student's Interaction in Classroom

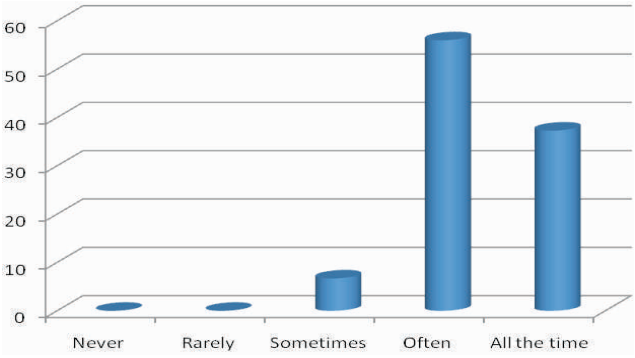

Figure 11. Providing Time for Students' Original Presentation

Objective 4: To give an overview of the operation of smart classrooms in general and educational context in specific

From Table 6, it is shown that among 150 secondary school students, 8% of students gave the response that teachers' comfortability level for using smart board – expert and 17.03% of students gave the response that teachers are in - Advance stage using smart board and other components of smart classroom, 31.3% of students say that teachers are in intermediate level in using smart board and other components of smart classroom, 39.3% of students say that teachers are in basic level in using smart board and other components of smart classroom, and 4% of students say that teachers are in novice level in using smart board and other components of smart classroom. Figure 12 shows the graphical representation of Teacher's comfort level using smart board and other components of smart classroom.

Objective 5: To find out the Smart Board usage by Teachers in a week

From Table 7, it is shown that among 150 secondary schools students, 6.6% students gave the response that they are using smart board less than one day, 7.3% are using 1-2 days a week, 20.7% are using 3-4 days a week, and 65.3% are using daily. Figure 13 shows the students' response of using smart board by the teachers in week time.

Statement	Novice	Basic	Intermediate	Advance	Experts
Frequency	6	59	47	26	12
Percentage	4	39.3	31.3	17.3	8

Table 6. Distribution of the Scores based on the Response of the Sample for Teacher's Comfort Level using Smart Board and other Components of Smart Classroom

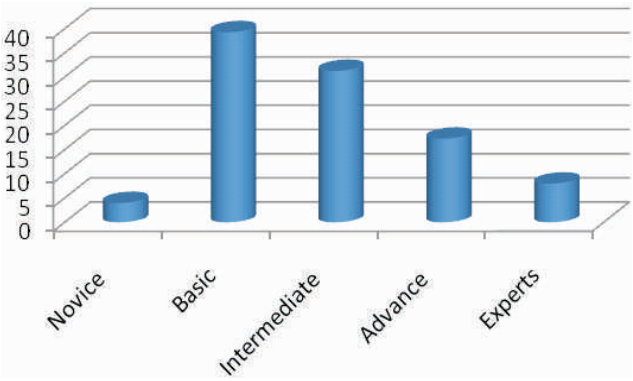

Figure 12. Teacher's Comfort Level using Smart Board and other Components of Smart Classroom

Statement	Daily	3-4 days a week	1-2 days a week	Less than 1 day
Frequency	98	31	11	10
Percentage	65.3	20.7	7.3	6.6

Table 7. Distribution of the Scores based on the Response of the Sample for use of Smart Board by a Teacher in a Week

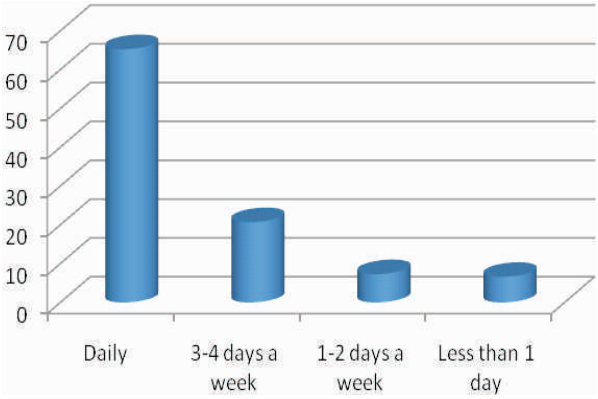

Figure 13. Use of Smart Board in a Week's Time

Table 8 shown that there is 100% of usage of Digital projector, smart board, and Laptop computer by all the Boards of schools. There is nil usage of wall projector and document camera in all the boards of schools. The International schools have high usage of Erase white board comparative to other boards.

With regard to different teaching methods, all the boards show that there is team work in terms of using computers. Among the three types of boards, Government CBSE schools use Audio-Visual tools, real world learning through demonstration, brainstorming, and storyboard telling as a teaching method in their Smart classrooms when there is less usage in other two boards (Marcellus, 1998). Usage of puzzles and games as a teaching method in their smart classrooms is the highest in International Board schools in comparison to other boards.

The use of Smart class teaching learning process in all the boards of schools is to search the internet to collect resources (Wood, 2001). They do have interactions in the classroom and provide time for students' original presentation. International boards use smart class when working in a group very often, whereas the other boards use sometimes. All the boards only sometimes send email messages. The contribution in creation of blogs for school work is rarely in all the three boards (Yau, Gupta, Karim,

Objectives	Government CBSE Schools	International Board Schools	State Board Schools
1	C.1 - 17.4% C.2, C.4 & C.6 - 100% C.3 & C.5 - 0%	C.1 - 32% C.2, C.4 & C.6 - 100% C.3 & C.5 - 0%	C.1 - 17.3% C.2, C.4 & C.6 - 100% C.3 & C.5 - 0%
2.	C.1 - 37%; C.2 - 25.4% C.3 - 28.6%; C.4 - 28% C.5 - 100%; C.6 - 21.8%	C.1 - 27%; C.2- 21.9% C.3 - 20%; C.4 - 20% C.5 - 100%; C.6 - 23.4%	C.1 - 25.3%; C.2 - 40% C.3 - 20.1%; C.4 - 20% C.5 - 100%; C.6 - 8.1%
3	S.1 - Sometimes S.2 - Often S.3 - Sometimes S.4 - Rarely S .5 - Sometimes S .6 - Sometimes S.7 - Often S.8 - Often	S.1 - Sometimes S.2 - Often S.3 - Often S.4 - Rarely S .5 - Sometimes S .6 - Sometimes S.7 - Often S.8 - Often	S.1- Sometimes S.2 - Often S.3 - Sometimes S.4 - Rarely S .5 - Sometimes S .6 - Sometimes S.7 - Often S.8 - Often
4	Basic comfort level in using Smart board and other components of smart classroom	Intermediate comfort level in using Smart board and other components of smart classroom	Basic comfort level in using Smart board and other components of smart classroom
5	Daily usage	Daily usage	Daily usage

Table 8. Board-wise Responses based on Objectives

Ahamad, Wang, & Wang, 2003). Teaching a lesson using a website and recording the responses of the students on comprehension happen only sometimes in all the boards.

The Government CBSE board and State Board schools teachers' comfort level in using Smart board and other components of smart classroom is only in a basic level. And in International Schools, it is in the Intermediate level. Almost every day, the smart board is used in all the schools.

10. Results and Findings

In this research, the researcher used different dimensions of the smart classroom. They are physical facilities (6 elements), teaching methods (6 elements), use of smart classroom in teaching learning process (8 statements), time usage for smart class, and comfortability level of teachers to use smart class in their teaching process. For this, the researcher has constructed a questionnaire and administered it to students. All these 5 dimensions are used to achieve the objectives of this study.

From the above data analysis, it is understood that under the objective of physical facilities in smart classroom, there are total 6 elements. Among 150 secondary schools students, 66.7% of students gave positive response to have 'erase whiteboard' in their class, 100% of students with 'digital projector', 'smart board' and 'laptop computer', and there is no 'wall projector' and 'document Camera' in their classroom (Tyack & Cuban, 2000). In most of the schools, recommendations related to smart classroom facilities according to RMSA are established during these nine years.

Under the objective of teaching methods in a smart classroom there are 6 elements. Among 150 secondary schools students, 89.3% of students gave positive response to the use of audio-visual tools by teachers in their classroom, 87.3% of students gave positive response to the use of real world learning through demonstration, 68.7% of them with brainstorming, 68% of them with Storyboard telling, 100% of them with work together as a team using computer, and 53.3% of them with puzzles and games.

Under the objective of the usage of smart class in teaching learning process there are total 8 statements. From the above analysis, it is understood that most of the teachers are using smart class for teaching learning process. Among 150 secondary schools students, 8% of students gave the response that teacher's comfortability level for using smart board and other components of smart classroom is in the level, 'experts', 17.3% are in 'advance', 31.3% of them are in 'intermediate', 39.3% of them are in 'basic', and 4% of them are in 'novice'. Among 150 secondary schools students, 6.6% of students gave the response that they are using smart board less than one day, 7.3% of them are using 1-2 days a week, 20.7% of them are using 3-4 days a

week, and 65.3% of them are using daily.

Under the objective of giving an overview of the operation of smart classrooms in general and educational context in specific, it is inferred that among 150 secondary school students, 8% of students gave the response that teachers' comfortability level for using smart board – expert and 17.03% of students gave the response that teachers are in - Advance stage using smart board and other components of smart classroom, 31.3% of students say that teachers are in intermediate level in using smart board and other components of smart classroom, 39.3% of students say that teachers are in basic level in using smart board and other components of smart classroom, and 4% of students say that teachers are in novice level in using smart board and other components of smart classroom.

Under the objective of finding out the Smart Board usage by Teachers in a week, it is inferred that among 150 secondary schools students, 6.6% of students gave the response that they are using smart board less than one day, 7.3% of them are for - using 1-2 days a week, 20.7% are for using 3-4 days a week and 65.3% of them are for using daily.

Almost in all the schools under different boards in Puducherry, smart class is functioning. They use different methodology in operating the boards in smart classrooms. But they do not show interest in mail usages and blog usages. It is being used only in classroom transactions and for collection of resources from internet. On looking at the comfort level of the teachers on the usage of Smart rooms, the researcher understood that teachers do need motivation and practice oriented training programmes.

The researcher collected reflections from teachers and interviewed the Principals to know about its effectiveness on the development of learners. The qualitative analysis of the reflective reports show that unanimously all teachers opine that students have built self-confidence and skill in using technical gadgets for learning. It gives them the skill of resource finding, writing and reading skill, and also expression skill. Their role in smart classroom motivates them to attend classes regularly and the interactions in class are healthy and rich. The Principals convey that it improved the overall achievement of the school. And there is greater support from Parents too. Parents show pride and confidence at 21st century skill development among their children.

11. Implications

On observing the recent developments on Smart classrooms, steps have been taken by the government to make Information Communication Technology, a mandatory component in school curriculum. It aims at preparation of Indian youth towards global participation in knowledge society creatively for sustainable developments. As a consequence, there are stringent measures to establish smart schools, which shall be technology demonstrators.

Though a decade has been over in the implementation of smart classrooms and the policy on the usage of ICT in school education is spelt out, there is a need for monitoring systems on the operation of smart classrooms are essential. The curriculum structure of each school should include optimal usage of smart classrooms in its teaching - learning and evaluation programme. This research will be an eye opener to the authorities' concern for streamlining monitoring systems and designing need based in-service training for school teachers on smart classroom operations.

Conclusion

The results reveal that smart classroom is more effective in efficient learning process. Smart classrooms rethink learning space and learners' expectations about what this space, along with resources and methodologies should be like. We can say that smart classroom is a platform where teachers and students can make attempts to learn all available techniques and tools for maximum utilisation of resources for widening up their knowledge. This investigation brought out awareness among the authorities and stakeholders on the actual status of the implemented Smart classroom program of RMSA.

From the above study, it can be concluded that Technology based Smart classrooms need to be used, and the instructors should always remember that students have widely heterogeneous needs and learning styles. Also, it should always be remembered that the instructor's goal should be deep learning and that excellent teaching skills are needed to reap benefits from technology and overcome its limitations.

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Appendix

Implementation of Smart Classrooms among Secondary Schools in Puducherry Union Territory

I am a student of M.Ed Second Year in the School of Education at Pondicherry University, India. I am visiting your school for the collection of data in order to serve the purpose of my practicum which is a part of the Master of Education curriculum, Pondicherry University. The data collected would be purely for my understanding of the sustainability of smart classrooms in your school and will remain confidential. Therefore, it is my earnest request to help me out by providing the authentic data as per your best knowledge. I shall remain thankful to you for doing so. Here I attach the tool for data collection and request you to go through the instructions before filling in the details.

Questionnaire for Students

1) Do you have the following in your classroom?

Physical Facilities	Yes	No
Erase whiteboard		
Digital projector		
Wall screen		
Smart board		
Document camera		
Laptop computer		

2) How often do you use computer for the following activities during your lessons in your classroom?

Statement	Never	Rarely	Some times	Often	All the time
Send or read email messages					
Search the internet to collect/ download/ upload/ browse material from your class					
Use computer when working in a group					
Contribute to and or create blog or discussions forums for school work					
Teaching of lesson using website					
Recording of responses of the students on comprehension					
Enhancing students interaction in classroom					
Providing time for students original presentation					

3) What kinds of methods are used to raise academic achievements in your smart classroom by your teachers?

Methods	Yes	No
Audio Visual Tools		
Real world learning through demonstration		
Brainstorming		
Story Board Teaching		
Work together as a Team using Computer		
Puzzles and Games		

4) How frequently do you use your smart board?

Daily ☐ 3-4 days in a week ☐ 1-2 days in a week ☐ less than 1 day ☐

5) Describe teacher's comfort level using smart board and other components of smart classroom?

Novice ☐ Basic ☐ Intermediate ☐ Advance ☐ Experts ☐

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