SCIENCE TEACHERS AT THE UPPER PRIMARY LEVEL IN DIRECT CONVERSATION WITH TEXTBOOK DEVELOPER DURING VIDEO-CONFERENCING: AN EXPERIENCE

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Introduction

In education system, there has to be congruence among policy statement, curriculum, syllabus and content in textbooks .The introduction of changes needs comprehensive planning, but as no planning is perfect, introduction of changes needs not wait too long. Similarly, it is found that curriculum misses some policy initiatives, syllabus misses some aspects of curriculum and textbooks misses some aspects of syllabus. Hence, periodic reviews should be undertaken to identify gaps and missing links. In the sequence of curriculum revision, this was the fourth revision of curriculum which made available National Curriculum Framework–2005 (NCF–2005) in our hands.The NCF–2005 has significantly altered the perspective on subject content in the light of constructivist approach to teaching-learning, by giving emphasis on the development of critical thinking and self-reflection abilities among students. The major thrust is given on enhancing comprehension of children in the classroom and integration of evaluation within the teaching-learning process. The foundation of success of any planning is not laid only through the involvement of educational planners, teachers, experts, representatives of the government and non-government organisations, but the voice of layperson is equally important. Hence, the process of further revision of curriculum was open to everybody for the inclusion of their views as well as of their feedback about the current scenario. After revision of curriculum, the syllabi in different areas were developed with the spirit to make an attempt to eradicate the problem of loaded bags.

As a continuous effort, the new textbooks have been developed by the team consisting of teachers, subject experts, representatives from various government and non-governmental organisations. The NCF–2005 has provided the necessary guidelines and directions for organising the content in different subjects at the various stages of school education.

After development of textbooks the major thrust was to reduce the distance between textbook developers and textbook users. Hence, while the textbooks were being prepared, it was realised in different forums that there is a need for orientation of teachers in the use of new textbooks considering the approach and

organisation in terms of content, style, exercises and illustrations, etc., in conformity with the thinking of NCF–2005.

The practice that has been followed for seveval years is to initiate the chain reaction by preparing the Key Resource Persons who further train other teachers, and the process goes on. But with time, it has been found that the quality of training dilutes at successive levels.Hence, it was appreciated that the orientation of teachers be organised by involving maximum possible number of teachers across the country and with an opportunity to these teachers to interact directly with the resource persons/experts and textbook writers so that they can be motivated to participate at all stages of the innovations and could gain confidence with a sense of self achievement.

Technology helped us to find out the solution so that the balance between quality and quantity could be taken into consideration. The use of videoconferencing, one of the modes of virtual academy, was adopted for the nation-wide orientation programme for the teachers of Kendriya Vidyalaya Sangathan, Navodaya Vidayalaya Samiti and independent schools affiliated to the Central Board of Secondary Education, on the use of new textbooks developed by NCERT, based on NCF–2005.The objectives of the programme were:

- to orient the teachers with new approach to education articulated in NCF –2005;
- to make them aware about the organisation of content and the use of the new textbooks; and
- to obtain feedback of teachers for continual and possible future improvements in school education.

The use of videoconferencing in the programme provided opportunity to about 40,000 teachers across the country for being in direct conversation with experts and textbooks writers. The discussion and consultations with focus on expeditious communication with teachers on NCF–2005, syllabi and the new textbooks led to the conclusion that videoconferencing could be an appropriate mechanism for the purpose. The programme was organised phase wise in coherence with the development of textbooks for each stage. The programme for the teachers of upper primary level was organised in three phases linked to three stages of textbooks development for various subjects.

The use of videoconferencing mode for the organisation of orientation of science teachers in three phases enabled about 3,650 teachers [VI -1291;VII-1307 andVIII-1052] to interact with experts / textbook writers through 30 learning centres located in different States, e.g., Andhra Pradesh, Karnataka, Tamil Nadu ,Kerala, Chhattisgarh, Himachal Pradesh, Madhya Pradesh, Rajasthan, Odisha, Gujarat, Haryana , Uttarakhand, Maharashtra, Uttar Pradesh, Assam, J & K, Meghalaya, Goa and Union Territory of Chandigarh.

The activities during each day consisted of:

- three presentations by the experts (30 minutes each) from teaching end, i.e., Central Institute of Technology (CIET) studio;
- three group-works by the teachers after each presentation in the supervision of master trainers at learning centres (30 minutes each); and
- three live interactions of teachers with the experts (60 minutes each).

Table 1

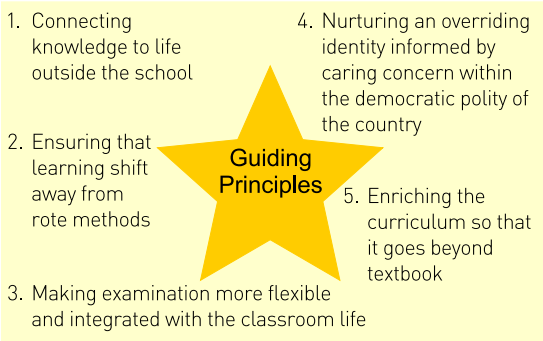
Types of Questions, Queries, Observations and Suggestions Made by the Science Teachers during Live Interaction

Class	Syllabus/ Curriculum	Textbook Content	Evaluation	Teaching Methodology	Non-availability of Books in Time	Infrastructure & Other Support Facilities	Time Management	Total
VI	11	20	14	11	05	02	02	65
VII	7	75	5	25	7	0	1	120
VIII	10	20	5	11	6	07	05	64
Total	**28**	**115**	**24**	**47**	**18**	**09**	**08**	**249**

The three presentations made by experts on each day were concerned with:

- Salient features of the new textbooks (*content, style, exercises and Illustrations, etc.*), reflection of NCF–2005 in new textbooks, interconnection/continuum across subjects and levels (classes) of education and Guidelines for using Textbooks;
- Teaching strategies for selected topics in the subject areas; and
- Evaluation strategies to be adopted by the teachers at different levels.

The main purpose of writing this paper is to: disseminate important information to a larger number of teachers who could not be included in the videoconferencing; to use the compiled information for enriching future programmes; and to make available the feedback of teachers on NCF–2005, new syllabi, textbooks and other related aspects to policy planners and other stake holders in school education. The group of teachers in Science subjects have provided their views, observations and feedback and also put forward their questions/queries. During live



interaction a total of about 249 questions/queries, observations and suggestions were made by the teachers (Table 1).

What NCF–2005 Says about Science Education?

The NCF– 2005 addresses the problem of curriculum load on children and it elaborates on the insight of "Learning without Burden". It recommends a major change in design of syllabi and textbooks and also a change in social ethos. To make teaching a means of harnessing the child's creative nature, NCF–2005 also recommends a fundamental change in the matter

of organising school curriculum and in the system of examination. It will enable teachers, administrators and other agencies to develop and employ innovative, local, need-based programmes. The NCF–2005 proposes five guiding principles for Curriculum Development (CD) which are as follows:

NCF–2005 makes us realise to make education more relevant to the present-day and future needs. It recommends to alleviate the stress which children are coping with and also suggests the softening of subject boundaries so that children can get taste of integrated knowledge and joy of understanding. It views that resource must be developed to enable children to express themselves, handle objects, explore their natural and social milieu and to grow up healthy children's classroom experiences that permit them to construct knowledge.

NCF– 2005 envisages that good science education is true to child, true to life and true to science. Science is a dynamic, expanding body of knowledge covering every new domain of experience. Broadly speaking, scientific method involves several interconnected steps, i.e., observation, looking for regularities and pattern, making hypothesis, devising qualitative or mathematical model, deducing their consequences, verification of theories through observation and controlled experiment and arriving at principles, theories and laws governing the natural world . This leads to the basic criteria for validity of science syllabus which emphasise that:

(i) The contents, process, language and pedagogical practices of curriculum are to be as per the cognitive level of child;

(ii) Curriculum must convey significant and correct scientific information.

(iii) Simplification of content is necessary for adapting the curriculum to the cognitive level of the learner;

(iv) Curriculum should engage the learner in acquiring the methods and processes that lead to generalisation and validation of scientific knowledge;

(v) Science curriculum should be informed by historical perspective, enabling learner to appreciate how the concept of science evolve over time;

(vi) Science should be placed in wider context of learner's environment, local and global, enabling her/him to appreciate the issues at the interface of science, technology and society; and

(vii) It should promote the value of honesty, objectivity, co-operation and freedom from fear and prejudice and inculcates in the learner a concern for life and preservation of environment (NCF – 2005).

The focus of NCF–2005 for science education in terms of validity vague was kept in view to design the syllabus of science for different stages. It was felt that to bring any changes in the desired direction, changes are required at syllabus level also. The most challenging task while designing the syllabus with this spirit was its presentation, because syllabus is a direct mode of communication between NCF and textbook writers .The challenge was to make the syllabus an enabling document for the creation of textbook that will be interesting and challenging without being loaded with factual information. This ultimately needs change in pedagogy.
The syllabus was organised in such a manner that instead of merely listing the topic it was presented in columns, concepts.

This way of presentation was followed up to secondary level .The most unusual feature of syllabus is that it starts with questions rather than concepts.

This paper specifically talks about changes at upper primary level. Seven themes were identified at the upper primary stage. This is the stage where children have just completed primary schooling and there is a need for continuity within the thematic areas covered at primary level.

Science at the Upper Primary Level

At the upper primary stage, the child should be engaged in learning principles of science through familiar experiences, working with hands to design simple technological units and modules (e.g., designing and making a working model of a windmill to lift weights), and continuing to learn more on environment and health through activities and surveys. Scientific concepts are to be arrived at mainly from activities and experiments. Science content at this stage is not to be regarded as a diluted version of secondary school science. Group activity, discussions with peers and teachers, surveys, organisation of data and their display through exhibitions, etc., in schools and neighbourhood are to be an important component of pedagogy.

During the interactive sessions a lot of observations, queries, suggestions and comments were made by the teachers on the new textbooks, related to their content, style, exercises and Illustrations etc.; reflection of NCF–2005 in new books; interconnection/continuum across subjects and levels (classes) and guidelines for using textbooks; and teaching strategies for selected topics and evaluation strategies to be adopted by the teachers at different levels. The details on few of them are explained as here:

1. We find a lot of repetition of the content in textbooks. In spite of repeating the things some more things could be added to remove the dilution of the syllabus.

The repetition of the content and dilution of syllabus are two different aspects. It was perceived during curriculum development and syllabus designing that cognitive vague should be given space and the syllabus should not be loaded with mere factual information. At the one side we discuss about learning without burden; on the other side we don't want to dilute the syllabus. Here we will have to focus on the objectives of science education. Does it mean to throw the information towards learner or to develop some fundamental skills and approach that are basically needed to learn science? If we analyse the initiatives to be taken, then it would be convincing that the syllabus is diluted from content point of view but from the view point of development of scientific temperament/attitude it needs a lot of effort. And that is the change that we really need in our system.

Group activities, discussion with the peer and teachers, surveys, organisation of data and their display through exhibition, etc., in school and neighbourhood should be important component of pedagogy. Because in hands-on way of learning science the ultimate aim is to help children become autonomous learners.

2. This is not a new thing to talk about activities in science teaching. We know its merits but it also carries some limitations like time constraints. During teaching-learning

process attention towards individual is also a matter of concern. We have to complete the syllabus within stipulated time which is too small to allow the activities in a classroom.

Definitely this is a matter of great concern. We should focus preferably on the issue. But should we stop ourselves to solve this problem just because of this time constraint? Or will we have to wait for a change that will bring change in our time schedule. Will you recommend longer school hours for teaching? No, you will not agree on this. Other school activities can't also be ignored just because of this. It has been felt that for transacting curriculum in the right spirit, teachers have to have triple combination of competencies, commitment and will power to perform.

Hopefully, we have got the solution of our problem. There is no question mark in front of our competencies but the matter of serious concern is our willingness to accept the challenges and commitment for the task. Beside this ideological parameter there is one more aspect of the problem. Somehow the term activity-based teaching misleads us.

In the textbook, if hundreds of activities are suggested then do we suppose to perform all the activities in classroom? We will have to think over it .There is some objective to perform an activity during science teaching-learning and that is to inculcate scientific attitude and scientific temperament among students. Once student starts taking interest in understanding the concept through this approach, rest of the things will happen themselves. And this will be the time when we will become the observer and facilitator rather than a teacher who is worried about syllabus completion. Ultimately, we will find that most of the things are going on without taking so much time that has scared us in the beginning to take a step forward in this direction.

During activities, individual attention doesn't come as a hindrance as activities provide an opportunity to work together and child can learn more within a peer group rather than as individual. Diverse thinking always brings out something innovative and creative and provides an opportunity to everyone along with motivation to learn from each other and hence the outcome will definitely be above our expectation. We all are aware that learning of concept is not the only outcome of this process, it also inculcate social values and sense of socialisation. Don't you think, in this way we can bring beautiful combination of science and humanities?

3. Students want to perform activities. But at upper primary level resources are also limited. How do we manage the things?

We are worried about availability of resources; this is a good indication to bring change. It reflects that we really want to take initiative but some hindrances stop us to move ahead. In the present scenario, we all are aware that there are no separate laboratories to work for students at upper primary level. But at this level, it is not expected from a child to handle typical kind of apparatus or instruments. The formal experimentation needs laboratory facilitation. So why do we panic about those kinds of facilities? And this is not a big problem for a competent and willing teacher. Although during writing the textbook, this kind of challenge was kept in mind and as far as possible those materials were suggested in the textbooks which are easily available. But even if the problem arises then we have solution in our hand in the form of low-cost teaching- learning material and in terms of substitution for a particular substance . Here we would like to share an experience of a teacher who is working in a government school. A small

science kit was made by collecting materials which are needed to perform activities with the help of students. All the materials in the kit are either improvised or low-cost materials. For example, for heating purpose a candle and an improvised sprit lamp/mustered oil lamp is kept, a rough balance was prepared with the help of sofa spring, etc.

4. What is CCE? We appreciate the book as it follows activity-based approach. Should we evaluate activities also?

As we know that at the upper primary stage the emphasis is on the process skills which enable children to know how to learn by themselves so that they can carry on learning beyond school boundaries. For this, there should be continuous and periodic assessment, with much less weight to the annual examination. Periodic and continuous assessment tells us about the learning progress of students and gives us direction for inputs for further improvement. Direct grading system should be adopted to show the progress of a child. The report card should show these grades for various components of assessment, but there should be no pass/fail grade and no detention. Merit ordering of students should be strongly discouraged.

The periodic tests should have both a written and an experimental component, with the practising teachers setting the question papers. Introducing open-book examination is one way to ensure moving away from mere information seeking questions in examinations. The examinations should assess the child's practical and problem-solving skills, ability to analyse data; application of knowledge learnt; understanding of concepts; understanding, reading and making graphical representations; and solving simple numerical exercises.

The parameter can be found to evaluate learner. At the end of each chapter, some activity-based questions are there.To answer such kind of questions, learner will have to perform the activity. This is also one of the ways to evaluate performance of students during activities. We all know that where we perform an activity or experiment, we note down our observations simultaneously and this practice is followed to learn systematic approach and to imbibe scientific attitude and values. This is the basis of evaluation during activities. At this stage, worksheets can also be prepared and used for students. There is no end to queries and questions until we wish to overcome them. Things cannot be changed overnight but changes can be initiated in a moment.

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