Strategies of Classroom Transaction of Science at Upper Primary Level in the Light of NCF-2005

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Abstract

The present paper highlights the research findings on the strategies of classroom transaction at upper primary level of science in the light of NCF-2005. Further it aimed to identify the students' co-perception towards classroom transaction of science at upper primary level in the light of NCF-2005.

School education has been periodically passing through different curricular and other reforms since independence. National Council of Educational Research and Training (NCERT) is an apex body which has always played an important role in this reforms and activities. Recently the council has brought out the National Curriculum Framework (NCF)-2005 with wide discussion and debates adding to the series of earlier Curriculum Framework, i.e., 1975, 1988, 2000. The guiding principles that NCF 2005 highlighted are:

- Connecting knowledge to life outside the school,
- Ensuring that learning is shifted away from rote method,
- Enriching the curriculum to provide for overall development of children rather than remain textbook centric
- Making examinations more flexible and integrated into classroom life and
- Nurturing and overriding identity informed by caring concerns within the democratic polity of the country.

NCF emphasises on giving primary to child's voices and questions in the

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classroom and also advices teaches to connect child's day-to-day experiences with school knowledge simultaneoulsy integrating assessment with classroom learning. Keeping all the above guiding principles of curriculum development in view, NCF-2005 proposes significant changes in curricular areas. With regard to teaching of Science the document states that Science is a dyanamic, expanding body of knowledge, covering ever-new domains of experience. In a progressive forward–looking society, Science can play a truly liberating role, helping people escape from the vicious cycle of poverty, ignorance and superstition. Good science education is true to the child , true to life and true to sciences. The document elaborates upon basic criteria of validity of science curriculum i.e., cognitive validity, content validity, process validity, historical validity, environmental validity and ethical validity. NCF-2005 recommended that teaching of science should be recast so that it enables children to examine and analyse everyday experiences.

Concerns and issues pertaining to the environment should be emphasised in every subject and through a wide range of activities involving outdoor project work. Some of the information and understanding flowing from such projects could contribute to the elaboration of a publicly accessible, transparent database on India's environment, which would in turn become a most valuable educational resource. If well planned, many of these student projects could lead to knowledge generation. A social movement along the lines of Children's Science Congress should be visualised in order to promote discovery learning across the nation and eventually throughout South Asia.

The NCF-2005 recommends that in our classrooms the traditional teacher dominated 55 read and remember till asked practice has to be replaced by pupil-centred, activity centred teaching learning process. Children will learn only in an atmosphere where they feel they are valued. Our schools still do not convey this to *all* children.

The association of learning with fear, discipline and stress has to be replaced with enjoyment and satisfaction for the real learning. The students should be provided with necessary resources, guidance, strategies, time and freedom so that they can enhance their own knowledge in the right manner. The document also emphasised upon the need of appropriate infrastructural facilities for a school. In fact, the structuring of infrastructural facilities is essential for paving the way for creating a learner–friendly and activity–centric context. Setting norms and standards, especially relating to space, building and furniture would help in fostering a discerning sense of quality. The document categorically emphasises that classroom learning be connected to outside school experiences and provide enough opportunities for students to go beyond the textbook. For this purpose the students ought to be encouraged to learn from each other, from environment, take up relevant activities, critically analyse and ask questions and try to find answers of them. The methodology of student evaluation should also change according to this situation.

The new development by the NCERT for all the stages of school education in all subject areas are in tune with the perspective of the NCF-2005 new syllabi and textbook. The textbooks of upper primary classes (VI-VIII) have been designed innovatively keeping in view the underpinings of child-centred pedagogy.

These learning materials are interactive and have been developed around the experiences of children. A number of activities have been given in the text-books which are to be performed by the students individually or in groups. Burden of the information has been reduced and ample opportunities have been provided in the textbooks to go beyond the classroom.

The teachers around the country have been oriented on NCF-2005 through the different programs organised by NCERT. The new textbooks are now being used by the teachers in the schools. They have to be used by the teachers and the students according to the recommendations of NCF-2005. The effectiveness of the recommendations of NCF-2005 can be wholly achieved if its objectives of teaching science can be transacted in the actual classroom situation while teaching these subjects. The students' acceptance and perception to the new curricula also guarantees the success of the new curricula. The role of the teacher in the modern classroom has to be also understood and taken care of while transaction of the new curriculum. It is henceforth be very interesting to study as to what extent the teachers and students are adopting these changes made in the textbooks and its transaction and what are the difficulties they face in adopting them. The present study is an attempt to study these aspects.

Objectives of the study

The objectives of the study are the following:

i. to find out sateges of the infrastructural facilities available for classroom transaction in the light of NCF-2005 at upper primary level.
ii. to study the learning strategies adopted for classroom transaction of science textbooks in the light of NCF-2005 at upper primary level.
iii. to identify students perception towards classroom transaction of science textbooks in the light of NCF-2005 at upper primary level.

Methodology

Sample: Three states of eastern region i.e. Jharkhand, Odisha and West Bengal are selected for the study and for the administration of the tools. The selection of schools was made through purposive random sampling method. All selected school are affiliated to CBSE, New Delhi and follows NCERT textbooks.

The details of the sample are as below:

Table 1

State wise Selection of Schools in Urban and Rural Setup

Odisha–3 Schools, Urban(3)	Jharkhand-5 Schools, Rural(2), Urban(3)	West Bengal-2 Schools Rural(1), Urban(1)

Tools: Four measuring tools in the form observation schedule were prepared for measuring the different dimensions of the infrastructural facilities available at upper primary level as well as for measuring transaction strategies of science students response of transactional facilities at upper primary level. The tools were prepared by the experts and resource persons in a workshop organised at NCERT, New Delhi from June 20-24, 2008. The description of the observation schedule is as follows:

i. *School facilities:* A performa containing columns for information about different facility available was developed. It gave information about library, laboratory, ICT facilities, demonstration kits, science clubs, science park, school garden, etc. available in school.

ii. *Classroom Facilitation:* Information about facilitation for instruction available in classroom was collected in the Performa as Yes or No. Information was collected on sufficiency and flexibility of seating arrangements availability of ICT facility in classroom, availability of science corner, visibility of black board, proper lighting, ventilation and availability of space for demonstration and bulletin board/ display board.

iii. *Classroom Transaction:* The investigators recorded observations in classroom about the introduction of the content, interaction in classroom, performance of activity for learning facilitation, evaluation methods and lab skills. The investigators recorded the observations YES/NO/NA and noted some remarks for making qualitative judgement.

iv. *Student's Response:* A questionnaire was developed in writing response in YES/NO/NA. The purpose of this was to involve the students and to take their view regarding the transaction of the Science contents in the classes.

Findings

The data was collected under the above four aspects namely school facilities, classroom facilities, classroom transaction and students response for the classroom transaction. The findings are as follows:

School facilities: School facilities include information about library, laboratory, ICT facilities, demonstration kits, science park and school garden. The findings showed that seating capacity of school in the library are adequate both in rural and urban setup. All the schools in urban areas possessed more than

Table 2

School Infrastructural Information at Upper Primary Stage in terms of Rural, Urban and Total Percentage (N-Schools Observed)

School Facilities	*Rural (%),N=3*	*Urban (%),N=7*	*Total (%),N=10*
Library			
Seating capacity in library (40 or more)	100	100	100
No. of books (5000 or more)	66.66	100	90

Adequacy of no. of magazines (more than 16)	66.66	100	90
No. of newspapers (5 or more)	66.66	71.42	70
Adequacy of periods allotted for upper primary classes	100	100	100
Issue of books to students	100	100	100
Laboratory			
Upper primary science lab	66.66	57.14	60
Upper primary maths lab	33.33	100	80
ICT facilities			
Adequate no. of computers (more than 20)	66.66	85.71	100
Overhead projector	33.33	85.71	70
LCD projector	66.66	85.72	80
TV/CD/DVD player	100	100	100
Demonstration kits			
For science	100	100	100
For maths	100	100	100
Clubs			
Science club	66.66	57.14	60
Maths club	66.66	71.42	70
Science park	0	0	0
School garden	66.66	100	90

5000 books whereas only 66.66% schools in the rural area are having more than 5000 books. 66.66% schools in rural setup and 71.42% schools in the urban setup are availing more than 5 newspapers daily. It is observed that total 60% of the schools (66.66% of rural and 57.14% of urban setup) have upper primary science lab whereas 85.71% of the urban schools are having adequate ICT facilities. Although there are some schools having science club in the schools, there is no school having Science Park. The results can be summarised in Table 2.

Classroom facilities: Classroom facilities included information on sufficiency and flexibility of seating arrangements, availability of ICT facility in classroom, availability of science and mathematics corner, visibility of black board, proper lighting, ventilation and availability of space for demonstration and bulletin board/display board. The findings indicates that there are adequate seating arrangement, flexibility of seating arrangement, visibility on blackboard and proper light and ventilation in the classroom at upper primary stage.

Table 3
Classroom Facilities at Upper Primary Stage in terms of Rural, Urban and Total Percentage (N=Classroom Observed)

Classroom Facilities	*Rural (%),N=103*	*Urban (%),N=83*	*Total (%),N=186*
CF.1. Adequate seating arrangement	89.33	100	74.80
CF.2. Flexibility of seating arrangement	65	98.80	63.70

CF.3. ICT facility in the classroom	0	2.4	0.9
CF.4. Science and Maths corners available	0	1.2	0.4
CF.5. Visibility on blackboard	96.11	98.8	77.44
CF.6. Bulletin board/Display board	46.66	97.6	55.10
CF.7. Proper lighting	91.33	100	75.60
CF.8. Proper ventilation	91.33	100	75.60
CF.9. Space availability for demonstration/group activity	71.80	100	67.10

ICT facilities and science corners in the classrooms are not available in mostly schools. Classrooms of 46.66% of rural schools and 97.66% of urban schools have bulletin board/display board facility. All the urban school classrooms and 71.84% classrooms of rural schools have space available for demonstration. The above findings can be more clearly understood by Table 3 and Fig. 1.

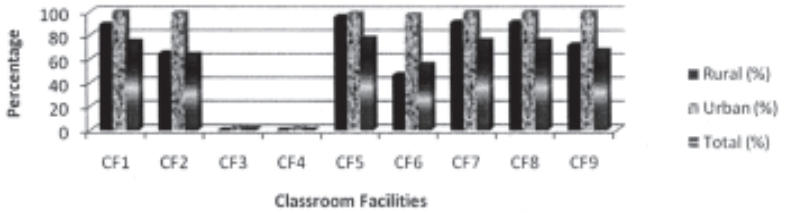


Fig. 1: Classroom facilities at upper primary stage in rural and urban setup

Classroom transaction: The findings regarding the classroom transaction procedures have been divided under the six heads relating to introducing the lesson, interaction with learners, learning facilitation, activity performed during class, assessment techniques and laboratory skills of learners. These all phases of classroom transaction were seen according to the recommendations of NCF-2005 document. It is found that the introduction of the lesson is done almost appropriately in the urban schools than their counterpart.

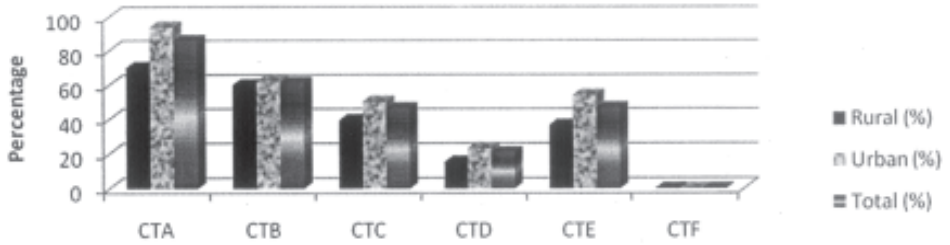
Table 4

Strategies of Classroom Transaction in Science at Upper Primary Stage in Rural and Urban Setup

Transactional Facilities	*Rural*			*Urban*			*Total*		
	1	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*
CTA(Introduction)	83	104	79.8	106	128	82.8	189	232	81.5
CTB(Interaction)	186	270	68.9	224	322	69.6	410	592	69.3
CTC(Learning)	138	342	40.4	285	564	53.4	423	876	48.3
CTD(Activity)	9	65	13.9	57	175	32.6	66	240	27.5
CTE(Assessment)	77	188	41	137	274	50	214	462	46.3
CTF(Laboratory Skills)	0	0	0	0	0	0	0	0	0

1. No. of observation that has followed the transaction strategy.
2. Total No. of observation
3. Percentage of observation that has followed the transaction strategy

It is very disheartening to find that the interaction procedure is not followed systematically in the upper primary schools. Learning facilities are also lacking behind the recommended level and the teacher themselves are giving observation, generalisation and conclusion from the activities being conducted. Table 4 and Fig. 2 show the information regarding classroom transaction in science.



CTA-Introduction, CTB-Interaction, CTC-Learning, CTD-Activity, CTE-Assessment, CTF-Laboratory

Fig. 2: Strategies of classroom transaction in science at upper primary stage in rural and urban setup

The teachers are neither altering their strategies to address the students need nor are the ICT facilities used during the classes. NCF-2005 has very significantly highlighted the importance of activities in the science classroom and NCERT has written the lessons in science textbooks totally activity oriented so as to harness the recommendations of NCF-2005 document. From the present study it is noticed that there is hardly any activities in the classrooms. The techniques of assessment in the schools are not very appropriate in the upper primary level in both the rural and urban setup. The teachers in both rural and urban schools made little or no use of ICT facilities to assess the learners. Neither the teachers are using open-ended questions in the class nor are the assessments done to identify the strength and weakness of learners. The students at the upper primary stage in both rural and urban schools were not trained in laboratory skills.

Students' response: The perception of students towards the modern transaction strategies is found to be quite satisfactory. The students were given freedom to ask questions, express their ideas, allowed to work in groups. Students are given time to prepare posters and models in the classroom. It has been also found that students' ideas are attended too and are given adequate space to interpret reasons for unexpected results. It is observed that opportunities for performing experiments individually are insufficient in both rural and urban schools at upper primary stage. Again very small percentages of classes are held outside the classroom, and are found to be more in rural schools. Making observation, recording and demonstration of activities are also not of the students' satisfaction level. It is very satisfactory that students are given chance to explore reasons for the unexpected results. The results have been summarised in Table 5.

Table 5

Students' Perception towards Classroom Transaction Strategies in Science at Upper Primary Level in Terms of Rural, Urban and Total Percentage

Response items for students	*Rural (%)*	*Urban(%)*	*Total(%)*
Freedom for asking question	87.70	93.10	90.70
Freedom for expression of ideas and views	83.30	96	90.60
Regularity of group activities	83	88.20	93.10
Discussion of topic with friend	78	90	90.80
Chance of performing experiments in groups	63.40	58.70	82.80
Chance of performing experiments individually	62.50	70.40	84.10
Collection of information from other sources (Internet, Newspaper)	75.50	70.40	72.80
Preparation of poster/model activities	64.30	66.70	65.60
Making note of the activities	80.80	88.20	85
Freedom of self conclusion on the observation of activities	80.80	89.90	86
Frequency of not agreeing to teachers and to speak of own view	87.70	80.30	83.90
Teacher listening to students saying	88.30	81	84.60
Teacher responding to students saying	89.80	68	94.60
Frequency of organising the classes outside the regular setup	20	18.20	18.80
Use of science/mathematics textbooks during classes	55.60	54.80	55.10
Teacher teaching methods of remembering terms and formulae	20	21.40	20.80
Freedom of solving problem and proving theorem in different ways	29.40	27.30	28.20
Teacher demonstrating activities	64.30	56.80	60.50
Freedom of conducting experiments individually	61.50	50	55.80
Frequency of observing and recording of experiments	46.70	51.30	49.30
Students making measurements themselves	46.70	48.70	47.80
Freedom of drawing conclusion by students	46.70	51.30	49.30
Freedom for exploring the reasons for unexpected results	98.40	88.10	99.20

Conclusion

NCF-2005 is a reflective document of what should be our education system in the future. It has reflected upon the different curricular areas as well as on the strategies to achieve them too. It has stressed upon the pedagogical aspects of different curricular content areas and transaction strategies. Accordingly, new textbooks have been written. The government has henceforth taken enormous efforts to train the teacher about the new transaction methods for the new textbooks. It has organised different in-service programs as well as orientation programs to acquaint the teachers to the new methodology of teaching and learning in science.

Without the effective knowledge of Science the students will surely not perform better in their future life. Modern approach of Science education demands more active participation than the traditional system. The modern learners are now not mere passive listener in the class but are eager to participate in each and every step of learning.

The above study has shown the current situation of classroom practices of Science in the eastern region of our country at upper primary level. Although we have been able to address some of the demands of new education system yet much is to be done. The emphasis of more and more activity centred classroom has to be taken care of. The classroom is to be made ICT equipped and it should be used to assess the students as well as to diagnose students' problems in learning. We are living in the world of science and technology,thus the students must be given chance to explore these areas and use the internet and communication technology in the process of learning Science. Science park, science corners in the schools have to be opened in more number. The concept should be explained to the students by organising more activities involving, interacting with students and generalisation should be done with the help of students. Students should also be given chances of inter-relating the facts to their day to day life situation. The teacher should also be always ready to alter their instructional strategies to address students' individual needs and requirements. The students must be acquainted through laboratory skills at the very best of their knowledge and also given more freedom for the conduction of experiments, observation of experiment and drawing conclusions individually.

As it is well known statement that the 'destiny of a nation is shaped in its classroom' (Education Commission 1964-66), the implementation of the recommended strategies of NCF-2005 will surely help for the development and progress of the students-the future citizens of our country. We have a dream of modern educated and technologically equipped young mass of students and our teachers are having the task in their hands in determining the success of this dream and for the progress of our future citizens for the development of our nation.

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