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The purpose is to provide a forum for teachers, teacher-educators, educational administrators and research workers; to encourage original and critical thinking in education through presentation of novel ideas, critical appraisals of contemporary educational problems and views and experiences on improved educational practices. The contents include thought-provoking articles by distinguished educationists, challenging discussions, analysis of educational issues and problems, book reviews and other features.

Manuscripts along with computer soft copy, if any, sent for publication should be exclusive to the *Journal of Indian Education.* These, along with the abstracts, should be in duplicate, typed double-spaced and on one side of the sheet only, **addressed to the Academic Editor, *Journal of Indian Education,* Department of Teacher Education, NCERT, Sri Aurobindo Marg, New Delhi 110 016.**

The Journal reviews educational publications other than textbooks. Publishers are invited to send two copies of their latest publications for review.

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EDITOR'S NOTE

The present issue of JIE will be touching upon various issues and areas related to education such as learning beyond classroom, inclusive education, school curriculum and practices, metacognition, and issue related to science and ethics. Amitabha Bagchi's lecture delivered as a part of NCERT's Golden Jubilee Lecture Series titled "Unstructured Learning in Structured Learning Environment: A Personal View" takes one back to the good old days in schools, along with rigid rules and regulations and fear of the teachers. Parallel to the thought of learning in schools, we will be reminded of our experience and learning which took place outside the classroom. He rightly pointed out that things which are out of our syllabus and textbooks sometimes remain with us for much longer than the ones learn from within the four walls of our classroom. Bagchi is of the view that schools and colleges inculcate and nurture human values – positive or negative among students mainly through teachers.

Metacognition – the conscious awareness about one's own cognitive process plays a crucial role in learning and development. Kapadia and Garg in their study pointed out a positive relationship between metacognition and teachers' competencies. The study concluded that teachers should be competent enough to identify the needs of the children in the classroom and accordingly prepare themselves to broaden their better learning abilities. Mohapatra, Mahapatra and Parida's paper looks into input-output models being used for Teaching-Learning Process (TLP). They argue despite introduction of new methods or approaches in the TLP the teacher and the learner remain as the most important human inputs and outputs. The paper suggests that for optimising learning outputs, the teacher's inputs have to be in consonance with the learner's constructivist inputs.

The Government of India has initiated numerous schemes and programmes to provide free and compulsory education to all children. Singh's paper focuses on the statistical details about major operational incentive schemes in our schools. Inclusive education did not have an easy entry to the educational system and institution of the nation till date, though it was recommended by Kothari Commission in the sixties. Nagpal and Sangeeta in their article reveal that inclusion of differently able children in general classroom, comes along with a lot of challenges and problem. Positive attitude for accepting diversities and preparation of teachers to address them is crucial for successful inclusion, the paper concludes.

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Dubey and Pandey in their paper highlighted the problems faced by special teachers as well as regular teachers in implementing inclusive education under SSA in one district of Uttar Pradesh. Angom and Leisangthem's article talks about secondary education among the boys and girls of Manipur. They explain that though the state has made satisfactory progress in access and participation of children at the secondary level but quality is still an issue which needs to be addressed through RMSA and other initiatives of the Government.

Gifted children are an asset to the family, society and nation at large provided they are given opportunities to nurture and utilise their giftedness and talents positively. Sharma in an interesting manner highlighted the problems and prospects of gifted children from humble background or disadvantaged groups of our society. She strongly feels that there is a need to be sensitive towards gifted minority in schools particularly those who don't have access to resources. Rout's article on Gopabandhu's innovations in education system draws our attention towards the initiatives of the educators in making education more meaningful by adopting indigenous innovative practices.

Mohanty critically analysed the Biological Science Curriculum of Odisha and found many deficiencies in the textbooks, infrastructure, curriculum transaction, assessment and teacher preparation. The conventional understanding of Science as a value-free subject has been challenged by many researchers. Saxena in her paper reiterated that we need to resolve the dichotomy between Science and ethics through the process of education and classroom strategies need a revamp and renewal for this exercise.

Academic Editor

Unstructured Learning in Structured Learning Environment: a Personal View*

Amitabha Bagchi**

Abstract

In this lecture I present some thoughts on the unstructured world of spaces and ideas that develop around the structured process of education. The lecture is based on my meditations on my own long experience of being a student and on my shorter experience of being a teacher. Briefly touching upon the school as a spatial and temporal entity that configures the student's world, I discuss the figure of the teacher both as a source of values—positive as well as negative— for the student and as an individual navigating a complex terrain.

I have been thinking for a while about how the institutions we affiliate ourselves to—maybe our parents 'admit' us to, or social pressures force us into—as students affect us, form us, shape us, turn our lives decisively down one of the many roads available to us. This question: Am I a product of the institutions I attended? falls in the family of questions engendered by the basic question: What makes me who I am? This question often precedes the perhaps more fundamental question—Who am I?—and is not so easily answered. After all, our lives are produced by a complex interplay of factors, some determined in advance such as—race, class, gender, geography, personality, biology and some random and contingent. The lens of science fails in the face of this complexity.

But the novelist, unlike the scientist, has a different relationship to questions. His job is not to answer them. His job is to put them into play. The unanswerable question is one of the basic tools of the storyteller's trade. Let me give you an example: Should Ram have made Sita take an *agni pariksha* because of what the washerman said? This question, so simple to state, is a

vortex that begins spinning slowly, but then it widens and becomes stronger and stronger. As we argue and debate, it sucks in ship after ship of the fleet of human experience. What facet of a man's life belonged to the realm of his duties? How far does the power of love extend? What constitutes fidelity in a marriage? What is the nature of trust? Keep answering these questions, and like the *asura* Raktabija, who had a wish granted by the God that every time a drop of his blood fell to the ground a new Raktabija was born, a new set of questions emerges with each answer. The novelist's job, then, is to set questions into play, ornament them and lead them through the lives of people, and watch as they draw those lives into their fold.

And so as a novelist, I find myself asking this question—Am I a product of the institutions I attended?—in an attempt to open out a field of questions, in an attempt to add to the form of human knowledge that is full of errors and poetry, and that form of human knowledge that is most intimate and personal.

Having used the P word—personal—let me start by saying that in the years since I left school I never thought that I would get an opportunity to thank NCERT for the impact it has had on my life. I could probably find a number of things to say in thanks, but let me just focus on one. In all my English textbooks since Class IX, I always found at least one story or play by a writer called William Saroyan. His stories of a young Armenian boy's life somewhere in the central part of California made a deep impression on

me. In the years since, I have derived many things from those few stories I read. I learned that there is a deep sadness that lies right at the heart of the immigrant experience—something that the now fashionable generation of immigrant writers has never fully captured. I learned that a gentle kind of realism is the best way to describe the lives of people trying to live a dignified life in the face of hardship. I learned and this is the one realisation on which my brief writing career so far has rested, and, I suspect, whatever I write in future will also rest on this—that the strength of weak people is the stuff of literature. But it was only when I moved to California in 2002 that I learned that Saroyan is all but forgotten in his home country. That's when I really thanked the people who decided to put him into an NCERT textbook for almost every year since Class IX.

Class IX was also my first year at a prominent school in South Delhi. Those among us who live in Delhi think of it as a flat region but every here and there we do come across small hills and this school is located on one such hill. So it happens that when I think back about this school and my days there, I often find myself thinking of walking up an incline towards the large metal gates, manned by a *chowkidar*. I had been to other schools before that one, whose topography was as flat as the rest of the city's, but somehow when I think of a school, I think of walking up a gentle slope, I think of a mass of grey boxy buildings sitting on a hill. Perhaps the fact that it is harder to walk up a hill than it is to walk on flat

ground has something to do with it. When you reached those gates, there was an invisible membrane you passed through, like a scene from Star Trek where you stepped through a portal and you reached another dimension. Those gates were a valve, easily entered but hard to exit through. Those gates separated the world within the school from the world outside. Inside those gates we were safe from things we did not even know existed outside them. Within them lay a world of classrooms and corridors, playing field and Principal's office, labs and the library. And in each of these spaces there was a protocol, an acceptable way of carrying yourself, and an unacceptable way.

So, school then is the place in which we learn what decorum is, and that each space has its own notion of decorum. But we learn this in what is to my mind the wrong way. We learn that decorum is linked to policing. That we should not be walking down a school corridor without an excuse during class time because a teacher may accost us. We learn that we should not talk too loudly in an unattended classroom because someone may come in and drag us off to the Principal's office. And this structure of learning engenders another learning. We find those distant corners of the football field where cigarettes may be smoked. We figure out which shadows under which staircase are best suited for stealing kisses with our new love. We share stories of rules broken without consequence, we aspire to create narratives of ourselves as clever lawbreakers. We begin to value duplicity and deceit. Perhaps this

process could redeem itself if it helped us lose our fear of authority. I have always believed that fear of authority causes psychic damage that weakens human society, and that the social control we get in return does not justify what we lose. But the problem is that plotting and scheming to undermine authority because it is a subcultural imperative—as it becomes in these situations—does not rob us of our fear of authority. We remain fearful. And we become sly.

School was not only a spatial category, it was also a temporal one. School was the world of 7.40 a.m. to 1.30 p.m. It was a division of the first part of the day into neatly ordered chunks of time, never shorter than twenty minutes, never longer than forty-five. I have sometimes wondered about the daily routines, and their fixed nature. At first, rather unfairly, I used to think that social control was best enforced by controlling a person's time. Marx, in his own take on this matter, wrote about the centrality of the working day to the capitalist project. Not as theoretically developed as Marx's but I too had—and still have—a rebellious schoolboy's approach to the regimentation of time. But then I also began to think of it in another way. Is unplanned time as threatening as unmapped space? School, the place where space was made safe for us, was also a place where our time was organised: the day was chopped into a sequence of intervals, each interval to be used in a particular way.

I was one of those people who stayed on the straight and narrow, but in my school bus there were two

elder boys who revelled in informing students like me of their escapades. These escapades involved getting off the school bus just like the rest of us, but walking off in the other direction, through the government houses that neighboured our school, onwards to a South Indian restaurant on Rao Tula Ram Marg. They had their breakfast there, it took about half an hour, and then walked leisurely past Moti Bagh to the Sarojini Nagar railway station, reaching there around a quarter to nine. Then they boarded the Ring Railway that took about two hours to take them around the city and bring them back to where they began. Getting off the train they would head towards the now demolished Chanakya cinema, reaching in good time for the eleven o'clock show. That would last till around 1 p.m., a convenient time to take a bus back to school, getting there just before the school bus left for home. It took me a while to realise that although these not-so-orderly schoolboys had rejected the school's way of organising the morning hours, they had not rejected the notion that the morning hours needed to be organised.

Those two boys fell neatly into one category of the taxonomy we informally maintained in my academically-oriented school. They were what call as bad students. After that category came good students and then brilliant students. There were other classifications too: some students were there to improve the school's results, some to fill its coffers and some to ensure that Delhi's political class looked upon our school favourably.

But the various categories that we had in my school in Delhi—it was one of what we still call the 'good' schools of Delhi—were to prove wholly inadequate when I graduated and found myself at college in IIT.

When I entered IIT Delhi in the early nineties, I happened to be assigned the same hostel that my cousin who had entered IIT in the middle of eighties had lived in. When given a choice between attending class and spending his time in the hostel's music room, I was told by some of my seniors who had known him that he preferred the latter. In this music room, he told me when I asked him, used to live a large collection of cassettes on which generation after generation of hostel residents had painstakingly recorded, from whatever source available, a fund of music that comprehensively represented the popular musical production of the American sixties and seventies. Rock musicians who were long forgotten in the United States lived in recordings that were revered in our hostel at IIT. That music room formed the person he was, and the person he continues to be today. But, oddly enough, of the trove of music the music room had housed there remained but three tapes when I got there. I used to go there to study sometimes, because no one seemed to have any use for that space. Outside that room, in the rest of the hostel, instead of long discussions over the superiority of Deep Purple over Led Zeppelin, now arguments raged between those who worshipped Madhuri Dixit and those whose hearts beat for Urmila Matondkar. In the common room next door, the newly installed cable TV was

firmly tuned to the one or two channels that had discovered a business model built around twenty fours hours of *Chitrahaar*.

At IIT we complain about the influence of the coaching class culture on the quality of our intake. But anecdotal evidence makes it amply clear that the rise of the coaching class culture meant the end of the dominance of English-speaking elites from urban centres at IIT, i.e. The end of the dominance of people like me.

If someone were to look at the grade sheets from my first year they would conclude that I didn't learn much that year, but the truth of the matter is that I learned a lot. I learned, for example, that I loved carrom board and I was really good at it. I spent hours and hours playing carrom. In the process I made friendships with other people who spent hours and hours playing carrom. One day I was partnering a boy who was one year senior to me, and we were playing against two others from his year. One of them, Gaurav, from a 'good' school in Chandigarh, pointed to my partner and asked: Do you know what his name is? An odd question, I thought at that time. Of course I knew what his name was, I saw him every other day at the carrom room. His given name was Sumer Lal and his surname was one that I had learned by that time was shared by other people who got into IIT on the Scheduled Caste quota. "I know his name," I said. Gaurav, who hadn't a trace of any negative sentiment in his voice, said: "I didn't find out his name till the end of my first year." Gaurav, who probably became friends with the

Rohits and Amits and Viveks within days of reaching the hostel, spent almost twelve months there before he learned Sumer Lal's name.

One of the interesting things we were all made to do during ragging was to read certain texts in Hindi written by a person whose name was always Mast Ram. The technical term for this literature was *uttejak sahitya*. We all had to read it, especially those of us who found it objectionable. I didn't find it objectionable, but for me a different task was assigned: I was made to translate it. Me and those few others who, the assigner of the task knew, would have trouble translating it. I knew the dirty words, that was not a problem, but I still struggled with the translation, stumbling over the heavily idiomatic language, the richly-textured euphemisms that seemed to come so naturally to Mast Ram. It was probably the first time it stucked me that my school Hindi textbooks had done me a disservice, and that the Hindi Cell style signage that I saw around the city was a total misrepresentation of a living, breathing language. In those early days in the hostel, when I was keen to offer friendship to whoever IIT had arbitrarily chosen to put along with me in the hostel, I struggled to cross a barrier of language that my education in Delhi had created for me. But the people on the other side appreciated the fact that I did struggle, at least I think they did. And even if they didn't, several years later when I picked up and read end to end my first Hindi novel— Shrilal Shukla's *Raag Darbari*—I had to them thank for showing me that Hindi had a colloquial richness, a

richness that would serve as a magnet for a person who loves language. And that magnetic attraction could take me to places I would not have otherwise chosen to go, shown me things about the country of my birth that I would not have otherwise chosen to see.

When I was in school, my mother would sometimes go shopping at one of the prominent fresh produce markets of Delhi. On occasion we would stop at a South Indian *dhaba* that sat at the mouth of this market. Much to my astonishment sometime into my stay at IIT, I found that the *dhaba* was owned by the family of one of my closest friends at IIT—he is now a leading computer scientist in a prominent research lab in the United States. I cannot forget the day he came to me, sometime in our third year, and asked: "Bagchi, *tu dose bana leta hai*?" Before I could answer this question in the affirmative or negative, he told me that his father was thinking of locking out the 'labour' at the *dhaba*. "*Ek do din maalik logon ko hi kaam karna padega.*" I nodded my agreement at the kind of prospect that I, the son of a civil servant father and school teacher mother, had never contemplated in my brief life. The thought of crossing the counter that I had sat on the customer side of, sent a thrill up my spine. Unfortunately, or fortunately, the labour came around by that evening and I never did get to make *dosas* on the large *tavas* the *dhaba* had, but for a brief moment there I teetered at the edge of it, and I had to project out of my own world into another world where shop owners and labour squabbled while *dosas* waited to be made.

I cannot claim that the life I live now is fundamentally different in its everyday rhythms from the lives that the other English speaking students, I went to school with, live. I cannot claim that what I learned in the years I was thrown into close contact with people who I had only seen from a distance before transformed me, because I have no way of knowing what I would have been like if I had not had that experience. But I do know that while I treasured what my teachers taught me at IIT—and treasured it enough to have joined their ranks today—I treasure equally, if not more, what I learned in the hostel's carrom room, in the canteen and in the corridors.

It is not my contention that we all learned to get along. Please do not think that I am trying to portray IIT as some happy melting pot of India's diversity. It was not that. It was as riven with casteism, communalism, classism, sexism and all the other ugly 'isms' that our society nurtures. How could it not be? But by pretending that these things didn't matter, that exams and grades and job interviews were more important than all these things, it gave an opportunity to those who were willing to learn to get along with people who weren't like themselves. It gave a quixotic notion of an India populated by Indians a chance. Indians who were consumerist, overambitious, self-important technocrats perhaps, but who were, nonetheless, more Indian than anything else. And the fact is that this learning was not part of any of the curricula at IIT. But, as all of us who have been teachers for even a short while know, all we can do is give people

an opportunity to learn. And if they don't learn, we can give them another opportunity, and another. Because the truth is that in a class of one hundred, there will only be four or five who get it the first time, only ten or fifteen who understand it in outline, and the remaining will take it in one ear and let it out of the other. I know people who still use the word "shadda" to refer to people who got into IIT through the SC/ST quotas, despite having played hard-fought games of volleyball in the same team as some of them, despite having stayed up long bleary-eyed hours preparing for exams along with them, despite having drunk too much and thrown up with them. Some people never learn. That is the teacher's frustration. But some people do learn and that is the teacher's reward. And, a priori, we teachers never know which is which.

It's a complex and random process, this interaction with young people that we teachers do for a living. It has many sides. Like so many other teachers, I spend a lot of time thinking about my students, and, also like many other teachers, I don't spend enough time thinking about what they think of me. But when I do, I am forced to remember how I saw my teachers. Physically I saw them through a forest of dark-haired heads—I always preferred to sit near the back of the class, though not in the very last row. I saw them standing up on the raised platform at the front of the class, on which the short looked tall and the tall looked taller. I took their careful grooming for granted—not realising that if one of them turned up looking slovenly I would probably have been as upset or offended as the school's principal. I associated a certain amount of self-possession with them. And I thought of them as older. A small anecdote here: In Class IX, I entered a CBSE school and took Sanskrit instead of Hindi. My mother was concerned that I wouldn't be able to cope so she went to meet my teacher. Afterwards I asked her how the meeting went and she said: "Your Sanskrit teacher is a very sweet girl." I realised that my mother was probably fifteen or twenty years older than my Sanskrit teacher, and senior in the same profession, but still the idea that my teacher could be thought of, by anyone, as a "girl" was very difficult to comprehend. So difficult that I still remember that statement, long long after, I'm guessing, my mother forgot all about it.

So there you are, you poor teacher, frozen in eternal adulthood, even on those days when you wish you could just curl into a fetal position and suck your thumb instead of having to stand up and talk for an hour to a room full of young people who are looking at you, or at least should be looking at you. Sometimes in the nitty-gritty of the syllabus, the announcements about exams and homework, the clearing of the last class's doubts, you forget about the current that emerges from your body and flows out into the class. You forget what you mean to them.

I was lucky to have some excellent teachers at IIT Delhi, and I am not just saying that because some of them are my colleagues now. Let me explain with a story why I thought well of them. In my second year, I had a class

in computer architecture. Before the first semester exam, being somewhat lazy I didn't memorise certain assembly language keywords and their meanings. When the exam paper came there was one big question that involved explaining what a fragment of assembly language code did. It was impossible to answer without knowing the meaning of those keywords. One of my friends from the hostel who knew I hadn't memorised the keywords looked at me and snickered. Stung by this I decided to take a risk. I raised my hand and called the professor. "I don't know what these keywords mean," I said. He looked down at the paper, thought for a moment, then went to the board and wrote out the meanings of all the keywords. Right there, on the spot, he decided that this question was not a test of memory, it was a test of understanding. Not only did I snicker back at the friend who had laughed at me, I also never forgot the lesson. I apply it in my classes even today.

I knew from around the age of nineteen that I wanted to be a professor. I was thirty when I actually became one. In those eleven years, especially towards the end of that period, I often used to daydream about the time when I would stand in front of my first class. When I dreamt about it I always saw myself standing in a particular lecture room at IIT Delhi, Block VI, Room 301, where most of my lectures in the latter part of my stay had been held. I would see myself standing up on the platform of VI 301 about to say my first words to my first class, and I knew I would be feeling something. I just didn't know what it was. As it turned out, my first teaching job was at IIT Delhi and when I got the room assignment for that first semester I found out that the class I was teaching would meet in VI 301. I walked up the one floor from my office, my stomach fluttering. I turned into that familiar door, carrying the attendance sheets, the sign of my authority, in my right hand, and walked onto the podium. I put the attendance sheets down on the table and turned towards the class. I looked up at them, seventy something of them, sitting in those long desks where I had so often sat and would never again sit. I looked at their faces and suddenly I felt the pain they would experience in their lives. It came running through me, unexpectedly, this thought: There is so much you all will go through in your lives. Sometimes when I feel I am forgetting what my students mean to me and what I mean to them, I remind myself of this moment, when I learned something about myself and about the life I had chosen for myself.

Relating Metacognition of Secondary School Students with their Perceived Teacher Competencies

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Indu Garg**

Abstract

This study investigated metacognition and perceived teacher competencies of secondary school students. Nine hundred twenty Class IX students from schools across Greater Mumbai participated in the study. Gender-wise comparisons were made between the students for the two variables. Female students were found to possess better metacognition and they also perceived teacher competencies more favourably than the male students. The study also aimed at ascertaining the relationship between metacognition and perceived teacher competency scores. Analysis was done for total and component-wise scores for metacognition and perceived teacher competencies. A significant, direct, positive correlation was found between total metacognition and total teacher competency scores. Component-wise analysis revealed technical competency of teachers to be a strong and significant predictor of all the components of metacognition for total sample and for male and female students. This indicates that the metacognition of students is related to teachers' technical competencies such as communication skill, evaluation ability, classroom management, mastery over content and ability to organise information. The study highlights the need for competent teachers for supporting student's metacognition.

Introduction

Education deals historically and contemporarily with the principles and practices of teaching and learning. It also increases skill, knowledge and understanding as a result of training and experiences. The central purpose of education is to help individuals make

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necessary adjustments towards a constantly changing environment. To this end, a large part of educational endeavour involves teaching general skills and strategies that can be applied to a variety of problems and learning situations. Pressley, Borkowski and O' Sullivan suggested in 1984 that strategy instruction should provide students with information about the utility of the strategy and when and how to use it. Put differently, strategy instruction should include a metacognitive component. Metacognition, thus, broadly defined as knowledge that a person has of his own cognitive processes (Husen and Postlethwaite [Eds.], 1985b). Metacognition can be defined as the conscious awareness of one's own cognition and the conscious control of one's own learning (El-Koumy, 2004). Metacognition plays an important role in communication, reading comprehension, language acquisition, social cognition, attention, self-control, memory, self-instruction, writing, problem-solving, and personality development (Flavell, 1979).

Education has two major dimensions. It is a discipline and disseminating tool or process. The second dimension includes the curriculum content, the teacher taught relationship, teacher quality and teaching aids/methods/environment. Transmission of knowledge depends upon teacher quality, commitment and competence. Since school learning takes place in a social context, teachers must obviously be concerned with group and social factors that impinge on the learning process. Apart from general classroom climate, teachers'

contribution to the social context in which learning occurs—their role, personality characteristics and teaching style are also important (Ausubel, 1968). Effective teachers provide a clear and empathetic learning environment to facilitate student's understanding. Students should be encouraged to reflect on their own attitudes values and skills in order to assume responsibility for their own learning which can be done with highly competent teachers.

Review of researches on metacognition revealed that metacognition as a construct has been researched in various countries. Importance of metacognition and intervention of metacognitive strategies to promote student learning have been acknowledged by several authors. Effect of age, experience and gender on metacognition has also been researched. Consequently the role of metacognition and self-regulated learning in student achievement, problem-solving skills both in mathematics as well as science-based problems and in various learning environments has been studied too.

Review of related literature on teacher competency suggested that Indian researches aimed at understanding core characteristics of an ideal teacher, teacher effectiveness, qualities of an effective teacher, teacher attitude, personality of teacher, self-efficacy and teaching competency, teacher interpersonal behaviour. These were studied in conjunction with demographic variables, student's achievement to a large extent, and with specific subjects like science or languages. Teacher competency has been studied sparsely in order to

improve the teacher selection process, understand the context with social correlates and identify competencies of pre-service and in-service teachers.

Need of Study

The education system emphasises much on accumulation of knowledge/ information. The ability to think or the cognition domain has been focused upon regularly. However, the ability to regulate one's own thinking and be able to self assess the extent and utilisation of one's own cognitive abilities, would possibly inculcate lifelong learning among the students. Winne and Butler (1995) record that the students' mediation of instructional events and self-regulation of approaches to learning are recognised as potent factors that influence the development of achievements. In other words, metacognition helps student better their learning abilities.

Students found the metacognitive approach supportive of their learning and self-assessment. Students with high achievement were more aware of their learning and thinking processes. Metacognitive awareness, therefore, serves a regulatory function and is essential to effective learning because it allows students to regulate numerous cognitive skills. An important factor that can bring about this change in the student is his teacher. A student interacts with the teacher as a person and not someone who is just efficacious or well behaved in class. The teacher has an overall influence on the student, including her interaction even after class hours. Competent teacher was thus necessitated. A need for wholesome understanding prompted the inclusion of social, technical and affective competencies of a teacher in the present research.

The present paper is therefore, an attempt to study and ascertain the relationship between metacognition of students and teacher competencies as perceived by them.

Design of the Study

Descriptive research method was used for the study. Gender-wise comparisons were made and correlations were ascertained between the variables. Data were collected from 920 Class IX students from schools situated in Greater Mumbai through stratified sampling technique. A 32 item five-point Likert scale, Inventory of Metacognitive Self-Regulation (IMSR) by Howard et al (2000) was used to measure metacognition and a self-prepared 5-point teacher competency tool including 54 items was used to measure perceived teacher competency. Validity and reliability of the tool were established (Kapadia, 2009). Data were analysed using the descriptive techniques and hypotheses were tested using the parametric techniques such as the *t*-test and ANOVA. Correlation between variables was computed using simple correlation coefficient (r) and multiple regression analysis (R); and Fishers' Z for ascertaining the standard error of difference.

Findings, Conclusions and Discussions

The findings of the study are reported under the following headings:
1. Difference in metacognition

2. Difference in perceived teacher competency
3. Correlation between metacognition and perceived teacher competency

Difference in Metacognition on the Basis of Gender

A significant difference for total metacognition (t=4.54, p=0.00) scores between male and female secondary school students was obtained. Mean scores indicated that female students possess higher metacognition than male students, for total metacognition.

A significant difference between genders was obtained for four out of five components of metacognition; knowledge of cognition (t=3.8, p=0.00), objectivity (t=4.37, p=0.00), problem representation (t=3.69, p=0.00) and evaluation (t=2.81, p=0.00). For each of the components, mean scores of female students were higher than male students. This shows that female students are better at understanding their cognitive abilities, objectively thinking about their learning as it proceeds, understanding the problem fully before proceeding to solve it and at double-checking their problem-solving process than male students.

No significant difference was obtained only for the sub-task monitoring scores between male and female students. Thus, monitoring the choice of learning strategies and completing each sub-task is an ability in which male and female students do not differ.

Difference in Perceived Teacher Competencies on the Basis of Gender

A significant difference for total teacher competencies (t=4.26, p=0.00) score between male and female students was obtained. Mean scores indicated that female students perceive total teacher competencies better than male students.

A significant difference between the mean scores for social competency (t=4.25, p=0.00), technical competency (t=2.82, p=0.00) and affective competency (t=5.12, p=0.00) components of perceived teacher competencies for male and female students was obtained. Mean scores indicated that female students perceive social competency, technical competency and affective competency better than male students.

Correlation between Metacognition and Perceived Teacher Competencies

It is discussed under the following heads
a. *Correlation between Total Metacognition and Total Teacher Competencies Scores*—A significant, positive, direct and substantial relationship between total metacognition and total teacher competencies was obtained for total sample (r=0.44, p=0.00) for male students (r=0.44, p=0.00) and female students (r=0.27, p=0.00).
A significant difference between the coefficients of correlation of total metacognition and total teacher competencies at 0.01 level was obtained on the basis of gender (Z=2.58). The correlation between total metacognition and total teacher competencies was stronger for male students (r=0.44) than female students (r=0.27).

b. *Correlation between Total Metacognition and Components of Teacher Competencies Scores*—A significant positive, direct and low to substantial correlation between total metacognition and components of perceived teacher competencies was seen for total sample (Refer Table 1) and for male and female students (Refer Table 2).

Table 1
Simple Correlation and Multiple Regression Analyses for Correlation between Total Metacognition and Components of Teacher Competencies for Total Sample

Components of Teacher Competencies	Metacognition	
	r	B
1. Social Competency	0.376**	– 0.091
2. Technical Competency	0.477**	0.507**
3. Affective Competency	0.378**	0.057
Multiple Correlation R		0.479**
R2		0.229

N=920 ** Correlation is significant at 0.01 level.

Table 2
Simple Correlation and Multiple Regression Analyses for Correlation between Total Metacognition and Components of Perceived Teacher Competencies on the Basis of Gender.

Components of Teacher Competencies	Group	Metacognition	
		R	β
1. Social Competency	Male	0.411**	–0.056
	Female	0.304**	–0.188
2. Technical Competency	Male	0.518**	0.498**
	Female	0.413**	0.575**
3. Affective Competency	Male	0.426**	0.083
	Female	0.291**	–0.001
Multiple Correlation R	Male		0.520**
	Female		0.425**
R2	Male		.270
	Female		.180

N (Males) = 505   N (Females) = 415 ** Correlation is significant at 0.01 level.

Significant multiple correlations (R) for total metacognition and components of perceived teacher competencies for total sample on the basis of gender was also obtained. This strongly supports the conclusion that all the components of teacher competencies are related to metacognition of students.

The standardised regression coefficients (β) revealed the significant predictors for total metacognition. Technical competency was seen to be the only significant predictor of total metacognition for total sample as well as for male and female students.

A significant difference between the coefficients of correlation of total metacognition and social competency (Z=1.96, at 0.05 level) and affective competency (Z=2.25, at 0.05 level) components of teacher competencies were obtained on the basis of gender.

A stronger correlation between the total metacognition and, social and affective competencies was seen for male students than female students. It can thus be inferred that male students perceive those teachers who are sociable, motivate them, are tolerant, have gratitude and compassion, are open to new ideas and have good self-esteem, are responsible for development of their metacognition more than perceived by female students.

c. **Correlation between Components of Metacognition and Components of Teacher Competencies Scores—**A significant positive, direct and low to substantial correlation between components of metacognition and components of perceived teacher competencies was obtained for total sample (Refer Table 3) and for male and female students (Refer Table 4).

Table 3
Simple Correlation and Multiple Regression Analyses for Correlation between Components of Metacognition and Components of Teacher Competencies for Total Sample

Components of Metacognition / Components of Teacher Competencies	1. Knowledge of Cognition		2. Objectivity		3. Problem Representation		4. Subtask Monitoring		5. Evaluation	
	r	β	r	β	r	β	r	β	r	β
1. Social Competency	0.25**	-.003	0.21**	-.103	0.31**	-.04	0.28**	-.10	0.27**	-.05
2. Technical Competency	0.31**	.308**	0.28**	.328**	0.38**	.392**	0.38**	.469**	0.32**	.298**
3. Affective Competency	0.24**	.007	0.22**	.053	0.31**	.042	0.28**	.003	0.28**	.093
Multiple Correlation R		.311**		.289**		.388**		.389**		.331**
R2		.097		.084		.150		.151		.109

N=920 ** Correlation is significant at 0.01 level.

Table 4
**Simple Correlation and Multiple Regression Analyses for Correlation
between Components of Metacognition and Components of
Teacher Competencies on the Basis of Gender.**

Components of Metacognition Components of Teacher Competencies	Group	1. Knowledge of Cognition		2. Objectivity		3. Problem Represen-tation		4. Subtask Monitoring		5. Evaluation	
		r	β	r	β	r	B	r	β	r	β
1. Social Competency	Male	0.21**	-.010	0.17**	-.088	0.29**	-.014	0.31**	-.033	0.24**	-.046
	Female	0.15**	-.023	0.11*	-.159	0.20**	-.129	0.12*	-.255	0.17**	-.087
2. Technical Competency	Male	0.26**	.235**	0.25**	.335**	0.38**	.439**	0.41**	.438**	0.31**	.288**
	Female	0.23**	.434**	0.18**	.369**	0.26**	.375**	0.24**	.542**	0.22**	.337**
3. Affective Competency	Male	0.23**	.107	0.18**	.031	0.28**	-.005	0.31**	.027	0.27**	.120
	Female	0.09*	-.151	0.11*	.037	0.20**	.075	0.12*	-.004	0.16**	.036
Multiple Correlation R	Male		.317**		.293**		.425**		.433**		.351**
	Female		.313**		.271**		.328**		.347**		.293**
R2	Male		.100		.086		.180		.187		.123
	Female		.098		.074		.108		.120		.086

N (Males) = 505   N (Females) = 415   **Significant at 0.01 level   *Significant at 0.05 level

Significant multiple correlations (R) for components of metacognition and components of perceived teacher competencies for total sample and on the basis of gender were also obtained. This strongly supports the conclusion that all the components of metacognition are related to components of teacher competencies.

The standardised regression coefficients (β) revealed the significant predictors for components of metacognition. Only technical competency emerged as the significant and strong predictor of every component of metacognition for total sample and on the basis of gender.

A significant difference between the coefficients of correlation of knowledge of cognition and affective competency (Z=2.1, at 0.05 level) of problem representation and technical competency (Z=1.96, at 0.05 level) and of sub-task monitoring and all the components of teacher competencies (Z=3.0, at 0.05 level) on the basis of gender was obtained. It is seen that a stronger correlation between the above components of metacognition and components of teacher competencies exist for male students.

Conclusion and Suggestions

For metacognition on the basis of gender

The above analysis shows that female students possess better metacognition than male students of secondary school, for both total metacognition as well as for four out of five components of metacognition. This result is in conjunction with other studies on metacognition. As seen in previous researches, females are sincere and reflective thinkers. This is extended to their metacognitive self-regulation ability also, as seen from the above results. This implies that while problem-solving, female students utilise their metacognition abilities more than male students. Knowledge of this result can be used by teachers in making homogenous groups in a class with both male and female students. While forming groups for any class, activity teacher should make sure that a good mix of male and female students is provided. The tendency of female students to use their metacognition ability in solving problems would possibly be imbibed by male students during the activity.

For perceived teacher competency on the basis of gender

Results show that female students perceive teacher competency better than male students, both for total teacher competency scores as well as componentwise for social, technical and affective competency scores. Female students perceive teacher to be more sociable, better classroom manager and possessing better gratitude and compassion than perceived by male students. Female students are found to be more attached to their teachers as compared to male students. Female students tend to develop a rapport with their teachers faster than male students. Male students at secondary school level conform to their peers more than adults or teachers. It is possibly for these reasons that such results are obtained.

From the above results it is clear that teacher should be competent enough in order to exert influence on both the genders equally. This is a necessity because the teacher is an important factor in student development. Every student should perceive their teacher to be competent so that desirable changes that a teacher is expected to bring about are obtained. That a teacher interacts with a student even outside the class necessitates that besides having thorough content knowledge, good communication as well as evaluation skills, a teacher should also possess social and affective competency.

For correlation between metacognition and perceived teacher competency

A positive and direct relationship between total metacognition and total teacher competencies scores was obtained for total sample and on the basis of genders. This indicates that teacher competencies would aid in improving metacognition of students. Thus, enhancing students' metacognition necessitates involvement of competent teachers.

The female students showed higher metacognition and perceived their teacher competencies more favourably than the male students. Yet the

correlation between total metacognition and total teacher competencies scores for female students is weaker than the male students. This is possible as the students are taught by several teachers and therefore their competencies may not immediately reflect in students' metacognition. In other words, teacher competencies do have a correlation with students' metacognition, but the teachers should be emphatic in their endeavour towards developing students' metacognition.

Technical competency was seen to be the only significant predictor of total metacognition as well as for each component of teacher competency for total sample and for male and female students. This indicates that the teachers' communication skill, evaluation ability, classroom management, mastery over content and ability to organise information is related to metacognition of students. This clearly indicates that the way in which the teacher transacts the curriculum is strongly related to students' metacognition.

A stronger correlation between the total metacognition and, social and affective competencies was seen for male students than female students. It can thus be inferred that male students perceive that teachers who are sociable, motivate them, are tolerant, have gratitude and compassion, are open to new ideas and have good self-esteem, are responsible for development of their metacognition more than perceived by female students.

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A Learner-centred Input–Output Model

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Abstract

Meaningful learning can be maximised by knowing what are the contributing structures (inputs) the learners carries with him/her into the classroom and using which he/she is going to construct new structures (output). In this research paper, a four-dimensional input has been presented and key information for the measurement of the inputs in the classroom situation has been discussed. The output has been delineated in the conceptual change model of the constructivist approach.

Introduction

During the second half of the twentieth century, the Teaching-Learning Process (TLP) as practiced inside the classroom has evolved through three broad paradigms, ensconced within the philosophy of Freedom of Necessity. The Necessity is defined by the demands of

- Social and cultural changes,
- The explorative investigations, particularly in science, and
- The new evidences about how a learner learns.

On the other hand, the individual learner has the Freedom to choose the context of learning. As a result of this,

- The focus of TLP has gone through continuous change,

- The domain of TLP operation has expanded beyond the walls of the classroom,
- The structures of TLP have been redesigned to meet the ever evolving situations,
- The form of TLP has been redefined,
- The operational modalities of TLP have been modified beyond recognition, and
- Evaluative procedures have been made more functional to meet grass-roots level realities.

In this process of evolution, the approaches to TLP have changed from the transmissionist one to the cognitive one, and now to the constructivist one. However, in this process of evolutionary

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changes (Kuhn, 1970) the two important human inputs, which obviously have remained unchanged, are the teacher and the learner.

The teacher brings with him/her, his/her

- Personality (which could be pleasant, smiling, caring, arrogant, angry, terse, authoritative, etc.),
- Content knowledge (which could be say, in the case of science teachers, textbook science, scientists' science, indigenous science, his/her personal construct – science, etc.),
- Pedagogy knowledge (which could have been acquired through professional training, years of experience, self-developed but operationally effective strategies, orientation programmes, etc.),
- Pedagogical content knowledge (Shulman, 1987) (which might have been developed through his/her innovation, socio-cultural context, linguistic expertise, infrastructural facilities available in the school etc.), and
- Creativity (generated and refined over years through self-modulated efforts, programmed orientations, etc.).

and perhaps a host of other factors into the classroom. These are inputs by a teacher in a classroom situation. He/she uses them in a way which he/she thinks is effective and expects certain learning outputs in the learner.

Similarly a learner, (independent of the teacher) brings with him/her a lot of inputs which he/she then uses in learning new concepts, events, examples, etc.

Thus an input-output model of learning must then necessarily build upon either a teacher-specific or a learner-specific or perhaps a composite-specific (where perhaps the teacher and the learner can be taken in unison) framework.
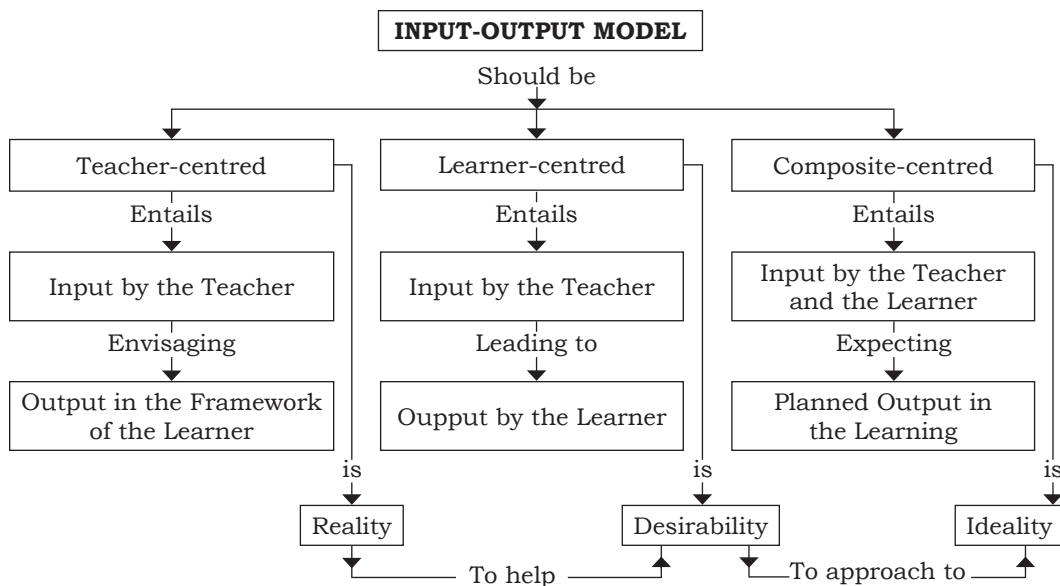

Figure 1

However, we are conscious that in this discussion we will not be considering such inputs as textbooks, infrastructure facilities, school specific co-curricular practices, contribution by the society in terms of Village Education Committee and other such organiations, use of electronic media, incentives in the form of scholarships, etc. because they are policy-prescribed inputs over which neither the teacher nor the learner has much of a say.

In 'Reality', the TLP as practiced even now in the classroom is mostly a teacher-centred input-output model. It entails inputs by the teacher. It envisages a prototype output in the learner, confined within the philosophy — 'What is relevant for examination is relevant for education'. However, in the context of learning in the constructivist framework, the 'Desirability' of TLP consists of input by the learner leading to output by the learner. One may call this the learner-centred input-output model. However, optimisation of TLP leading to maximization of meaningful learning cannot afford to consider the teacher and the learner in isolation. Thus in 'Ideality' the composite model for TLP involves input by both the teacher and the learner expecting a planned construction by the learner. This means the 'Reality' should help the 'Desirability' to approach the 'Ideality'

In this research paper we shall confine ourselves to the crucial learner-centred input-output model. We call this crucial because through conclusive field study-based evidences constructivism advocates that

- the learner constructs his/her knowledge,

- no learner enters a class devoid of personal constructs (Alternative conceptions), and
- knowledge is constructed through a process of conceptual change (Posner et al, 1982; Hewson and Thornley, 1989)

Thus to maximise meaningful learning it is essential to know what are the contributing structures (inputs) the learner carries with him/her into the classroom and using which he/she is going to construct new structures (output).

Inputs

The inputs by the learner have four discernible dimensions, which are
- Intrinsic inputs
- Constructed input
- Cognitive preference input
- Concept-based input

Dimension 1: Intrinsic inputs

These inputs depend on the age, genetic design, biological growth as well as socio-cultural background of the learner. These are further classified into two categories (a) Mental developmental level of the learner and, (b) Creativity of the learner.

(a) Mental developmental level (MDL) of the learner: When a learner enters a class, obviously his/her mental developmental level or, mental readiness determines the concepts he/she can construct and internalise. If there is a mismatch between the MDL of the learner and the cognitive demand level of the concept, then even the best efforts by a teacher to facilitate the construction by the learner will

result in a constructed concept which will be most likely not the desirable one.

Hence, this puts a premium on educational administrators, curriculum framers, textbook authors and classroom teachers to at least ascertain the average MDL of a group of learners in a particular class before they are exposed to actual learning situations.

Several models are available in the literature to perform this task.

i) Piagetian Stage–dependent model

In this model, it is important to note the following points :

- Although the stages form a nominal scale, they can be functionally converted to an ordinal scale for use in a classroom situation.

- In this model the inbuilt lacunae are that the Piagetian clinical interview technique is individualistic in character and is time-consuming. These inhibit the technique to be transported, as such, into a classroom situation, involving large number of learners whose MDLs spread over quite a few Piagetian stages.

Inspite of this, the Piagetian model is still a fairly reliable reference point and hence there have been large number of efforts to take it into a classroom.

Longeot (1965) was the first to take Piaget into the classroom by overcoming the above limitations of Piaget's method Clinique. His was a text of combinatorial thinking, propositional logic and proportionality. He used scalogram technique to analyse the responses. But he did not give the date on inter-task correlations, nor, on the reliability of the task. It was purely a pencil-on-paper test and demanded reading visual recall and writing abilities. Bruner (1960) had earlier commented that such tests are likely to put the pupils in suspicion. Further the responses in such a test rarely reflect the MDL of the child, measured in terms of the ability to handle specific logical structures.

Raven (1973) developed a test of logical operations. It was again a pencil-on-paper test of classification, seriation, logical multiplication, compensation, proportional thinking, probability and corelational thinking operations. Thus, although as compared to Longeot's test, Raven broadened the range of logical structures to be tested by a tool, his test suffers from the limitations of a pencil-on-paper test.

Tisher and Dale (1975) went a step forward by introducing an apparatus which should be on view during the administration of their understanding in science test. But the apparatus was never used as an aid to supplement the actual administration of the test. Further it distinguished between only formal and concrete operations without any finer discrimination.

Rowell and Hoffman (1975) developed a group task to be given in a laboratory with each pupil

using an apparatus. The disadvantages are that one needs a spacious laboratory and a large number of apparatus, which in any way does not relate to a realistic classroom situation. Further the responses of any child depended upon how he/she completes the experiment and hence demands on his/her experimental skill which does not necessarily reflect his/her MDL.

To do away with the requirement of a large number of apparatus Issacs (1976) used video-taped presentations. Apart from the fact that this demanded a high level of pictorial perception-to-comprehensional ability, the test also relied heavily on ticked answers, which involved high probability of guessing. Thus the conclusions arrived at from the responses are likely to be quite off the mark.

Shayer and Wharry (1973) developed Seven tasks in which the administrator presented the questions verbally while demonstrating the activities with a simple apparatus. However, they did not provide data on the reliability and validity of the tasks.

The CSMS (Concepts in Secondary Maths and Science) group at Chelsea College, London, in 1974, subjected all the Shayer-Wharry tasks through a thorough psychometric developmental process. The final versions of these tasks are called the Science Reasoning Tasks (SRT). These tasks have the following characteristics:

- Their reliabilities are well-established.
- Each task requires one very simple equipment for stepwise demonstration of different items.
- They do not impose any constraint on the responses in terms of adequate verbal ability as they demand short answers from the pupils.
- The provision of short answers also eliminates the effect of 'guessing' as is common in case of ticked answers.
- The internal consistencies of the tasks as measured (Johnson, 1977) by KR-20 coefficients have values around 0.85.
- The test-retest correlation is also as high as 0.8 (Johnson, 1977).
- Even the task-interview correlations are quite large (Shayer and Adey, 1981) indicating a direct correspondence with Piaget's method Clinique.
- At the end of each demonstration in the context of an item in the task, the pupil is asked to
  — guess what could happen; and
  — explain what actually happens.
  Responses to both these are likely to reflect the mental level of the child.
- Each task is a good discriminator over a range of Piagetian stages.
- They have a cross-cultural validity. In fact, the validity of tasks III and IV, under Indian conditions, have been established by Mohapatra and Mohapatra (1997)

Lawson (1977), without the knowledge of the already developed SRT designed a set of tasks independently. But they suffered from the defect that the test items were not classified as concrete, or, formal before trial. The stage assigned to each score range was determined by past-hoc inspection of contingency table.

ii) Pascual-Leone's M-Power Model

The proponents of the neo-Piagetian approaches to diagnose and map MDL of pupils advocate that Piaget's theory suffers (Pinard and Laurendeau, 1969) from several drawbacks like horizontal and vertical decalages and low correlation between tasks which are supposed to be passed at about the same age and MDL, such as, conservation, classification and seriation.

Pascual-Leone retained the Piagetian notions of scheme, assimilation, differentiation, accommodation and structural invariants, but introduced the concept of M-Power (Pascual – Leone, 1977, 1987). This facilitated the introduction of several hyperfine structures into the stage-dependent model of Piaget. He argued that the instruction does not have to be geared to some general logical structure, but to the specific pre-requisite structures of relevance to the domain in question together with the M-Power of the learner.

He introduced a new rule for stage transition by stating that the children progress from non-solution to solution of a developmental task when their M-Power increases to the point at which it can activate all the task-relevant schematic boosting, namely, scheme's own cues, field effects and logical, or structurally-related cues. A reliable and valid tool to measure the M-Power of the child has been developed by Pascual-Leone. Interesting and important case studies involving assessment of M-Power of pupils in a classroom situation can be obtained from Niaz (1988, 1991). One may use this M-Power framework to assess the MDL of the learner. However, in this formalism, to ascertain the M-demand of any concept, no general taxonomy is available in the literature, as is the case with SRTs (Shayer and Adey, 1981)

iii) Processing Space Model

Case (1985, and references therein) in an information processing framework, propounded that the completion of an item/activity by a learner should not be looked upon in totality because the process of completion goes through several steps, each demanding a different cognitive ability. Thus the completion of each step should be analysed separately. To operationalise this idea, he advanced the concept of Executive Processing Load (EPL). EPL is the number of schemes a learner must activate in order to complete one particular step in an executive sequence. The EPL for different steps will be different. He called the maximum instantaneous value of EPL as Maximum Processing Load (MPL).

In this model he introduced three variables, Total Processing Space (TPS), Operating Space (OS) and Short-Term Storage Space (STSS), which are related by the following equation:

TPS= OS + STSS

Thus a measurement of TPS and OS of the learner will also give an assessment of the learner's effective MDL.

iv) Vygotsky's Zone of Proximal Development Model

Vygotsky's (1962) analysis of the relationship between learning and development is the basis for his concept of the Zone of Proximal Development (ZPD). Vygotsky writes (1978) –"What the children can do with the assistance of others might be in some sense more indicative of their MDL than what they do alone". The abilities which help the child to accomplish this are mature as they must have been internalised by the child for quite sometime. These in fact reflect the Actual Developmental Level (ADL). There could be, of course, the abilities which the child cannot exercise at all, even with extensive assistance. These abilities may mature later. But there could be perhaps quite a few abilities which the child can demonstrate with assistance. These abilities could be considered as existing in the process of maturing. They are latent and need little props. These maturing abilities then provide excellent predictive information on how the child will/can perform independently in the near future. Thus, assessment of the soon-to-be-mature mental abilities provides a perspective measure of the projected performance ability of the child and reflects the potential developmental level called by Vygotsky, the Zone of Proximal Development (ZPD). Vygotsky asserts that an assessment of ZPD of a child will also indicate the functional mental developmental level. It is stated in brief by the following equation:

$$MDL = ADL + ZPD.$$

In view of the above research findings, we recommend the following:

- Taking a broad-based sample of learners one should have a statistically clear picture of the MDL of the pupils in a class before even the curriculum is framed, textbooks are drafted, and the actual classroom teaching takes place, because MDL is the most important intrinsic input by the learner.
- An analysis of the cognitive demands of each concept to be taught in any class be undertaken simultaneously.

(b) **Creativity of the learner:** The learner also brings with him/her his/her creative abilities, which can be measured in terms of the classical model (Torrence, 1965, 1968), involving four parameters, namely fluency, flexibility, originality, and elaboration. Many culture-specific tools (viz. Sudhir and Varpari, 1991) are available in the literature for ready use. One may note that these four parameters are continuous variables and as contrasted to this model. The Oregon University

Group, U.S.A. has now proposed the quantum creativity model. One must not lose sight of the fact that creativity also plays a major role for the construction of knowledge by the learner.

Dimension 2: Constructed input

It is now known that the learner constructs knowledge in a continuous ontogenic (Glasersfeld 1992) process. However, as had already been clearly stated by Ausubel (1968), the degree and quality of construction is decided by the Alternative Conceptions (ALCONS) of the learner. Since 1980, there have been focussed efforts to:

- diagnose and map learner's ALCONs;
- refine and innovate new techniques to carry out this diagnosis;
- study ALCONs cross-cultural vitiations, if any;
- identify genesis of ALCONs, common to a group of learners;
- study the characteristic of ALCONs;
- locate implications of ALCONs for TLP; and
- develop and try out teaching models incorporating learner's ALCONs.

Comprehensive reviews and overviews can be obtained from the books by Fensham et al. (1994), Steffe and Gale (1995), Glynn and Duit (1995) and papers by West (1982) Driver and Erickson (1983), Gilbert and Watts (1983), Hashweh (1986) and Mohapatra (1989, 1997). In fact studies on ALCONS were pursued so extensively and intensively that Gilbert and Swift (1985) called these endeavours as 'The Alternative Conception Movement'. To maximise the degree of meaningful construction by the learner it is imperative that the teacher should be equipped with knowledge, techniques, and strategies so as to be able not only to diagnose learner's ALCONs but also to suitably use them through cognitive negotiation in the TLP for an optimal and fruitful output.

Dimension 3: Cognitive Preference Input

Cognitive preference is a learner's stable mode of perceptual organisation of the external environment and the concepts taught to him/her (Tamir, 1985). In fact in the process of learning a concept through construction, cognitive preference of a learner is the self-induced reply to such self-asked question as — 'Why shall I learn this concept?' The answer to this question is obviously an input by the learner and becomes the guiding motive force in the process for further learning. Four cognitive preference modes have been indentified. They are

- Recall — It involves acceptance of information for its own sake without consideration of its implications, or applications. A preference for "Recall" indicates an interest in learning a name, a number, a definition, a formula, an observation, a fact or even a table.
- Principle — A preference for 'Principle' indicates an interest in identifying relationship between variables, or a rule that can be applied to a class of objects, phenomena or, an interest in explaining a phenomenon leading to

a representation of fundamental principles, or relationships.

- Questioning — A preference for 'Questioning' indicates an interest in critically analysing and commenting on information for completeness, general validity, or limitations, or in generating suggestions and hypotheses for further research.

- Application — A preference for 'Application' indicates an interest in using scientific information to solve problems in commerce, industry, farming, or in other real, life situations.

Cognitive preference ultimately controls the quality of meaningful learning by the learner. Although preference for 'Principle' is perhaps cognitively the best at the intake point where, very few learners have this cognitive preference. However, experimental results show that by suitable intervention techniques (Okebukola and Jedge, 1988) learners originally having preference for 'Recall' can be made to gradually adopt the cognitive preference mode of 'Principle'. But for this the teacher should have a tool (Tamir, 1985) to ascertain the initial cognitive preference of the learners. We note in passing that the mode of cognitive preference adopted by a learner is, many a time, specific to the concept domain and context.

Dimension 4: Concept-based input

Based on the two main observations of constructivism, namely

- Learning is a purposeful, intentional, ontogenic (Glasersfeld, 1992) sequence of construction of cognitive structures by the cognising subject, and

- Learning is pervasively influenced by ALCONs of the learners.

Posner et al. (1982) and Hewson (1981, 1982) developed the conceptual change model of learning as discussed in an earlier chapter. Activation of the process of conceptual change, when a learner encounters a new concept, requires an assessment of the concept by the learner. This assessment is subjective and purely personal to the learner and hence is a concept-specific input by the learner. Four conditions are associated with this autonomic process of assessment. They are as follows (Hewson and Thornley, 1989)

C1:   The new concept has to be Intelligible

In the framework of the existing knowledge of the learner, i.e. the learner's ALCONs in the relevant concept domain, the new concept should convey meaning (not necessarily the correct meaning) to the learner. Without intelligibility a concept has no cognitive status (Hewson and Thornley, 1989) for the learner. Schollum and Osborne (1985) call this the criterion of relevance.

C2:   The concept has to be Plausible

The new concept should not only be intelligible but also seem to be true and valid to the learner, i.e. it should make sense in the framework of the learner's ALCONs.

C3:   The new concept has to be Fruitful

The new concept should be such that the learner should find it useful, or

should be convinced that he can achieve something by using it. This achievement could be just logical consistency leading to mental satisfaction in the learner's framework, or could seem to have enough potential for fruitful use in future.

C4: *The concept could be a source of Dissatisfaction to the learner.*

This state may arise if (a) the learner finds that the new concept leads to conclusions which are in conflict with the existing ALCONs, or (b) they seem to be valid but are different from those arrived by other pupils using their respective ALCONs, or (c) the new concept does not seem to be plausible, or, fruitful to the learner, or (d) the connotation of the concept arrived at by the learner is in conflict with that advanced by the teacher (Dreyfus et al, 1990). Some of these have already been discussed under cognitive conflict but are repeated here to keep intact the framework developed by Posner et. al (1982) and Hewson (1982). The four learner-centred inputs are presented in Fig 2.

Output

Out of the four broad inputs by the learner, the intrinsic input decides the ability of the learner to assimilate a concept having specific cognitive demand, the constructed input decides not only the background but also the mosaic of the new construction, the cognitive preference controls the quality of construction and the concept-based input decides the final states of learning after the construction is complete. When a learner encounters a new concept, he/she makes use of the learner specific four kinds of inputs and is likely to suitably assimilate and accommodate the new concept through needed deconstruction and reconstruction of
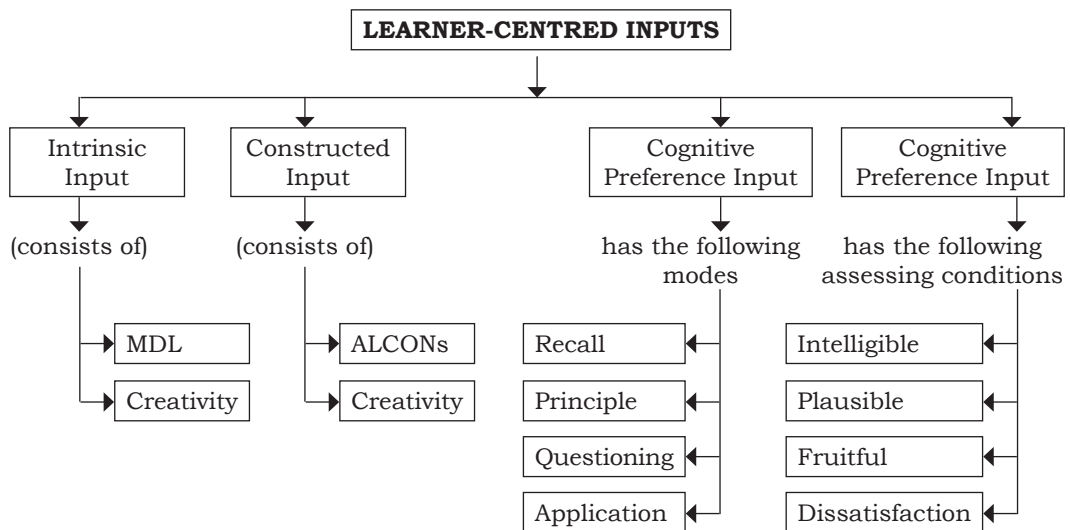
Figure 2

the epitaxy of his/her cognitive structures resulting in one of the various possible equilibrated (a la Piaget) states, which we call the output (OP) of learning. They could be one of the following (as discussed in the chapter on conceptual change (Mohapatra, 1997):

OP1: *Conceptual Rejection*: This will occur if either the new concept does not satisfy the condition C1, or the MDL of the learner is below the cognitive demand level of the concept. In such a situation the teacher's input (teacher-centred model) has to provide suitable props to ensure that C1 is satisfied, or that the learner attains some amount of cognitive acceleration (Adey, 1988)

OP2: *Conceptual Integration*: If condition C1 is satisfied but C2 is not satisfied, the learner may modify the structures of the existing ALCONs and accommodate the new concept (Hewson, 1981, Posner et al., 1982). It is a long-term process aiming at a stable final state.

OP3: Conceptual Extension: If the conditions C1 and C2 are satisfied and C3 is not satisfied, the learner may still absorb the new concept by adding new structures to the already existing ALCONs.

OP4: *Conceptual Capture*: If the conditions C1, C2, C3 are satisfied, then the new concept is incorporated straight away in the existing structures of the ALCONs (Hewson, 1981, Posner et. al., 1982). There are two possible sub-states under this as listed below.

OP5: *Conceptual Dichotomy*: If the conditions C1, C2 and C3 are satisfied but the concept is something different from the existing structures and cannot be incorporated into them by trial of various fitments, then the learner faces a problem. On one hand the learner is not prepared to abandon the old structures as he/she perhaps does not find anything wrong with them, and on the other hand he/she does not like to reject the new concept as it satisfies the three basic conditions. In such a case the learner is likely to retain the new concept as a new, independent ALCON, side by side with his/her old ALCONs (Mohapatra, 1989). Villani (1992) also hypothesises the co-presence of the old and the new knowledge.

OP6: *Conceptual Exchange*: This will happen when the conditions C1, C2 and C3 are satisfied and the new concept seems to have better, broader and finer utility value than some of the old ALCONs. Arriving at such a conclusion goes through a process of trial and error, hypothesis formation and testing in so far as organising his/her experiential world is concerned. In most of such cases a broad scale conceptual change takes place where some of the old ALCONs is/are replaced by the new one.

OP7: *Conceptual Indifference*: If C4 is strongly satisfied but C1, C2, C3 are also satisfied, the learner may neither accept nor reject the new concept. The learner may prefer in such a situation to keep his/her old ALCONs unchanged and remain indifferent to the new concept that is being taught. It may be noted that this is not a case of conceptual rejection.

These outputs are presented in Fig. 3. The seven possible outputs in the event of a learner encountering a new event, instance, or a concept form a taxonomy of outputs (Mohapatra, 1997). This taxonomy is more encompassing and richer than other such attempts, like those by Dykstra et al (1992).

A NEW CONCEPT

If	If	If	If	If	If	If
Not Intelligible	Intelligible but not Plausible	Intelligible, Plausible but not Fruitful	Intelligible, Plausible and Fruitful	Intelligible, Plausible, Fruitful but different from existing ALCONs.	Intelligible, Plausible, Fruitful, different from ALCONS but with broader utility	Strong dissonance with existing ALCONs
leads to	leads to	leads to	leads to	leads to	leads to	leads to
OP 1 : Conceptual Rejection	OP 2 : Conceptual Integration	OP 3 : Conceptual Extension	OP 4 : Conceptual Capture	OP 5 : Conceptual Dichotomy	OP 6 : Conceptual Exchange	OP 7 : Conceptual Indifference

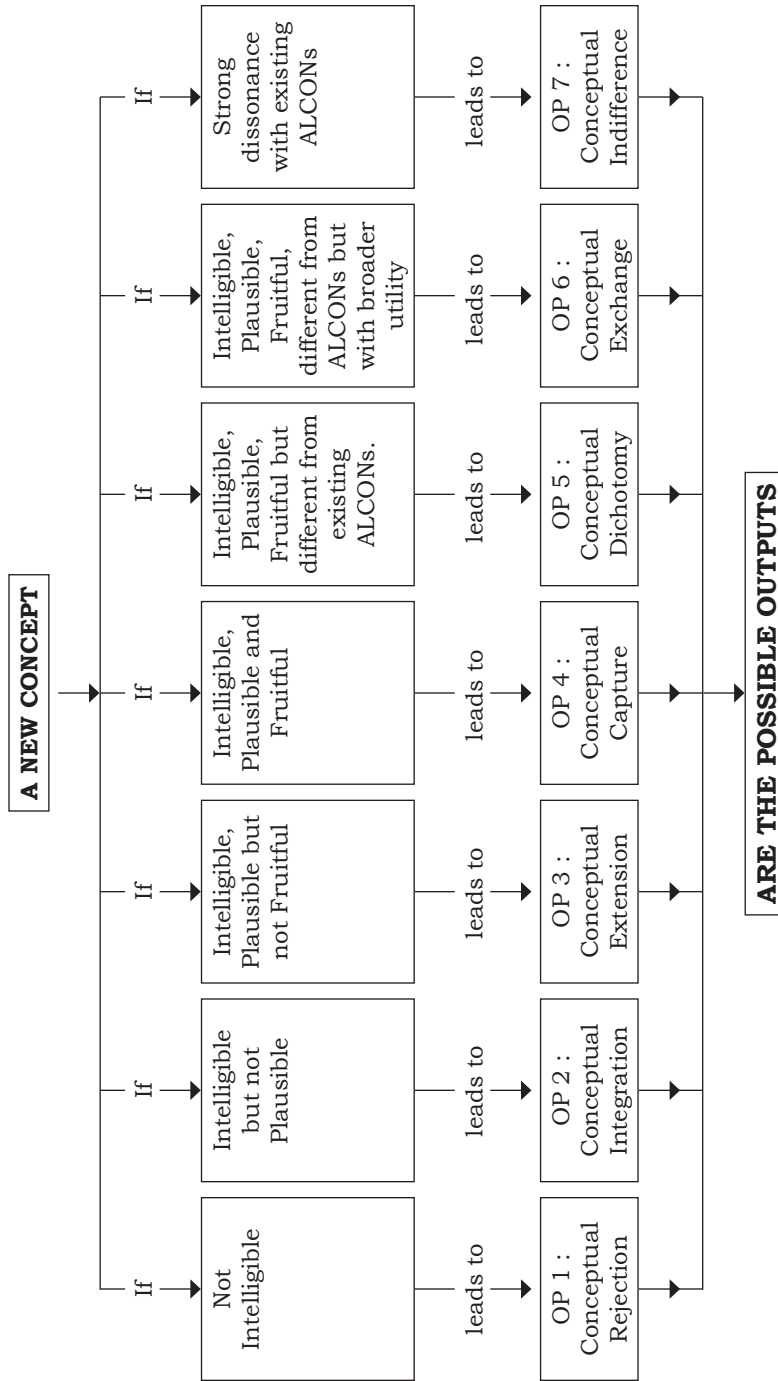**ARE THE POSSIBLE OUTPUTS**

Figure 3

Conclusion

In a classroom TLP, the only two and most crucial human components are the teacher and the learner. The average teacher brings with him/her his/her conformist inputs whereas the learner brings with him/her his/her constructivist inputs. Since the efficacy of a TLP is measured not by the quality of teaching but by the quality of learning, any input by the teacher will have functional meaning if and only if it works in consonance with the learner's constructivist inputs and endeavour and guides the learner to an output which best approaches the envisaged output of the formal schooling process. In the framework of the above mode, this optimisation of learning demands that the following steps be taken:

- A class-wise assessment of the MDL of the learners be undertaken so as to provide crucial statistical picture to curriculum framers and textbook writers.
- The cognitive demand of concepts that are to be included in the curriculum for each class, be undertaken to provide informative bench-marks to curriculum framers and textbook writers.
- The learner's ALCONs in each concept domain be diagnosed and mapped to help the teachers to plan teaching strategies.

- If possible genesis of the ALCONs of a group of learners be identified.
- Steps be taken for mass orientation of all personnel involved, right from the planning to curriculum framing to textbook writing to classroom teaching to evaluation, about the constructivist approach and this learner-centered input-output model.
- Teachers may be apprised of the cognitive preference modes so that they may try to adopt methods which will help the learner to go from the 'Recall' mode to the 'Principle' mode.
- In all teacher orientation programmes emphasis may be put on the 'Conceptual Change' model and the seven possible outputs with the aim in view to impress upon the teachers to use strategies so that the outputs like 'Conceptual Rejection' or, 'Conceptual Indifference' are never manifested.

We have presented here a four dimensional input and made an effort to provide key information for the measurement and/or use of the inputs in a classroom situation. The outputs have been delineated in the conceptual change model of the constructivist approach. It is hoped that this usable model will initiate the much needed step towards a functional and pragmatic composite model.

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Some Statistical Aspects of Major Operational Incentive Schemes in Indian Schools

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Abstract

This paper considers some statistical aspects of major operational incentive schemes prevailing to attract children in the Indian schools. Attempts have been made to analyse the availability of major incentive schemes in the schools, such as schemes on free uniforms, free textbooks, attendance scholarship for girls, mid-day meals at primary stage in the country. The present paper is based mainly on secondary data on school education collected during Seventh All India School Education Survey conducted by the National Council of Educational Research and Training under administrative and financial control of Government of India.

Introduction

The success of democracy depends on the growth of a spirit of cooperation, disciplined citizenship and the capacity of ordinary citizens to participate intelligently in the public affairs. Prior to Independence in 1947, the colonial regime established a system of education that was accessible to only few people and hence masses were denied of education in India. It gave greater emphasis on conformism to socio-economic and political system established during those times. Lord McCauley (founder of educational system under British regime) explicitly stated that the objective of educational system was to create a new breed of the Indians as similar to Europeans as possible. It was on this account that the Indian National Movement developed a strong critique of the British System that only imparted *Learning Skills* and not *Life Skills*. To achieve it, the Indian Constitution had required that within

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10 years of its commencement, free and compulsory education should be provided to all children up to the age of 14 years (Singh, 2004).

Proposals for educational reform generally focus on teachers and curricula. But the most important factor in education may be the student himself or herself. A growing number of states in India and elsewhere have established programmes that provide financial rewards in the form of merit scholarships to students who perform well academically. However, such programmes are controversial with some educators, and the structure of many existing programmes in the states makes it difficult to evaluate rigorously the impact of such incentive programmes because it is hard to identify for comparison a credible group of students who were not eligible for the programme. On the other hand, the low-income families or economically weaker section of the society leave their children feeling isolated, and do not send their children to the school mainly due to economic reasons. Many parents worry from one term to another about how they will afford the cost of next year's schooling and hate having to tell their children that they cannot afford an extra-curricular activity. The economic situations of such families who simply can't meet the costs of sending their children to school has received considerable attention, and accordingly the public authorities, being conscious of the situation and considering such

economic deprivations as impediments to implementation of educational policies and programmes at the grass-roots level, have made some landmark provisions through providing incentive schemes/programmes, and evolving mechanism for proper operation thereof in the schools.

Major Operational Incentive Schemes: A Brief Resume

Despite constitutional efforts at free and compulsory elementary education, several states but not all [12 States and 4 Union Territories] in India have enacted legislation for free and compulsory primary education stage. All States have exempted children from tuition fees up to upper primary classes. However, it will be required to remodel the education system at elementary level in regard to the education as a fundamental right of children in the light of constitutional amendment, and accordingly the *Sarva Siksha Abhiyan* (Education for All) programme has been initiated in the mission mode in recent past in the country to ensure that all children are enrolled in the schools. It has also paid special attention to several incentive schemes including free uniforms, free textbooks, scholarships, mid-day meals, etc.

The Indian States/UTs have introduced a number of incentive schemes including scholarships to attract children in the schools and achieve gender equality[1]. Some of these major incentive schemes are listed hereunder:

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1. Based on compilation from various websites of the State Governments in India, and an unpublished report titled "Seventh All India School Education Survey: State Policies and Practices on School Education" developed by the Department of Educational Surveys and Data Processing, National Council of Educational Research and Training, New Delhi.

1. All students from Class I to V in government primary schools are served mid-day meals in various forms.
2. Free supply of uniforms and text-books to students based on parental income, social groups (SC/ST/OBC etc.), and other relevant criteria, namely, students who have secured 75% of attendance during the preceding academic year with satisfactory performance).
3. Distribution of free textbooks to the children of certain disadvantaged social groups (SC/ST/OBC etc.), and all girls under *Sarva Shiksha Abhiyan* (SSA).
4. Free transport facility to girl students in rural areas to pursue their studies.
5. IRDP scholarships to all children of families living below poverty line.
6. Scholarships to all children of SC/ST/OBC and general category students.
7. Girl attendance scholarships to boost attendance of girls in schools.

Materials and Methods

Keeping in view the importance of incentive schemes as described in preceding paragraphs, the All India Educational Surveys have been enumerating information on various aspects of the incentive schemes. Besides, the most recently conducted seventh survey (in year 2002) has assessed the availability of incentive schemes and beneficiaries in the schools covering incentive schemes on free uniforms, free textbooks, supply of free textbooks, attendance scholarship for girls and beneficiaries thereof,

respectively including mid-day meals and types thereof at primary stage in the country. The present paper is based mainly on the secondary data on school education collected during sixth survey and seventh survey [NCERT (1998) and NCERT (2007)].

This paper will provide an analytical overview and discuss in the ensuing paragraphs keeping in view the impact of incentive schemes in school education on some of the prominent and major incentive schemes and beneficiaries thereof enrolled in the schools for all communities, which are further being segregated by social groups, namely, scheduled castes (SC) and scheduled tribes (ST) including educationally backward minority community (Muslims) in the country (NCERT, 2007). The data are processed and analyzed by simple statistical approach to have better understanding in uncomplicated terms as well as to provide the directions on incentive schemes operating in the schools that are taking place in recent years in India.

Results and Discussions

We shall, now, present our major findings regarding the incentive schemes, beneficiaries and temporal comparisons thereof on above-captioned key parameters associated with operating incentive schemes in school education in the country. It will certainly provide the necessary areas of intervention to be undertaken by the public authorities concerned in this regard. For convenience, the major findings of incentive schemes on free uniforms, free textbooks, supply of free textbooks, attendance scholarship for

girls and mid-day meals are considered by area (rural and urban) and school category (primary, upper primary, secondary and higher secondary) as given hereunder in five parts.

Part I: Free Uniforms

The children of weaker section of the society do not attend the schools mainly due to lack of suitable clothing for going to school. In this regard, Table 1 provides information about number of schools by area and by school category having the scheme, and number of beneficiaries by social group and by sex in the country.

The seventh survey reveals that out of 10, 30,996 schools in the country, 2, 40,778 (23.35%) schools have incentive scheme of free uniforms in the country. The total number of beneficiaries is 2, 03, 33,930 children (10.09%) consisting of 7.79 per cent boys and 12.87 per cent girls, respectively in the country. These figures on beneficiaries of free uniform scheme by social group comes around 14.50 per cent for SC, 14.61 percent for ST, 8.40 per cent for EBMC including 8.40 per cent for others, respectively.

Area-wise, this distribution of beneficiary of free uniforms for all communities is found on higher side in rural area (10.99 %) as compared to urban area (8.03 %) in the country. The proportion of SC and EBMC beneficiaries are having a very marginal difference in rural and urban areas in terms of per cent points, whereas the ST beneficiaries of free uniforms are found higher in rural area (13.70%) as compared to urban area (5.12%).

During sixth survey, incentive scheme for free uniform has been available to 2,307,45 schools thereby it reflects a longitudinal growth of 4.35 per cent over a period of nearly one decade that is at the time of seventh survey. Besides, the number of beneficiary students of this scheme has been reported 84,98,982 students, and in that way it has provided a growth of 139.25 per cent points in the country.

The information in regard to schools having incentive schemes of free uniforms and number of beneficiaries by area and school category are presented in the succeeding paragraphs.

Primary Schools

As per the seventh survey, out of 6, 51,064 primary schools 1, 65,242 schools (25.38 %) provide free uniform incentive scheme to the students in the country. Around 96,76,566 students (11.96 %) have been beneficiaries of free uniform scheme in primary schools, and this distribution by sex has been 8.03 per cent for boys and 16.33 per cent for girls, respectively. By social group, the beneficiaries of free uniform scheme have been 15.24 per cent for SC, 13.74 per cent for ST, 8.86 per cent for EBMC including 11.08 per cent for others, respectively. The proportion of schools having this scheme in rural area is 25.87 per cent as against 21.79 per cent in urban area. In primary schools, the distribution of beneficiary of free uniforms for all communities is found on lower side for rural area (11.44%) as compared to urban area (14.34%) in the country. The proportion of EBMC beneficiaries of free uniform scheme for primary schools is found lowest in terms of per cent points (8.86%) as compared to other social groups in the country.

Table 1
Schools having Incentive Scheme of Free Uniforms and Number of Beneficiaries, 2002

Categories of School	Area	Total Number of Schools	Schools Having the Scheme	Number of Beneficiaries					Total	
				All Communities	Schedule Castes	Schedule Tribes	Educationally Backward Minority Community (Muslims)	Others	Boys	Girls
1	2	3	4	5	6	7	8	9	10	11
Primary	Rural	5,72,814	1,48,191	75,74,741	23,95,205	9,89,103	8,53,558	33,36,875	25,21,569	50,53,172
			(25.87)	(11.44)	(14.48)	(13.99)	(8.26)	(10.33)	(7.22)	(16.14)
	Urban	78,250	17,051	21,01,825	5,77,013	54,095	3,42,606	11,28,111	8,95,673	12,06,152
			(21.79)	(14.34)	(19.43)	(10.38)	(10.83)	(14.09)	(11.72)	(17.19)
	Total	6,51,064	1,65,242	96,76,566	29,72,218	10,43,198	11,96,164	44,64,986	34,17,242	62,59,324
			(25.38)	(11.96)	(15.24)	(13.74)	(8.86)	(11.08)	(8.03)	(16.33)
Upper Primary	Rural	1,93,947	52,491	63,41,741	14,15,927	9,89,733	5,31,000	34,05,081	31,32,781	32,08,960
			(27.06)	(16.15)	(20.92)	(21.58)	(12.50)	(14.40)	(14.34)	(18.43)
	Urban	51,375	8,568	19,12,511	5,08,933	1,14,249	4,26,670	8,62,659	9,14,010	9,98,501
			(16.68)	(12.77)	(20.86)	(16.43)	(14.58)	(9.67)	(11.37)	(14.39)
	Total	2,45,322	61,059	82,54,252	19,24,860	11,03,982	9,57,670	42,67,740	40,46,791	42,07,461
			(24.89)	(15.22)	(20.90)	(20.91)	(13.35)	(13.10)	(13.54)	(17.27)
Secondary	Rural	63,576	7,233	9,20,819	2,56,665	1,83,685	71,025	4,09,444	4,06,555	5,14,264
			(11.38)	(4.82)	(7.56)	(10.98)	(3.50)	(3.41)	(3.75)	(6.23)
	Urban	27,165	2,094	3,14,077	1,08,190	15,937	42,687	1,47,263	1,26,554	1,87,523
			(7.71)	(2.82)	(7.31)	(3.39)	(2.76)	(1.93)	(2.16)	(3.55)
	Total	90,741	9,327	12,34,896	3,64,855	1,99,622	1,13,712	5,56,707	5,33,109	7,01,787
			(10.28)	(4.08)	(7.49)	(9.32)	(3.18)	(2.83)	(3.19)	(5.18)
Higher Secondary	Rural	22,847	2,541	5,92,156	1,98,315	48,537	41,583	3,03,721	3,08,784	2,83,372
			(11.12)	(3.75)	(7.06)	(5.16)	(2.41)	(2.94)	(3.17)	(4.67)
	Urban	21,022	2,609	5,76,060	1,95,390	17,273	76,857	2,86,540	2,72,986	3,03,074
			(12.41)	(2.84)	(7.54)	(3.07)	(3.16)	(1.95)	(2.44)	(3.34)
	Total	43,869	5,150	11,68,216	3,93,705	65,810	1,18,440	5,90,261	5,81,770	5,86,446
			(11.74)	(3.24)	(7.29)	(4.38)	(2.85)	(2.36)	(2.78)	(3.87)

Note: Figures within parentheses indicate percentage with respect to total number of enrolment in respective categories.

Upper Primary Schools

There are 2,45,322 upper primary schools in the country, of which 61,059 upper primary schools (24.89 per cent) give free uniforms to 82,54,252 students (15.22 per cent) that is distributed among 13.54 per cent boys and 17.27 percent girls in the country, respectively. Further, among these beneficiaries, the free uniform incentive scheme has covered 20.90 per cent SC, 20.91 per cent ST, 13.35 per cent EBMC including 13.10 per cent others, respectively. Among the beneficiaries, 16.15 per cent are studying in rural area and this proportion is comparatively on higher side as compared to 12.77 per cent in urban area. The distribution of beneficiaries of free uniforms for SC and ST are found nearly 20.90 per cent for both social groups, respectively as compared to other social groups in the seventh survey.

Secondary Schools

The incentive scheme of giving free uniforms to students is available in 9,327 secondary schools (10.28%) in the country, thereby 12,34,896 students (4.08%) have been covered under free uniform scheme. In secondary schools, 3.19 per cent boys and 5.18 per cent girls are covered under this scheme at the time of seventh survey. The beneficiaries of free uniform scheme studying in the secondary schools belong to 7.49 per cent SC, 9.32 per cent ST, 3.18 per cent EBMC including 2.83 per cent for others, respectively. The proportion of schools having this scheme in rural area is 11.38 per cent as against 7.71 per cent in urban area. In secondary schools, the distribution of beneficiary of free uniforms for all communities is found on higher side for rural area (4.82%) as compared to urban area (2.82%) in the country. The EBMC beneficiary of free uniform scheme in secondary schools is found lowest in terms of per cent points (3.18%) as compared to other social groups in the country. The proportion of secondary schools having this scheme is relatively higher in rural area (11.38%) as against in urban area (7.71%). In secondary schools, 12,34,896 students (4.08%) are the beneficiaries of free uniforms for all communities, and those are also found on higher side in rural area (4.82%) as compared to urban area (2.82%) in the country.

Higher Secondary Schools

At the time of seventh survey, the distribution of free uniforms to 11,68,216 students (3.24%) as an incentive scheme are available in 5,150 higher secondary schools (11.74%) covering 2.78 per cent boys and 3.87 per cent girls, respectively in the country. By social group, the beneficiaries of free uniform scheme pertains to 7.29 per cent SC, 4.38 per cent ST, 2.85 per cent EBMC including 2.36 per cent for others, respectively. The EBMC beneficiary of free uniform scheme in higher secondary schools is found lowest in terms of percent points (2.85%) as compared to other social groups in the country. The proportion of higher secondary schools having this scheme is relatively higher in urban area (12.41%) as against in rural area (11.12%). In higher secondary schools, 11,68,216 students are the beneficiaries of free uniforms for all communities,

and are found on higher side in rural area (3.75%) as compared to urban area (2.84%) in the country.

Part II: Free Textbooks

In a bid to encourage the student community, and thereby to achieve the millennium development goals on *education for all*, the incentive of free textbooks scheme are undertaken by several states/UTs Governments as a policy measure despite huge financial constraints in the country. The incentive scheme of free textbooks and its distribution to students is primarily given to attract children to schools, and to retain them there by the public authorities. Table 2 provides information about number of schools by area and school category having the scheme, and number of beneficiaries by social groups and sex in the country.

It is revealed by the seventh survey data that out of 10,30,996 schools in the country, 6,84,742 schools (66.42%) have free textbooks scheme covering nearly 7,86,36,584 students (39.03%) consisting of 35.71 per cent boys and 43.04 per cent girls, respectively. Based on social stratification, these figures for beneficiary students of free textbooks have come around 56.43 per cent for SC, 51.33 per cent for ST, 36.17 per cent for EBMC including 32.23 per cent for others, respectively.

The free textbooks incentive scheme by area for all communities is found on higher side in rural area (46.45%) as compared to urban area (21.97%) in the country. The proportion of SC beneficiary students has been highest (62.75%), followed by ST (48.63%) and EBMC (42.41%) in rural area, and these proportions in rural area are almost 18 to 20 per cent points higher than in urban area with respect to the social stratification of communities in the country.

As compared to sixth survey, the free textbooks incentive scheme to students has been available in 4,32,568 schools, thus longitudinally it provides a growth of 58.30 per cent over a period from 1993 to 2002. In addition, the number of beneficiary students of this scheme has been reported 1,77,94,631 students in sixth survey, and in that way the seventh survey reflects a growth of 341.91 per cent points in the country.

The free textbook scheme and number of beneficiaries based on the seventh survey data by area and school category are presented in the succeeding paragraphs.

Primary Schools

The seventh survey database records that 4,94,717 primary schools (75.99%) have free textbooks incentive scheme for the students, and this scheme covered nearly 4,83,02,182 students (59.71%) befitting to 56.39 per cent boys and 63.38 per cent girls enrolled in primary schools in the country. Based on social stratification of the communities as adopted in the survey, the beneficiaries of free textbooks scheme have been 75.20 per cent for SC, 62.93 per cent for ST, 53.33 per cent for EBMC including 53.73 per cent for others. Area-wise the proportion of primary schools having scheme in rural area is 79.02 per cent as against 53.79 per cent in urban area. The distribution of beneficiaries of free textbooks for all communities is found higher in rural

Table 2
Schools having Incentive Scheme of Free Textbooks and Number of Beneficiaries, 2002

Categories of School	Area	Total Number of Schools	Schools Having the Scheme	Number of Beneficiaries					Total	
				All Communities	Schedule Castes	Schedule Tribes	Educationally Backward Minority Community (Muslims)	Others	Boys	Girls
1	2	3	4	5	6	7	8	9	10	11
Primary	Rural	5,72,814	4,52,629 (79.02)	4,17,24,731 (62.99)	1,29,95,141 (78.57)	45,47,756 (64.32)	58,77,782 (56.90)	1,83,04,052 (56.67)	2,07,80,946 (59.50)	2,09,43,785 (66.88)
	Urban	78,250	42,088 (53.79)	65,77,451 (44.87)	16,75,413 (56.41)	2,29,858 (44.09)	13,18,278 (41.67)	33,53,902 (41.90)	32,25,094 (42.21)	33,52,357 (47.76)
	Total	6,51,064	4,94,717 (75.99)	4,83,02,182 (59.71)	1,46,70,554 (75.20)	47,77,614 (62.93)	71,96,060 (53.33)	2,16,57,954 (53.73)	2,40,06,040 (56.39)	2,42,96,142 (63.38)
Upper Primary	Rural	1,93,947	1,22,815 (63.32)	1,72,66,470 (43.98)	36,30,159 (53.63)	25,51,276 (55.64)	13,07,735 (30.78)	97,77,300 (41.34)	87,78,821 (40.19)	84,87,649 (48.74)
	Urban	51,375	16,551 (32.22)	42,57,023 (28.42)	9,77,419 (40.07)	2,60,570 (37.47)	8,30,471 (28.38)	21,88,563 (24.54)	20,71,367 (25.77)	21,85,656 (31.49)
	Total	2,45,322	1,39,366 (56.81)	2,15,23,493 (39.69)	46,07,578 (50.04)	28,11,846 (53.25)	21,38,206 (29.80)	1,19,65,863 (36.74)	1,08,50,188 (36.31)	1,06,73,305 (43.82)
Secondary	Rural	63,576	29,398 (46.24)	44,37,128 (23.22)	12,74,868 (37.55)	5,12,324 (30.64)	4,32,641 (21.34)	22,17,295 (18.46)	22,67,798 (20.91)	21,69,330 (26.27)
	Urban	27,165	6,803 (25.04)	12,87,636 (11.56)	3,86,453 (26.13)	73,889 (15.73)	1,95,572 (12.65)	6,31,722 (8.27)	5,77,937 (9.86)	7,09,699 (13.45)
	Total	90,741	36,201 (39.89)	57,24,764 (18.93)	16,61,321 (34.09)	5,86,213 (27.37)	6,28,213 (17.58)	28,49,017 (14.49)	28,45,735 (17.03)	28,79,029 (21.27)
Higher Secondary	Rural	22,847	8,835 (38.67)	17,96,453 (11.37)	6,17,851 (21.99)	2,36,955 (25.19)	1,56,855 (9.08)	7,84,792 (7.60)	9,75,161 (10.02)	8,21,292 (13.53)
	Urban	21,022	5,623 (26.75)	12,89,692 (6.36)	4,46,521 (17.24)	65,548 (11.66)	1,52,971 (6.29)	6,24,652 (4.25)	6,36,236 (5.68)	6,53,456 (7.21)
	Total	43,869	14,458 (32.96)	30,86,145 (8.55)	10,64,372 (19.71)	3,02,503 (20.13)	3,09,826 (7.45)	14,09,444 (5.63)	16,11,397 (7.70)	14,74,748 (9.74)

Note: Figures within parentheses indicate percentage with respect to total number of enrolment in respective categories.

area (62.99 per cent) as compared in urban area (44.87 per cent) in the country. The proportion of EBMC beneficiaries of free textbooks scheme for primary schools is found lowest in terms of percent points (53.33 per cent) as compared to other social groups in the country. This scheme has provided maximum benefit to the SC (75.20 per cent) community covering maximum number of beneficiaries (78.57 per cent) in rural area in terms of percent points with respect to the total SC students enrolled in primary schools in the country, and followed in decreasing order by the ST and others.

Upper Primary Schools

Nearly 1,39,366 upper primary schools (56.81%) out of total 2,45,322 upper primary schools provide free textbooks to 2,15,23,493 students (39.69%) at the time of seventh survey in the country. These textbooks are distributed among 36.31 per cent boys and 43.82 per cent girls with respect to total number of boys and girls enrolled in upper primary schools, respectively. In addition, the free textbooks incentive scheme has benefited to 50.04 per cent SC, 53.25 per cent ST, 29.80 per cent EBMC including 36.74 per cent other students. Area-wise, 43.98 per cent beneficiaries are enrolled in rural area, which is substantially on higher side as compared to the 28.42 per cent in urban area. The beneficiaries of free textbooks incentive scheme in upper primary schools for ST has been highest, and found nearly 53.25 per cent as compared to SC (50.04%), Others (36.74%) and EBMC (29.80%) with respect to total number of students enrolled of the respective

communities in upper primary schools in the country.

Secondary Schools

Out of 90,741 secondary schools, the free textbooks incentive scheme is available in 36,201 secondary schools (39.89%) in the country, and provided benefit to 57,24,764 students (18.93%) covering 17.03 per cent boys and 21.27 percent girls under this scheme at the time of seventh survey. Further, beneficiaries of free textbooks scheme by social groups belong to 34.09 per cent SC, 27.37 per cent ST, 17.58 per cent EBMC including 14.49 per cent for others in secondary schools with respect to total number of students in respective social groups. In secondary schools, the distribution of beneficiaries of free textbooks for all social groups is found on higher side in rural area as compared to urban area in the country. In rural area, this scheme exists in 46.24 per cent secondary schools as against 25.04 per cent secondary schools in urban area. In secondary schools in terms of per cent points, the beneficiaries of free textbooks for all communities are also found on higher side in rural area (23.22%) as compared to urban area (11.56%) in the country.

Higher Secondary Schools

The incentive scheme on free textbooks is available in 14,458 higher secondary schools (32.96%) out of total 43,869 higher secondary schools, and total number of beneficiaries covered under this scheme have been 30,86,145 students (8.55%), and these beneficiaries students are further distilled in 7.70 per cent for boys and 9.74 per cent for girls

with respect to their total number in higher secondary schools in the country. Moreover, the beneficiary students of free textbooks by social groups belong to 19.71 per cent SC, 20.13 per cent ST, and 7.45 per cent EBMC including 5.63 per cent for others in respect to their total number of students, respectively. This information reveals that the social group, namely, others as beneficiaries of free textbooks scheme in higher secondary schools is having lowest coverage in terms of percent points as compared to other social groups getting school education in the country. Area-wise, the higher secondary schools having free textbooks scheme are relatively higher in rural area (38.67%) as against in urban area (26.75%). Also, out of total beneficiary students of free textbooks for all communities are found substantially on higher side in rural area (11.37%) as compared to urban area (6.36%) in the country.

Part III: Supply of Free Textbooks to Students

In preceding part (Part II), the findings of seventh survey on incentive scheme of free textbooks and beneficiaries thereof in schools are presented in brief. The seventh survey also canvassed information on the practices followed in supply of free textbooks to beneficiaries by system of school education in the country. Accordingly, Table 3 depicts information on supply of free textbooks to students during the academic session 2001-2002 in schools that is collected on three points of time interval during the session, namely within three months, between three to sixth months, and between six to nine months.

Regarding incentive scheme of free textbooks, it is mentioned elsewhere in this paper that 6,84,742 schools (66.42%) out of 10,30,996 schools in the country have free textbooks incentive scheme of which 5,52,753 schools (80.72%) are providing free textbooks to their students within three months during the referred session. Besides, 1,00,017 schools (14.61%) are supplying free textbooks during referred session between three to six months, and remaining 31,972 schools (4.67%) are supplying free textbooks between six to nine months during referred session in the country.

In rural area, the supply of free textbooks during session within three months is observed in 80.06 per cent schools. Moreover, 15.07 per cent schools are distributing the textbooks to students between three to six months, and 4.87 per cent schools are providing free textbooks to students between six to nine months during referred session. However, the proportions of supply of free textbooks to students are on lower side in rural area as compared to urban area over all three points of time interval during the session considered under seventh survey.

By area and school category, the succeeding paragraphs furnish information regarding supply of free textbooks scheme over different periods of interval to students during academic session 2001-2002 in the country.

Primary Schools

During seventh survey, the incentive scheme of free textbooks is available in 4,94,717 primary schools (75.99%) during academic session 2001-2002.

Table 3

Schools having Incentive Scheme of Supplying Free Textbooks to Student during the Session 2001-2002

Categories of School	Area	Total Number of Schools	Number of Schools having Scheme	Number of Schools Supplying Free Textbooks		
				Within Three Months	Between 3rd and 6th Month	Between 6th and 9th Month
1	2	3	4	5	6	7
Primary	Rural	5,72,814	4,52,629 (79.02)	3,54,962 (78.42)	73,802 (16.31)	23,865 (5.27)
	Urban	78,250	42,088 (53.79)	35,794 (85.05)	5,005 (11.89)	1,289 (3.06)
	Total	6,51,064	4,94,717 (75.99)	3,90,756 (78.99)	78,807 (15.93)	25,154 (5.08)
Upper Primary	Rural	1,93,947	1,22,815 (63.32)	1,02,214 (83.23)	15,258 (12.42)	5,343 (4.35)
	Urban	51,375	16,551 (32.22)	14,433 (87.20)	1,549 (9.36)	569 (3.44)
	Total	2,45,322	1,39,366 (56.81)	1,16,647 (83.70)	16,807 (12.06)	5,912 (4.24)
Secondary	Rural	63,576	29,398 (46.24)	26,215 (89.17)	2,651 (9.02)	532 (1.81)
	Urban	27,165	6,803 (25.04)	6,116 (89.90)	538 (7.91)	149 (2.19)
	Total	90,741	36,201 (39.89)	32,331 (89.31)	3,189 (8.81)	681 (1.88)
Higher Secondary	Rural	22,847	8,835 (38.67)	7,929 (89.75)	785 (8.89)	121 (1.37)
	Urban	21,022	5,623 (26.75)	5,090 (90.52)	429 (7.63)	104 (1.85)
	Total	43,869	14,458 (32.96)	13,019 (90.05)	1,214 (8.40)	225 (1.56)

Note: Figures within parentheses indicate percentages

The number of primary schools that is 3,90,756 schools (78.99%) are providing free textbooks to their students within three months, 78,807 schools (15.93%) are providing free textbooks between three months to six months, and others between six to nine months during the referred academic session.

The supply of free textbooks within three months after start of academic session is found in 78.42 per cent rural primary schools. Apart from this, 16.31 per cent schools are distributing the free textbooks between three to six months, and remaining 5.27 per cent other primary schools are providing free textbooks between six to nine months to students during the referred academic session. The supply of free textbooks in rural area is on lower side in comparison to urban area over all three points of time interval during academic session.

Upper Primary Schools

The incentive scheme of free textbooks is available in 1,39,366 upper primary schools (56.81%) during academic session 2001-2002. The number of upper primary schools that is 1,16,647 schools (83.70%) are providing free textbooks to their students within three months, 16,807 schools (12.06%) are providing free textbooks between three to six months, and others between six to nine months during the referred academic session.

The supply of free textbooks within three months after start of academic session is found in 83.23 per cent rural upper primary schools. Apart from this, 12.42 per cent schools are distributing the free textbooks between three to six months, and remaining 4.35 per cent other upper primary schools are providing free textbooks between six to nine months to students during referred academic session. The supply of free textbooks in rural area is on lower side in comparison to urban area on all three points of time interval as stated herein during academic session.

Secondary Schools

The seventh survey data on free textbooks incentive scheme reveals that 36,201 secondary schools (39.89%) are having the scheme during academic session 2001-2002 and out of these 32,331 secondary schools (89.31%) are providing free textbooks to their students within three months. Nearly 3,189 secondary schools (8.81%) are providing free textbooks between three to six months, and remaining 681 secondary schools (1.88%) are supplying free textbooks between six to nine months during the referred academic session.

Area-wise supply of free textbooks in rural area is having same trend with a marginal change in percent points akin to the primary and upper primary schools, and this trend has been on lower side in comparison to urban area over all three points of time interval during the academic session.

Higher Secondary Schools

The supply of free textbooks incentive scheme is available in 14,458 higher secondary schools (32.96%). During the academic session 2001-2002, nearly 13,019 higher secondary schools (90.05%) are providing free textbooks to their students within three months, and 1,214 higher secondary schools (8.40%)

are providing free textbooks between three to six months including other 225 higher secondary schools (1.56%) are distributing free textbooks between six to nine months.

Akin to other categories of schools, supply of free textbooks in rural area is having same trend with a marginal change in percent points as compared to urban area over all three points of time-interval during academic session 2001-2002 at the time of seventh survey in the country.

Part IV: Attendance Scholarship for Girls

The public authorities have developed a growing number of programmes in the form of incentive schemes that provide scholarships based on merit, social and gender criteria in the country. Eventhough, only girls are offered scholarships for attending schools in the country, and perhaps the most interesting finding in this regard is that the scholarship programmes increased student attendance for girls improving a reduction in absenteeism of girls from the schools. The attendance scholarship for girls are instituted by the public authorities with an objective to bring the girls of school age going to school and retain them there to peruse the studies. Table 4 presents information about schools having incentive scheme of attendance scholarship for girls and number of beneficiaries in the country.

The seventh survey reported 10,09,390 schools (97.90%) with girls' enrolment, and out of these schools with girls' enrolment nearly 1,22,054 schools (12.09%) are covered by the incentive scheme of attendance scholarship for girls which is distributed over in 13.33 per cent rural schools and 5.95 per cent urban schools, having 32,22,122 beneficiary girl students (3.53%), and these beneficiary girl students by social group belong further to 9.00 per cent SC, 8.99 per cent ST, 1.99 per cent EBMC and 1.36 percent others with respect to total number of girl students enrolled in the respective social groups in formal school system. These proportions of beneficiary girl students in rural area are found substantially higher than in urban area, and arithmetically are almost double except SC group in the country.

During sixth survey in 1993, the incentive scheme of attendance scholarship for girls has been made available in 1,23,154 schools, thus seventh survey in 2002 provides a longitudinal negative growth of –0.89 per cent over a period from 1993 to 2002 reflecting a sorry state of public affairs. In addition, the number of beneficiary girl students of this scheme is reported nearly 19,67,968 students in sixth survey, and in that way the seventh survey in 2002 reflects a growth of 63.73 per cent points in the country.

Based on seventh survey, a brief analytical overview on attendance scholarship for girl students and beneficiaries thereof by area and school category are given in following paragraphs.

Primary Schools

The seventh survey reveals 6,41,090 primary schools (98.64%) with girls' enrolment. Out of these, 71,947 primary schools (11.22%) are covered by the incentive scheme of attendance

Table 4

Schools having Incentive Scheme of Attendance Scholarship for Girls and Number of Beneficiaries, 2002

Category of School	Area	Total Number of Schools with Girls' Enrolment	Schools Having Attendance Scholarship Scheme for Girls	Number of Beneficiaries				
				All Communities	Schedule Castes	Schedule Tribes	Educationally Backward Minority Community (Muslims)	Others
1	2	3	4	5	6	7	8	9
Primary	Rural	5565042	67,623 (11.97)	14,30,564 (4.57)	8,57,832 (11.05)	2,66,134 (8.07)	86,760 (1.79)	2,19,838 (1.43)
	Urban	76048	4,324 (5.69)	1,67,781 (2.39)	1,13,790 (8.02)	8,638 (3.47)	20,882 (1.36)	24,471 (0.64)
	Total	641090	71,947 (11.22)	15,98,345 (4.17)	9,71,622 (10.58)	2,74,772 (7.74)	1,07,642 (1.69)	2,44,309 (1.27)
Upper Primary	Rural	190853	35,389 (18.54)	8,51,038 (4.89)	2,67,883 (9.11)	2,80,662 (14.15)	47,417 (2.56)	2,55,076 (2.40)
	Urban	49176	3,284 (6.68)	1,54,692 (2.23)	52,777 (4.69)	20,741 (6.48)	28,077 (1.99)	53,097 (1.30)
	Total	240029	38,673 (16.11)	10,05,730 (4.13)	3,20,660 (7.89)	3,01,403 (13.08)	75,494 (2.32)	3,08,173 (2.09)
Secondary	Rural	62208	6,522 (10.48)	2,20,601 (2.67)	1,00,116 (7.00)	38,250 (5.68)	17,866 (1.98)	64,369 (1.23)
	Urban	25426	1,193 (4.69)	60,847 (1.15)	30,578 (4.33)	4,514 (2.07)	7,885 (1.02)	17,870 (0.50)
	Total	87634	7,715 (8.80)	2,81,448 (2.08)	1,30,694 (6.12)	42,764 (4.80)	25,751 (1.54)	82,239 (0.93)
Higher Secondary	Rural	22273	2,466 (11.07)	1,62,413 (2.68)	72,830 (7.11)	28,881 (8.77)	22,942 (3.48)	37,760 (0.93)
	Urban	18364	1,253 (6.82)	1,74,186 (1.92)	82,475 (7.33)	9,167 (3.91)	28,512 (2.55)	54,032 (0.82)
	Total	40637	3,719 (9.15)	3,36,599 (2.22)	1,55,305 (7.23)	38,048 (6.74)	51,454 (2.89)	91,792 (0.86)

Note: Figures within parentheses indicate percentage with respect to total number of enrolment in respective categories.

scholarship for girls. Of these primary schools, 11.97 per cent schools in rural area and 5.69 per cent schools in urban area are having the incentive scheme with respect to total number of schools with girls' enrolment in respective areas. These primary schools provide the attendance scholarship to 15, 98,345 girl students (4.17%) out of total girls enrolled. Further, these beneficiary girl students by social groups belongs to 10.58 per cent SC, 7.74 per cent ST, 1.69 per cent EBMC and 1.27 per cent others with respect to total number of girl students enrolled in respective social groups in primary schools. The proportions of beneficiary girl students for social groups are found higher in rural area as compared in urban area.

Upper Primary Schools

In regard to upper primary schools, the seventh survey reveals 2,40,029 upper primary schools (97.84%) with girls' enrolment, and 38,673 upper primary schools (16.11%) out of referred total upper primary schools with girls' enrolment that have provision of attendance scholarship for girls in the country. Area-wise, 18.54 per cent and 6.68 per cent upper primary schools are situated in rural and urban areas, respectively and are having the girls' attendance scholarship scheme with respect to total number of schools with girls' enrolment. The number of beneficiary girl students of attendance scholarship is nearly 10, 05,730 girl students (4.13%) with respect to total number of girls enrolled in upper primary schools. Further, out of total girl students enrolled by social groups, the beneficiary girl students belong to

7.89 per cent SC, 13.08 per cent ST, 2.32 per cent EBMC including 2.09 per cent others in the country. The proportions of beneficiary girl students for various social groups are found on higher side in rural area as compared in urban area.

Secondary Schools

There are 87,634 secondary schools (96.58%) with girls' enrolment, and 7,715 secondary schools (8.80%) out of total secondary schools with girls' enrolment that have the provision of attendance scholarship for girls. In rural area, 10.48 per cent secondary schools are providing attendance scholarship to girl students as against to 4.69 per cent in urban area with respect to total number of schools with girls' enrolment in the country. Nearly 2,81,448 girl students (2.08%) with respect to total number of girls enrolled are getting the benefit of this scheme in the secondary schools. Of these, out of total girl students enrolled by social groups, the beneficiary girl students belong to 6.12 per cent SC, 4.80 per cent ST, 1.54 per cent EBMC including 0.93 per cent others in the country. The proportions of beneficiary girl students for various social groups are found on higher side in rural area as compared in urban area.

Higher Secondary Schools

Out of 43,869 higher secondary schools, 40,637 higher secondary schools (92.63%) are with girls' enrolment in the country, and nearly 3,719 schools (9.15%) out of these referred number of schools with girls' enrolment are providing incentive scheme of

attendance scholarship for girls which is distributed over in 11.07 per cent rural schools and 6.82 per cent urban schools with respect to total number of schools available in these areas which are having 3,36,599 beneficiary girl students (2.22%). These beneficiary girl students by social group belong further to 7.23 per cent SC, 6.74 per cent ST, 2.89 per cent EBMC and 0.86 per cent others with respect to total number of girl students enrolled in the respective social groups. These proportions of beneficiary girl students in rural area are found substantially higher than in urban area akin to other category of schools as mentioned herein in preceding paragraphs.

Part V: Mid-day Meals

The role of health in promoting student achievement and relationship between children's nutritional status and school indicators like age at enrolment, absenteeism, performance, etc., on selective cognitive tasks including concentration in the classroom has been well-established through several studies in India and elsewhere in the world of human kingdom. It is also agreed that protein-energy malnutrition temporary hunger and micronutrient deprivation adversely affect the achievement of children, and can easily be treated efficiently in schools. It is generally accepted that such types of deficiencies can easily and efficiently be treated in schools (Lockheed and Verspoor, 1991).

Accordingly, the introduction of mid-day meals programme in schools has been a right step in this direction in India and elsewhere in the world. In India under mid-day meals programme, the Government of India has been sharing the cost of implementing nutritional support for elementary education by providing required food grains. The Government of India launched the present mid-day meals programme in the States/UTs in 1995-96. However, the States/UTs are free to have their own specific programme in this regard with appropriate infrastructure and delivery system. There are three main options for delivery of nutritional support that are supply of hot meal, pre-cooked food, and food grains (Saxena *et al.* 2000). In view of the significance of mid-day meals programme, Table 5 reveals based on seventh survey data about number of schools having incentive scheme of mid-day meals and types thereof at primary stage.

The seventh survey reveals 10, 30,996 schools and out of these schools, 8, 50,421 schools (82.49%) have primary stage of school education in the country. The survey data indicates that nearly 6, 62,792 schools (77.94%) are having mid-day meals scheme with primary stage for the children enrolled in the formal system of school education. Area-wise 5, 97,596 schools (83.46%) in rural area and 65,196 schools (48.51%) in urban area provide the incentive scheme of mid-day meals to the children.

The seventh survey also imparts data on the type of mid-day meals, viz., foodgrains, pre-cooked foods, cooked meals that are being provided by the schools to children in the country. The survey records that nearly 67.01 per cent schools do not provide either pre-

Table 5
Schools having Incentive Scheme of Mid-day Meals and Types thereof at Primary Stage, 2002

Category of School	Area	Number of Schools having Primary Stage	Number of Schools having Mid-day Meals Scheme at Primary Stage	Number of Schools Providing		
				Foodgrains	Pre-cooked Food	Cooked Meal
1	2	3	4	5	6	7
Primary	Rural	5,72,814	4,91,262 (85.76)	3,48,136 (70.87)	1,998 (0.41)	1,41,128 (28.73)
	Urban	78,250	46,860 (59.88)	31,240 (66.67)	1,546 (3.30)	14,074 (30.03)
	Total	6,51,064	5,38,122 (82.65)	3,79,376 (70.50)	3,544 (0.66)	1,55,202 (28.84)
Upper Primary	Rural	1,33,922	1,03,606 (77.36)	53,316 (51.46)	280 (0.27)	50,010 (48.27)
	Urban	40,953	17,126 (41.82)	9,981 (58.28)	116 (0.68)	7,029 (41.04)
	Total	1,74,875	1,20,732 (69.04)	63,297 (52.43)	396 (0.33)	57,039 (47.24)
Secondary	Rural	7,089	2,122 (29.93)	835 (39.35)	23 (1.08)	1,264 (59.57)
	Urban	8,456	627 (7.41)	229 (36.52)	47 (7.50)	351 (55.98)
	Total	15,545	2,749 (17.68)	1,064 (38.70)	70 (2.55)	1,615 (58.75)
Higher Secondary	Rural	2,212	606 (27.40)	230 (37.95)	9 (1.49)	367 (60.56)
	Urban	6,725	583 (8.67)	203 (34.82)	46 (7.89)	334 (57.29)
	Total	8,937	1,189 (13.30)	433 (36.42)	55 (4.63)	701 (58.96)

Note: Figures within parentheses indicate percentages.

cooked or cooked meals to the children. Area-wise, percentage of schools that do not provide either pre-cooked or cooked meals are recorded 67.36 per cent in rural and 63.89 per cent in urban areas, respectively with respect to number of schools having primary stage in the area.

The sixth survey conducted in year 1993 provides information in regard to incentive scheme of mid-day meals in the country. Accordingly, 1,18,364 schools have mid-day meals scheme; therefore, the seventh survey provides longitudinally a growth of 459.96 per cent over a period from year 1993 to 2002. In addition, obvious impressive jumps in growth of mid-day meals have been recorded in rural and urban areas in the country.

The succeeding paragraphs furnish information in regard to schools by area and category having the scheme of mid-day meals and types thereof in the country.

Primary Schools

The seventh survey records that out of 6,51,064 primary schools in the country, 5,38,122 schools (82.65%) are having incentive scheme of mid-day meals. The proportion of schools having this scheme in rural area is 85.76 per cent as against 59.88 per cent in urban area with respect to number of schools in respective area.

As per the findings of survey, 70.50 per cent schools do not provide either pre-cooked or cooked meals to children, and area-wise this is being recorded 70.87 per cent in rural and 66.67 per cent in urban areas, respectively with respect to number of schools having primary stage in the area.

Upper Primary Schools

There are 2,45,322 upper primary schools in the country, of which 1,74,875 upper primary schools (71.28%) are having primary stage. Out of these upper schools having primary stage in the school, 1,20,732 upper primary schools (69.04%) are providing mid-day meals to the children enrolled in the schools. In respect to area-wise distribution of these schools, 77.36 per cent schools of rural area and 41.82 per cent schools of urban area are having the referred scheme.

The survey also documents that 52.43 per cent upper primary schools having primary stage in schools do not provide either pre-cooked or cooked meals to the children, and area-wise such proportions are found 51.46 per cent in rural area and 58.28 per cent in urban area, respectively with respect to number of schools having primary stage in the area.

Secondary Schools

In 2002 at the time of seventh survey, it is found that 15,545 secondary schools (17.13%) are having primary stage. Out of these secondary schools, 2,749 secondary schools (17.68%) are having incentive scheme of mid-day meals at primary stage for children enrolled in these schools in the country. Further, the proportion of these schools having scheme in rural area has been 29.93 per cent and relatively high as against 7.41 per cent in urban area.

In regard to schools providing type of mid-day meals, the survey provides that secondary schools are having better status in terms of serving meals in

comparison of primary and upper primary schools, and it maybe due to better infrastructure available within the schools premises. In terms of percent point, nearly 58.75 per cent secondary schools have provided cooked meals followed by 2.55 per cent pre-cooked meals/ foods in the country. Area-wise cooked meals are provided by 59.57 per cent rural schools as compared to 55.98 per cent urban schools, whereas on the other hand, the pre-cooked meals/foods are provided by 1.08 per cent rural schools as compared to 7.50 per cent urban schools in the country. However, the survey provides sorry state of affairs by revealing that 38.70 per cent secondary schools having primary stage in schools do not provide either pre-cooked or cooked meals/ foods to the children. Area-wise such proportions are found 39.35 per cent in rural area and 36.52 per cent in urban area, respectively with respect to number of schools having primary stage in the area.

Higher Secondary Schools

The seventh survey counts the number of higher secondary schools having primary stage, and accordingly 8,937 higher secondary schools (20.37%) are having primary stage in the country. Out of these higher secondary schools having primary stage, 1,189 schools (13.30%) are having incentive scheme of mid-day meals/ foods at primary stage for children enrolled in these schools in the country. Area-wise proportion of these schools having scheme has been 27.40 per cent in rural area, and found relatively high as against 8.67 per cent in urban area.

As far as issue of providing type of mid-day meals/foods is concerned, the survey provides a comparatively better status in terms of serving meals/foods as compared to primary and upper primary schools in the country, and it follows the patterns akin to the secondary schools as described elsewhere in this part. The probable reasons in serving meals may be due to better infrastructure available within the schools premises.

Proportion-wise, 58.96 per cent higher secondary schools provide cooked meals/foods followed by 4.63 per cent pre-cooked meals/foods vis-à-vis 63.59 per cent schools in the country. The cooked meals/foods are being provided in 60.56 per cent rural schools as well as in 57.29 per cent urban schools, while 1.49 per cent rural and 7.89 per cent urban higher secondary schools provide pre-cooked meals/foods akin to the secondary schools in the country. However, the survey provides a sorry state of affairs akin to the secondary schools by revealing that 36.42 per cent higher secondary schools having primary stage in schools do not provide either pre-cooked or cooked meals/foods to the children. Area-wise such proportions are found 37.95 per cent in rural area and 34.82 per cent in urban area, respectively with respect to number of schools having primary stage in the area.

Conclusions

Based on above statistical aspects, results and discussions, following conclusions have been emerging on

major operational incentive schemes in school education in India.

- **Free Uniform Scheme**

  The total number of beneficiaries is 2,03,33,930 children (10.09 per cent) consisting of 7.79 per cent boys and 12.87 percent girls, respectively, in the country. By social group, the beneficiaries of free uniform scheme in primary schools have been 15.24 per cent for SC, 13.74 per cent for ST, 8.86 per cent for EBMC including 11.08 per cent for others, respectively. Further, among these beneficiaries, the free uniform incentive scheme in upper primary schools has covered 20.90 per cent SC, 20.91 per cent for ST, 13.35 per cent for EBMC including 13.10 per cent others, respectively. The beneficiaries of free uniform scheme studying in the secondary schools belongs to 7.49 per cent SC, 9.32 per cent ST, 3.18 per cent EBMC including 2.83 per cent for others, respectively. In higher secondary schools by social group, the beneficiaries of free uniform scheme pertains to 7.29 per cent SC, 4.38 per cent ST, 2.85 per cent EBMC including 2.36 per cent for others, respectively.

- **Free Textbooks**

  Based on social stratification, the figures for beneficiary students of free textbooks comes around 56.43 per cent for SC, 51.33 per cent for ST, 36.17 per cent for EBMC including 32.23 per cent for others, respectively. Area-wise the higher secondary schools having free textbooks scheme are relatively higher in rural area (38.67 per cent) as against in urban area (26.75 per cent).

- **Supply of Free Textbooks to Students**

  Nearly 1,00,017 schools (14.61 per cent) are supplying free textbooks during referred session between three to six months, and remaining 31,972 schools (4.67 per cent) are supplying free textbooks between six to nine months during referred session in the country. Area-wise supply of free textbooks in rural area is on lower side in comparison to urban area over all three points of time-interval during the academic session.

- **Attendance Scholarship for Girls**

  Nearly 1,22,054 schools (12.09 per cent) are covered by the incentive scheme of attendance scholarship for girls in the country. The scheme is distributed over in 13.33 per cent rural schools and 5.95 per cent urban schools, having 32,22,122 beneficiary girl students (3.53 per cent). The beneficiary girl students by social group, further, belong to 9.00 per cent SC, 8.99 per cent ST, 1.99 per cent EBMC and 1.36 per cent others with respect to total number of girl students enrolled in the respective social groups in the schools.

- ### *Mid-day Meals*

  The data analysis reveals that 82.49 per cent schools have primary stage of school education in the country of which 83.46 per cent in rural and 48.51 per cent in urban areas having primary stage school education are providing the incentive scheme of mid-day meals to the children. The study also points out that nearly 67.01 per cent schools do not provide either pre-cooked or cooked meals to the children, although the public authorities are fully concerned on this issue in India.

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Inclusion in Education: Role of Teachers

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Abstract

The inclusion of children with disabilities in general education is becoming more prevalent. Inclusive education, in its broader sense, is about acknowledging diversity of learners' needs and providing appropriate support. This happens when the education system is characterised by a shared responsibility among all the stakeholders to collaboratively provide a continuum of specialised support to address different needs of all learners.

This paper presents an overview of the concept, principles, models of inclusive education, difference between inclusive education and integrated education and various policies and legislations concerning inclusive education in India.

Inclusive education demands that the teacher should be able to meet the needs of students with disabilities in a regular/ordinary classroom. The success of inclusive education rests on quality teacher preparation gearing towards inclusive education. Although there is widespread support for inclusion at a philosophical level, there are some concerns that the policy of inclusion is difficult to implement because teachers are not sufficiently well-prepared and supported to work in inclusive ways.

The paper reviews some of the barriers to the development of successful inclusive schools and suggests that the way of overcoming these difficulties is to develop positive attitude among teachers towards inclusive education as Inclusion is basically an attitude of acceptance of diversities. For teaching in an inclusive classroom the teacher needs to possess, skills and knowledge that help her/him to plan and implement strategies that provide wider access to regular classroom.

Inclusive Education: Meaning and Nature

Education is the core of equality and empowerment. The Constitution of India ensures equality, freedom, justice and dignity to all individuals and implicitly mandates an inclusive society for including persons with disabilities.

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In the recent years, there have been vast and positive changes in the perception of society towards persons with disabilities. It has been realised that a majority of persons with disabilities can lead a better quality of life if they have equal opportunities and effective access to rehabilitation measures.

According to census 2001, there are 2.19 crore persons with disabilities in India, which constitutes 2.13 per cent of the total population. This forms quite a large chunk of the population. Hence, there is a need for mainstreaming the persons with disabilities in the general education system through inclusive education.

Inclusive education refers to an education system that accommodates all children regardless of their physical, intellectual, social, emotional, linguistic or other conditions. The range of challenges confronting the school system while including children with diverse abilities and from diverse backgrounds have to be met by creating a child-centred pedagogy capable of successfully educating all children. Inclusion is the practice of establishing heterogeneous classrooms in neighbourhood schools, where every child strives to accomplish individual goals while fully participating in social and academic activities.

This often requires modifying the curricula and the environment in order to ensure the success and attainability of these goals (Lipsky and Gartner, 1996; Oremland, Flynn, and Kieff, 2002). Inclusive Education is a process of increasing the participation of all students in school including those with disabilities (Ainscow, 2000). It is about restructuring the culture policies and practices in schools so that they respond to the diversity of students.

According to Pinnock H. and Lewis I. (2008), inclusive education is a dynamic process that reflects the following features:

- An acknowledgement that all children can learn.
- Respects differences in children: age, gender, ethnicity, language, disability, etc.
- Enables education structures, systems and methodologies to meet the needs of all children.
- Promotes an inclusive society.

The most common definition of inclusive education is the practice of educating students with moderate to severe disabilities alongside children without disabilities, in general classrooms within their home neighbourhood schools (Brown *et al.* 1989; Lipsky and Gartner, 1992). "Inclusion includes physical integration, social integration, and access to normalised educational, recreational, and social activities that occur in school" (Ryndack and Alper, 2003).

The Salamanca Statement and Framework for Action on Special Needs Education (1994), a major initiative at International Level, stipulates that "*… schools should accommodate all children regardless of their physical, intellectual, social, emotional, linguistic or other conditions. This should include disabled and gifted children, street and working children, children from remote or nomadic populations, children from linguistic, ethnic or cultural minorities and children from other disadvantaged or marginalised areas or groups.*"

Since, inclusion in India is still in its evolving stage, there are many myths and misconceptions associated with its meaning, nature and practices. There are many approaches to inclusion ranging from fully inclusive to quasi-inclusive. Integrated education is not the same as inclusive education. There is a vast difference between the two approaches. Integrated education emphasises placement of children with disabilities in mainstream schools. The major thrust is on attendance. The school system remains rigid and as a result very few children with disabilities are able to cope with the demands of such a rigid system. This is a system that would not accept many of children with disabilities on the basis of not being prepared enough. In other words, in integrated education, the child, not the system, is seen as a problem. S/he is considered to be different from others and if s/he cannot learn it is her/his problem. Hence, integrated education is based on the medical model of disability and views a child with disability through clinical blinders needing remedy. Inclusive education, on the other hand is all about effective learning by all children including children with disabilities. It is based on the social model of disability and considers that if the child is not learning then the system needs to be blamed. Integrated Education is a stepping stone for inclusive education.

Inclusive education refers to an education system that accommodates all children regardless of their physical, intellectual, social, emotional, linguistic or other conditions. It implies that regular school curriculum, teaching methods, organisation, and resources need to be adapted quite significantly to ensure that all children, regardless of ability or disability, can participate successfully in the mainstream of education. Ainscow (1995) stipulates that the former refers to "additional arrangements within a system of schooling that remains largely unchanged", while the later aims to restructure schools in order to respond to the needs of all students.

Thus, the older concept of integration brings with it an inherent notion of 'coping' which rests with the child rather than the school. Inclusion is a child-friendly approach which stresses on educational outcomes for all children and not just allowing the child with disability to be in the regular setting. The mode of education now being most advocated for children with disability is inclusive education. It implies a radical reform of school in terms of curriculum, assessment, pedagogy and grouping of pupil.

The principles on which inclusive education is based are as follows:
- Every student has an inherent right to education on the basis of equality of opportunity.
- No student is excluded from, or discriminated within education on grounds of race, colour, gender, language, religion, political or other opinion, national, ethnic or social origin, disability, birth, poverty or other status.
- All students can learn and benefit from education.
- Schools adapt to the needs of students, rather than students adapting to the needs of the school.

- The student's views are listened to and taken seriously.
- Individual differences between students are a source of richness and diversity, and not a problem.
- The diversity of needs and pace of development of students are addressed through a wide and flexible range of responses.

There is no consensus in the field of special education about the modes and meaning of inclusion to be prepared actually in one or the other learning or educational situations (Kauffman and Hallahan 1991). Some of the researchers in this field are strong supporters of full inclusive model (i.e. full-time placement of all students with disabilities along with non-disabled peers); the others are in favour of partial inclusion or any degree of integration into the mainstream. Therefore, the models of inclusive education may be broadly based on the fully inclusive and partially inclusive nature of the placement of disabled students in the mainstream.

Model of Full Inclusion

Full inclusion calls for the inclusion of all students regardless of handicapping condition or severity, in regular classroom/programmes of school (curricular and co-curricular) full-time in the same way and to the same degree as received by non-disabled children. All the services are being taken to the child in that setting. A fully inclusive classroom keeps all children together for all subjects. The regular classroom teacher or general education teacher works cooperatively with a special education teacher in the same classroom.

Models of Partial Inclusion

In practical sense, however, such type of full inclusion is neither feasible nor proves more productive from the viewpoints of both the disabled and nondisabled children. Thereby, attempts are made to seek such integration that works well in prevailing situation/resources and suits the needs of the disabled as well as non-disabled children. It is named as partially inclusive education. It may be classified into five types.

Resource-centre or Cluster Model

In this model, children with disabilities are provided resource room facilities near the school. Area is chosen and a resource centre is established in the centre. The resource centre has facilities for producing educational aids and appliances for children with disabilities. One resource teacher is appointed here who caters to the special needs of disabled children. Four to five trained professionals are appointed in this centre. They survey the society, identify the disabled children, and enrol them in regular schools. They, however, attend the standard school in the locality. They daily go from their resource centre to standard school and come back after the classes are over.

Resource Room Model

In a resource room model, students with disabilities leave the general education class for a designated time period to visit the resource room and receive specialised instruction in areas such as language, reading, and maths, etc. This might even include making some adaptations in instructional procedures

and assignments to accommodate children with special learning needs in the general education classroom. The resource model is often referred to as a "pull-out" model, indicating that students with disabilities are pulled out of the general education classroom for special education instruction. However, they remain in regular classes for majority of academic instruction.

Itinerant Model

Itinerant Model means "Resource Programmes on Wheels". This model is more practical and popular in those areas that have limited funds for full-time services and that have limited number of students to call for full-time resource teacher. In this model children stay with their families in their communities only. The disabled children accompany non-disabled children to the nearby school and return to their homes, like other children, after the classes are over. They are provided services of an itinerant teacher, educational and instructional material and equipment. The itinerant teacher travels from school to school to provide special instruction and support services in the regular school. The number of times the itinerant teacher visits the school depends on the needs of children. The difference in this model is in the movement of teacher rather-movement of children.

Self-contained Classroom Model

In a self-contained model of instruction, students with disabilities receive all or most of their classroom instruction from special education teachers. Even in this model, however, students

with disabilities usually have opportunities to interact with their non-disabled peers during activities such as art, music, physical education, recess, lunch, and assemblies. Special educators working in resource rooms often provide individualised or small-group instruction for some students with disabilities.

Although most regular classroom teachers support and believe that inclusion, philosophically, is the best answer, most prefer the traditional "pull-out" model for delivering special education services. Regular classroom teachers believe they are not adequately prepared to handle special education challenges within a regular classroom (Hines and Johnston, 1996). Many teachers believe that if they were to receive appropriate training, the inclusive classroom would offer unlimited opportunities to develop more flexible and responsive classrooms. Favourable opinions are reported more by teachers in qualitative studies than in large scale teacher surveys (Hines and Johnston, 1996).

Co-teaching model

Frequently referred to as the premier format for inclusive instruction, co-teaching can be defined as two or more professionals delivering substantive instruction to a diverse or blended group of students in a single physical space (Cook and Friend, 1995). According to Cook and Friend, each educator is engaged and involved in the instruction of students, both general and special education, within the same classroom in the co-teaching model. Within such instructional situations, general and

special educators may engage in parallel teaching, alternative teaching, and team teaching, or may opt to rotate primary teaching responsibilities throughout the day, with the other teacher serving in a support capacity. Through such modes of instruction, each teacher is indeed jointly responsible for the instruction of students with and without special needs, allowing for greater differentiation of instruction and employment of intervention techniques designed to benefit both general and special education students.

The collaborative teaching team, a general educator and a special educator, delivers special education services in the general education classroom. They have the joint responsibility to design, deliver, monitor and evaluate instruction for a diverse group of learners in classes where both are present and engaged simultaneously (Fister-Mulkey, DeBoer, 1995).

In India, both full-fledged inclusive education programmes and quasi-inclusive programmes are being practised in various forms by various organisations. At present at least seven implementing strategies of inclusive education are observed in India.

1. Resource models where children with disabilities study in general schools and stay in hostels meant for non-disabled children.
2. Resource models where children with disabilities study in general schools and stay in hostels of the nearby special schools.
3. Resource models where children with disabilities study in general schools and stay with parents at home.
4. Semi-resource models or cooperative models where children with disabilities are taught only by the resource teacher in a separate class in a general school.
5. Itinerant model where a resource teacher visits the child in his/her local school and the child stays with parents.
6. Multi-category resource model where disabled children of different kinds are educated in a general school by the regular teachers and a specialist teacher.
7. Multi-category itinerant model where one special teacher attends to the needs of disabled children of different categories in a particular locality.

Inclusive Education in India

During the post-Independence period, it was the Kothari Commission (1966) which highlighted the importance of educating children with disabilities. It expressed that the education of children with disabilities must be a part of the general educational system suggesting that educational facilities must be extended to the blind, deaf, orthopedically challenged and mentally challenged (Pandey, 2006). In 1974, the centrally sponsored scheme of Integrated Education for Disabled Children (IEDC) was launched which is presently being implemented in over 90,000 schools in the country. The scheme was introduced to provide equal opportunities to children with disabilities in general schools and facilitate their retention. It provides facilities like expenses related to books, stationery and uniforms, allowance for

transport, reader, escort, etc., to students with disabilities. It also supports appointment of special teachers, provision of resource rooms and removal of architectural barriers (MHRD, 2009).

The first pilot project on integrated education in India came in the form of Project Integrated Education for the Disabled (PIED). PIED launched in 1987, was a joint venture of MHRD and UNICEF. This project was implemented in one administrative block each in Madhya Pradesh, Maharashtra, Nagaland, Odisha, Rajasthan, Tamil Nadu, Haryana, Mizoram, Delhi Municipal Corporation and Baroda Municipal Corporation. In these ten blocks, 6000 children with special needs were integrated in regular schools. The success of PIED led to the inclusion of the component of Integrated Education of the Disabled (IED) in DPEP, a scheme launched by the Government of India for the development of primary education and subsequently in SSA to upgrade it to elementary education. SSA has adopted a zero rejection policy. This means that no child having special needs should be deprived of the right to education. All children must be provided a free and appropriate education. The school system does not have the option to accept or reject a child. So far in SSA, 2.85 million children with disabilities have been identified in 2008-09 (up from 2.4 million in 2006-07), of which 2.3 million (81%) have been enrolled in schools, 91,000 have been enrolled in EGS/AIE centres, and 114,000 are provided home-based education, for a total coverage of 2.5 million (or 88%). A few states like Uttar Pradesh, Chhattisgarh, Goa, Uttarakhand, Madhya Pradesh, Jharkhand, Haryana, Nagaland, Sikkim and Delhi have identification rates below one per cent of the child population which suggests additional efforts are needed there.*

The National Policy on Education (1986) and its subsequent actions in pursuit of the goal to attain 'Education for All' have had considerable impact. The World Declaration on Education for All (Jo mtien, Thailand, March 1990), acted as a catalyst and further promoted the processes already initiated in the country. The Rehabilitation Council of India (RCI), a statutory body of the Ministry of Social Welfare was established in 1986, followed by an Act to implement its objects in 1992. In essence, the Council and its Act aims to regulate the quality of training of Rehabilitation Professionals. In 1999, the government passed the National Trust for Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act for the economic rehabilitation of people with disabilities. These legislations have been instrumental in bringing about perceptive change in the attitudes of government, NGOs and people with disabilities.

The most important legislation which comprehensively covers issues related to people with disabilities is the Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, enacted in 1995. The Chapter V of the Act concerns education. This act makes it mandatory

* *Source*: 10th Joint Review Mission of *Sarva Shiksha Abhiyan*, Government of India, 20 July 2009.

to provide free education to children with disabilities in an appropriate environment until the age of 18 years. For integration of students with disabilities in normal schools, comprehensive schemes have been prepared by the government for

• providing transport facilities to the children with disabilities or in the alternative, financial incentives to parents or guardians to enable their children with disabilities to attend schools;

• the removal of architectural barriers from schools, colleges or other institutions, imparting vocational and professional training;

• the supply of books, uniforms and other materials to children with disabilities attending school;

• the grant of scholarship to students with disabilities;

• setting up of appropriate forums for the redressal of grievances of parents, regarding the placement of disabled children;

• suitable modification in the examination system to eliminate purely mathematical questions for the benefit of blind students and students with low vision; and

• restructuring of curriculum for the benefit of children with disabilities.

The Government of India recently promulgated the National Policy for Persons with Disability, 2006 which clarifies the framework under which the state, civil society and private sector must operate in order to ensure a dignified life for persons with disability and support for their caregivers. It includes extending rehabilitation services to rural areas, increasing trained personnel to meet needs, emphasising education and training, increasing employment opportunities, focusing on gender equality, improving access to public services, encouraging state governments to develop a comprehensive social security policy, ensuring equal opportunities in sports, recreation and cultural activities, increasing the role of civil society organisations as service-providers to persons with disability and their families.

Most recent advancement is the Right of Children to Free and Compulsory Education (2009) Act which guarantees right to free and compulsory education to all children between the age six to fourteen years. For education of a child with disability, the act has to be read in conjunction with the Chapter V of the Persons with Disability Act, 1995. Chapter V of the PWD Act ensures that every child with disability is entitled to free education up to the age of 18 years. The government and local authorities must endeavour to promote integration of students with disabilities in regular schools, promote setting up of special schools in order to make them accessible to children living in any part of the country.

The most recent initiative of Government of India to achieve the goal of Universalisation of Secondary Education (USE) is Rashtriya Madhyamik Shiksha Abhiyan (RMSA) aimed at expanding and improving the standards of secondary education, i.e. from Classes VIII to X. RMSA will work in line with revised scheme of Inclusive Education for the Disabled at Secondary Stage (IEDSS) which ensures that every

child with disability will be identified at secondary level and his/her educational needs will also be assessed. Every student in need of aids and appliances, assistive devices will be provided the same. All architectural barriers in schools will be removed so that students with disabilities have access to classrooms, laboratories and toilets in school. Each student will be supplied learning material as per his/her requirement. Students with disabilities will have access to support services like appointment of special educators, establishment of resource rooms in every block. Model schools are proposed to be set up in every state to develop good replicable inclusive education.

Role of Teachers in Promoting/ Facilitating Inclusion

In the field of education, teachers are viewed as the primary agents in the implementation of the philosophy of inclusive education; therefore, their perceptions may influence their behaviour towards and acceptance of children with disabilities. Further, the attitude of mainstream educators may have some bearing on the success of inclusive educational programme.

Teachers' sentiments, beliefs, attitudes, values, professional competence are known to influence their teaching practices and management strategies in the classroom, and therefore, to directly influence students' learning. In particular, a teacher's beliefs and knowledge about the learning capacity of children with disabilities may determine the extent to which the teacher is willing to make adjustment to teaching methods, curriculum, or classroom or-

ganisation, or indeed whether he or she even recognises that some students in the class do have special needs. It is argued that successful inclusion is possible when teachers display reasonably positive and accepting attitude towards children with disabilities and to the basic principles of inclusion.

With the recent adoption of inclusive models, the term diversity broadens to include children with varied abilities, particularly those with disabilities. As general and special education teachers share responsibility for educating children with disabilities, they should possess knowledge of different disability types, characteristics of disabilities, learning styles, instructional techniques or methods, problem and behaviour management, etc. They must have the skills necessary to modify educational programmes to effectively meet the needs of individual student. According to Opdal *et al.* (2001), teachers require knowledge and skills that empower them rather than provide them with comprehensive information about each disability. In their opinions, anxiety towards teaching children with disabilities is often linked to insufficient skills, time and support services.

Inclusion being on our national agenda, a major challenge facing regular school teachers today is to accommodate children with disabilities to regular classrooms. Including children with disabilities into regular classrooms is a complex issue and its implementation is a topic of great controversy. Although there is widespread support for inclusion at a philosophical level, but there are some concerns that the policy of inclusion is difficult to implement

because teachers are not sufficiently well-prepared and supported to work in inclusive ways. Inclusion requires teachers to accept the responsibility for creating schools in which all children can learn and feel they belong. In this task, teachers are crucial because of the central role they play in promoting participation and reducing under-achievement, particularly with children who might be perceived as having difficulties in learning. Mitchell and Desai point out that providing education to such a vast number of children with disabilities in regular school settings will face a number of challenges or issues: (a) the challenge of modifying deeply held attitude; (b) the challenge of providing adequate levels of training to key stakeholders; (c) the challenge of providing adequate resources; (d) the issue of large class size; (e) the issue of coordination among the various government departments; and (f) the concerns of educators.

Researchers have reported that any change initiative such as development of inclusive schools requires the perceived concerns of regular education teachers to be systematically addressed. They further add that failure to address teachers' concerns may result in problems related to implementation. Evans, *et al.* (1996) point out that attention needs to be given not only to the identification of the barriers and challenges faced by educators but also to the development of mechanisms to confront and overcome such challenges. In area of concerns about inclusive education, researchers noted that teachers working in inclusive classrooms had experienced various kinds of concerns such as dilution of academic success of others students, inability to handle extra workload, large class size, difficulty in meeting the medical needs and behavioural challenges of students with disabilities, etc. Thus, the hallmark of inclusive education is the teachers' willingness to accept students with special needs. Their attitudes, knowledge and concerns about inclusive education are important as these are indicators of such willingness.

A policy of inclusion needs to be implemented in all schools and throughout our education system. The participation of all children needs to be ensured in all spheres of their life in and outside the school. Opportunities need to be given to all children with disabilities, who may need assistance or more time to complete their assigned tasks. It would be even better if, while planning for such activities, the teacher discusses them with all the children in the class, and ensures that each child is given an opportunity to contribute. When planning, therefore, teachers must pay special attention to ensuring the participation of all. This would become a marker of their effectiveness as teacher (NCERT, 2005).

Rouse (2007) has suggested that developing effective inclusive practice is not only about extending teachers' knowledge, but it is also about encouraging them to do things differently and getting them to reconsider their attitudes and beliefs. In other words, it should be about 'knowing', 'doing', and 'believing'. In other words,

Knowing about involves

Teaching strategies;
Disability and special needs;

How children learn;

What children need to learn;

Classroom organisation and management;

Where to get help when necessary;

Identifying and assessing difficulties;

Assessing and monitoring children's learning;

The legislative and policy context;

Doing involves

Turning knowledge into action;

Moving beyond reflective practice;

Using evidence to improve practice;

Learning how to work with colleagues as well as children;

Becoming an 'activist' professional;

Believing involves

That all children are worth educating;

That all children can learn;

That they have the capacity to make a difference to children's lives;

That such work is their responsibility and not only a task for specialists.

Conclusion

An ideal inclusive education concept aims at facilitating total integration of the child in the community. The upcoming inclusive education programmes in India are avoiding separation of children with disabilities from their families for the purpose of education.

Mere creation of an environment for inclusion is not sufficient. Efforts are needed to provide real educational support in the inclusive setting. The concept of inclusion as an ideology should be assimilated right from the classroom level, and in this context general teachers are the key players in inclusive education. Increasing positive attitude of teacher in inclusive education starts with dedication of himself to the work to be done. For the success of inclusion, the class teacher must accept the children with SENs and by showing a positive attitude towards them, the adaptation of the children to the educational environment is facilitated.

To open up the regular school system to disabled children is not enough. The policy on inclusion and mainstreaming can easily become "mere dumping" if not implemented carefully. A big gap exists between the ideal situation and the present reality. Thus there is an urgent need for interventions for equipping general teachers with special skills, making general curricula, teaching methods. Evaluation procedures, learning material disability-sensitive and addressing the attitudes/needs of other children in the school to ensure that such interventions benefit all children.

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Problems Faced by Special Teachers in Implementing Inclusive Education under *Sarva Shiksha Abhiyan*

Varun Kumar Dubey*
Yogendra Pandey**

| Abstract |

As free and compulsory elementary education for the children of age group 6 to 14 years become the fundamental right through inclusion of article 21A in part III of Indian Constitution, a recent initiative of Government of India to universalise elementary education has been taken as Sarva Shiksha Abhiyan (SSA). An endeavour has been made to implement the inclusive education through SSA. The responsibility of education of Children With Special Educational Needs (CWSENs) under SSA goes to special teachers appointed as Itinerant or Resource Teachers as well as regular counterpart, while the key persons to implement inclusive education under SSA are these special teachers. The present study carried out in Varanasi district of Uttar Pradesh incorporates 20 special teachers as sample and as a tool investigator's made questionnaire based on six dimensions was used to analyse the data. Survey method and purposive sampling method was used to investigate the problems. Findings of the study reveals that special teachers face problems regarding non-cooperation of government officials which have the responsibility of inclusive education under SSA and financial problems were also reported by them. They also have fear of job insecurity and they found themselves under pressure due to over workload. All these problems revealed under investigation adversely affect the implementation of inclusive education under SSA.

Introduction

Inclusive Education (IE) is a recent approach towards educating the Children With Special Educational Needs (CWSENs) with that of normal ones within the same roof. This is

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possible only in flexible education system that assimilates the needs of the diverse range of learners and adapts itself to meet these needs. The principle of inclusive education was adopted at the "Word Conference on Special Needs Education: Access and Quality" (Salamanca, Spain 1994) and was restated at the "World Education Forum" (Dakar, Senegal 2000). The recent and inclusive design of inclusive education is further supported by the United Nations Standard Rules on Equalization of opportunities for person with Disability Proclaiming Participation and Equality for All. Of late, a consensus has emerged among Indian intellectuals and pedagogues for adopting inclusive education in regular schools. Everyone knows India has its identification in the world as the teacher of the world Vishwa Guru due to its philosophy of value-based living and inclusive education is not an experiment to be tested but a value to be followed. All the children whether they are disabled or not have right to education as they are not only future citizens but the assets of the nation. By implementing inclusive education through SSA, India moves forward one step ahead.

- Inclusive education is about embracing all.
- Disability is a social responsibility— Accept it.
- No selection procedures to be adopted for denying admission to learners with disabilities.
- Accept differences...celebrate diversity.
- Inclusion is not confined to the disabled. It also means non-exclusion.

- Learn human rights... conquer human wrongs.
- Handicap is a social construct, deconstruct handicap.
- Make provisions – not restrictions; adjust to the needs of the child.
- Remove physical, social and attitudinal barriers.
- Partnership is our strength such as
- School-community; school-teacher;
- Teachers-teachers; teachers-children;
- Children-children; teachers-parents; school
- systems and outside systems.
- All good practices of teaching are practices of inclusion.
- Learning together is beneficial for every child.
- Support services are essential services.
- If you want to teach, learn from the child.
- Identify strengths not limitations.
- Inculcate mutual respect and interdependence. *NCF–2005,* p. 84.

As we know the teacher is one of the vital columns of the tri-polar system of education. Teachers will continue to play a crucial role in the formulation and implementation of educational programme (Education Commission 1964-66). The responsibility of implementing inclusive design in integrating Person With Disabilities (PWDs) into mainstream society largely depends upon the teachers particularly special teachers. In Sarva Shiksha Abhiyan (SSA), the responsibility of education of CWSENs goes to special teachers. Hence, special teaches are main implementing body of inclusive

education under SSA scheme. By extracting the suggested interventions and main functions of special teachers given in SSA-plan-manual, it has been concluded that special teachers are key persons to implement inclusive education under SSA.

In prevailing Indian situation, resources are insufficient, even to provide quality mainstream schools for common children it is unethical and impracticable to put CWSENs to test or to prove any thing in a research study to live and learn in the mainstream of school and community (Dash, 2006). Teachers view the inclusion of CWSENs into mainstream settings as difficult and stressful (Whiting and Young, 1995). The need for collaboration with several support staff has resulted in tension and confusion (Cant, 1994). However, the inclusion of CWSENs into regular classroom is viewed by some educators as contributing to increased workload (Dane, Berne-smith and Lathum, 2000). To make implementation of inclusive education under SSA successful, a joint endevour of special teachers, government officials and parents of CWSENs is needed. However, stress for teachers was caused by the shortage of equipment and resources, the non-support of specialists to provide assistance for CWSENs and the parents' unwillingness to provide assistance to both teachers and the children (William & Gersch, 2004). Conway, (2005) indicated that teachers from both settings were also under pressure to provide additional programming, especially the individual education plan (IEP) for each pupil, with the assessment

tasks, modification of curriculum and the supervision. Having CWSENs in a regular classroom means additional work, this is appended onto teachers existing workloads (Forlin, 1998). If the number of CWSENs in one class is more than five then the class teacher is under pressure to plan and prepare for each individual student. The teacher wouldn't find enough time to prepare tasks for the CWSENs as well as the other regular children (Prochow *et.al*, 2000, cited by Mapsea, A. J.).

Evaluation of the IEDC scheme in Maharashtra by TISS (Rane, 1983) identified linear approach of resource teachers modality, lack of trained manpower, lack of understanding of scheme by educational administrators, lack of orientation of general teachers, non-availability of appropriate learning materials suited to special educational needs, inadequate assessment and lack of awareness in community about the scheme as the factors adversely affecting its implementation. Similarly, Express Newsline (May 26, 2007) Lucknow stated that Itinerant Teachers faced problems in implementing inclusive education under SSA due to non-cooperation of regular teachers and parents of CWSENs. Although the researchers from different countries have reported different results which maybe reasons affecting successful implementation of Inclusive Education under SSA.

The present study tried to identify problems faced by special teachers in implementing inclusive education under SSA. The present study was undertaken by the investigator to identify problems

faced by special teachers at various dimensions such as availability of aids and appliances, non-cooperation of colleagues and society, non-cooperation of government officials, school administration, finance and job security and teacher's workloads. The study, it was thought, could provide a base for a further refinement of the schemes for successful implementation of inclusive education under SSA.

Objectives

The present study was investigated with the following aims:

1. To identify problems faced by special teachers in implementing inclusive education under SSA.
2. To suggest measures to successfully implement inclusive education under SSA.

Method

The present study was conducted in Varanasi district of Uttar Pradesh (India) on special teachers working as itinerant and resource teachers under SSA with the purpose to identify problems faced by them in implementing inclusive education.

Descriptive survey method and purposive sampling technique was employed to conduct the study. The population of the study comprises of all special teachers working as Itinerant and resource teachers of Varanasi district. There were only 24 itinerant teachers and 3 resource teachers and hence a total of 27 special teachers were working in 8 blocks of Varanasi district under SSA. Out of these, 20 special teachers were selected from the different blocks of Varanasi district.

Tool Used in the Study

As there was no standardised tool available to collect the data, a questionnaire was prepared by the investigator consisting of 25 items covering six different areas to collect different factual information from the sample. As the objectives of the study were to identify the problems faced by special teachers in implementing inclusive education under SSA at Varanasi, the items were carefully constructed by the investigator so that objectives could be achieved. The questionnaire covered areas such as

1) Availability of Aids and Appliances
2) Non-cooperation of Colleagues and Society
3) Non-cooperation of Government Officials
4) School Administration
5) Finance and Job Insecurity
6) Teachers' Workload.

The items were constructed in mother tongue Hindi to easily understand and responses can also be drawn out.

Collection of Data

For the collection of relevant data, the investigator administered questionnaire and demographic data sheet and these were supplied personally to all the sampled teachers. The filled-in questionnaire and demographic sheet were collected. Data were critically examined, cleaned and quantified as far as possible and tabulated systematically for further analysis.

Data Analysis

As the objectives of the research work was to identify problems of special teachers in implementing inclusive

Table 1
Responses of samples regarding various dimensions (1 to 6)

Dimension No.	No. of Items	Sample	Responses			
			Yes		No	
			Frequency	Percentage	Frequency	Percentage
1	4	20	36	45	44	55
2	6	20	41	34.17	79	65.83
3	4	20	44	55	36	45
4	4	20	34	42.5	46	57.5
5	5	20	60	60	40	40
6	2	20	24	60	16	40
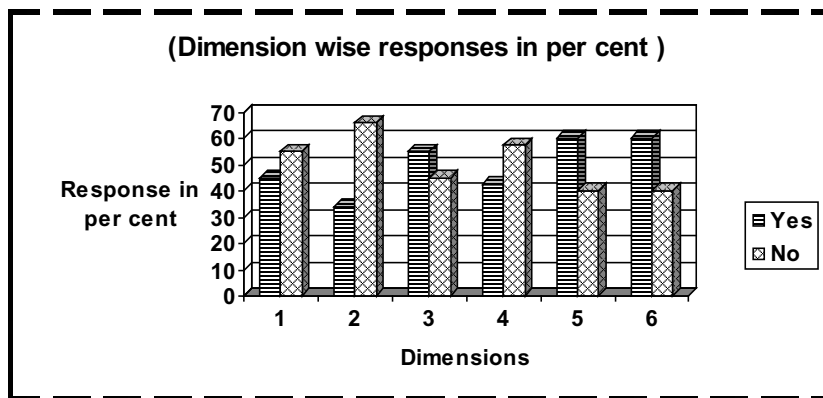
Figure 1 : *Percentage (%) responses of all samples in 'Yes' and 'No'*

education under SSA in Varanasi district, percentage (%) method was selected as an appropriate statistical method.

The above analysis revealed that

1. 45 per cent special teachers were facing problems regarding availability of aids and appliances whereas 55 per cent weren't facing problems.

2. 34.17 per cent special teachers were facing problems regarding cooperation of colleagues and society whereas 65.83 per cent weren't facing problems.

3. 55 per cent special teachers were facing problems regarding cooperation of government officials whereas 45 per cent were not facing problems.

4. 42.5 per cent special teachers were facing problems regarding school administration whereas 57.5 per cent were not facing such problems.

5. 60 per cent special teachers were facing problems regarding finance

and security whereas 40 per cent weren't facing such problems.

6. 60 per cent special teachers were facing problems regarding teachers' work load whereas 40 per cent weren't facing such problems.

Note: Items no 18 and 21–problems regarding (i) inadequate salary, and (ii) incentive and awards) have responses of special focus whose responses are as follows:

(i) 100 per cent special teachers reported that they didn't get an attractive salary as per their work.

(ii) 80 per cent special teachers claimed that they didn't get any incentive or awards for their work whereas 20 per cent hadn't such claim.

Discussion

On the basis of above analysis, it can be said that special teachers were not facing problems regarding availability of aids and appliances because under SSA there is a provision to grant Rs 5.00 lack per district for the purpose from the utilisation of Rs 1200 per child as SSA fund (SSA Plan Manual, page 24-25) and obviously this fund was being utilised properly and hence they were not facing any problems regarding availability of aids and appliances for teaching-learning of CWSENs.

Special teachers were not facing any problem regarding school administration and non-cooperation of colleagues and society because Rs 1.00 lac was being granted to make the community aware of the needs and potential of disabled children and obviously this very fund was being utilised.

Special teachers were facing problems regarding non-cooperation of government officials in the implementation of inclusive education under SSA maybe due to lack of understanding of scheme by educational administrators (Rane, 1983), lack of awareness, attention and attitude of government officials because there is no fund granted for the training and awareness programme under SSA scheme for them.

Special teachers were facing problems regarding finance and insecurity of job because, they were appointed on contractual basis with consolidated remuneration of Rs 6500 per month only while on the other hand newly appointed permanent regular teachers of government scale were getting approximately Rs 18000 per month. The Special (Resource) Teachers, instead of receiving 15 per cent of their basic salary as their allowance, received only Rs 75/- per month (Singh and Prabha, 1987). Nowadays standard as well as cost of living had gone up and to survive in this little amount is too difficult.

Teachers were facing problems regarding their workload because they were assigned 8 to 10 schools to visit twice in a week and simultaneously they were assigned some other non-teaching and administrative works like collection of data, polio drops feeding, etc., beside main works. The above problems are also corroborated by few studies.

Stress for teachers was caused by the non-support of specialists to provide assistance for children with moderate and severe disabilities, and the parents'

unwillingness to provide assistance to both teachers and the children (Williams and Gersch, 2004).

The inclusion of students with SENs into regular classrooms is viewed by some educators as contributing to increased workloads, (Daane, C. J., Beirne Smith, M. and Lathum, D. 2000) while teachers in New Zealand spend large amounts of time in planning and preparation of lessons, and in teaching children. Apart from teaching, most teachers also have to complete other professional and administrative tasks (Campbell and Neill, 1993; cited by Mapsea, A.J. 2006).

Conclusion

Following conclusions could be drawn from the present study:

- Most of the special teachers weren't facing problems regarding availability of aids and appliances, school administration and non-cooperation of colleagues and society.
- Majority of special teachers were facing problems regarding non cooperation of government officials, finance and security and teachers' workload.
- All special teachers were not satisfied with their salary.
- Most of the special teachers did not get any incentive or awards for their work.

Educational Implications

1. The problems of special teachers that need to overcome in order to implement inclusive education under Sarva Shiksha Abhiyan successfully can be identified.

2. The adequate essential information maybe provided to the policy makers and government officials to correct the scheme for successful implementation of inclusive education.
3. Sufficient information may be provided about all areas where special teachers are not satisfied.
4. Major hurdles of the scheme can be identified which affects the successful implementation of inclusive education.

Suggestive measures

For successful implementation of inclusive education under SSA, the drawbacks of schemes should be eradicated for its proper functioning by

- solving problems (not identified here) of government officials which may be a cause of non-cooperation, their cooperation will indeed provide acceleration to the success of the scheme;
- providing attractive packages to special teachers because one can't give one's best in their financially stressful living conditions;
- changing the nature of the job from contractual to permanent because in this nature of job conditions employee's tendency is only to finish the tenure of job, not to take it as challenge or responsibility;
- reducing the responsibility of 8 to10 schools to 1 or 2 because visiting 8 to 10 schools twice in a week is a very tedious job and only visit is not sufficient but to spend time there with great dedication is required for the successful implementation of the scheme; and

- making arrangements of awards and incentives to best performers because reinforcement and a level of motivation also enhance a person's performance and undoubtedly it will provide a momentum to successful implementation of inclusive education under SSA.

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Secondary Education in Manipur
A Status Study

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Abstract

Education in its broadest sense of development of youth is the most crucial input for empowering people with skills and knowledge and giving them access to productive employment in future. The Eleventh Plan places the highest priority on education as a central instrument for achieving rapid and inclusive growth. Elementary education has received a major push in the Tenth Plan through the Sarva Shiksha Abhiyan *(SSA). In the view of the demands for rapidly changing economy, a mere eight years of elementary education would be grossly inadequate for the young children to acquire necessary skills to compete in the job market. Therefore, a mission for secondary education is essential to consolidate the gains of SSA and to move forward in establishing a knowledge society. Moreover, secondary education serves as a bridge between elementary and higher education, the success of SSA thrown open the challenge of expanding access to secondary education through its universalisation. With this context, the present paper aims to study the present status of secondary education in Manipur. It also tries to capture the major gaps in enrolment, dropouts and school retention at secondary level. Finally, the paper also attempts to examine the schemes and policy taken up by the State Government for universalisation of secondary education in Manipur. The paper is based mainly on secondary data collected from Selected Educational Statistics, Census Report, Statistical Report of Manipur, DISE data, data from Directorate of Education(s), Manipur, Board of Secondary Education, Manipur and RMSA, Manipur.*

Introduction

The Eleventh Five Year Plan places the highest priority on education as a central instrument for achieving rapid and inclusive growth. Elementary education has received a major push in

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the Tenth Plan through the *Sarva Shiksha Abhiyan* (SSA). In the view of the demands for rapidly changing economy, it was felt that a mere eight years of Elementary Education would be grossly inadequate for the young children to acquire necessary skills to compete in the job market. Therefore, a mission for secondary education is essential to consolidate the gains of SSA and to move forward in establishing a knowledge society. Moreover secondary education serves as a bridge between elementary and higher education, the success of SSA thrown open the challenge of expanding access to secondary education through its universalisation. The Eleventh Plan aims to i) Raise the minimum level of education to Class X and accordingly universalise access to secondary education; ii) Ensure good quality secondary education with focus on Science, Mathematics, and English and iii) Aim towards major reduction in gender, social and regional gaps in enrolments, dropouts and school retention.

With this context, the present paper, based mainly on secondary data, aims to study the present status of secondary education in Manipur and also to capture the major gaps in enrolment, dropouts and school retention at secondary level. Finally, the paper also attempts to examine the schemes and policy taken up by the State Government and RMSA, a centrally sponsored scheme for universalisation of secondary education in Manipur.

Secondary Education in Manipur

The secondary education which serves as a bridge between primary and higher education is expected to prepare young ones between the age group 14 to 18 for the world of work and entry into higher education. The secondary education starts with Classes IX to X leading to higher secondary Classes XI and XII.

The State Government of Manipur primarily looks after the school education, both primary and secondary education in the state. The high school stage of education consisting Classes from IX and X is under the academic control of the Board of Secondary Education, Manipur and higher secondary schools education comprising of Class XI and XII is under the control of Council of Higher Secondary Education, Manipur. The Board of Secondary Education and Council of Higher Secondary Education, Manipur conduct the High School Leaving Certificate (HSLC) and Higher Secondary School Leaving Certificate (HSSLC) examinations, respectively. The Directorate of Education (schools) under the supervision of the Secretariat Education Department is taking care of the administration of school education in the state. The Board of Secondary Education, Manipur was set up during the year 1972-73. The State Institute of Education (SIE) was set up during 1973 for academic improvement of school education in Manipur. Towards the end of Fourth Plan, the Department of Education was reorganised to cope with the rapidly expanding education at all stages and it was bifurcated into two; one to look after school education and other to deal with higher education (college and university). The total population of Manipur is 21,66,788 and

literacy rate is 70.53 (Census, 2001) and the total population is 2,721,756 and literacy rate is 79.85 (Provisional Census, 2011).

History of Formal Education in Manipur

The traditional system of education in Manipur was gradually replaced by the Western education system with the arrival of the British in Manipur in the early nineteenth century. Maharaja Chandra Kirti Singh gave his consent to Sir James Johnstone, Political Agent in Manipur in the year 1885 by allotting a plot of land in Imphal East for establishing an English Middle School. This was the first formal system of education in Manipur. The Johnstone Middle English School was upgraded to High School Level under Calcutta University by the year 1921. It was converted into State Government School in the year 1946.

Progress in Educational Institutions Capacity

Size of school education in the state is generally measured in terms of three indicators, namely, number of educational institutions, number of teachers and students. The state has progressed in these indicators. Till the year 1947, the number of High Schools was only six with an enrolment of 3705 and 111 teachers. In the year 1997, the number rose to 501 High Schools with an enrolment of 1,74,670 including 82,840 girls with 366 teachers. In the year 2005-06, the numbers of schools and number of teachers were 4088 and 28,506 with an enrolment of 6,01,588 students.

Types of Secondary Schools in Manipur

The types of secondary schools in Manipur are government secondary schools, private-aided secondary schools and private secondary schools. The Board of Secondary Education, Manipur has recognised 823 schools as on 11 May 2011. Among these recognised schools 230 are government schools, 103 are aided schools and 490 are private schools. The dominance of private schools in terms of number and enrolment of students is the significant feature of school education in the state.

Table 1
Number of Secondary Schools in Manipur

Year	Number of Secondary Schools	Number of Senior Secondary Schools
2001-02	564	95
2002-03	540	147
2003-04	540	112
2004-05	588	118
2005-06	603	102
2006-07	701	103
2007-08	701	103

Source: Statistics of School Education, 2010

In the last six years, number of secondary schools has increased from 564 to 701 and shows an increasing trend except for the years 2002-03 and 2003-04. Number of senior secondary school also increased from 95 in 2001-2002 to 103, however sudden increase happened during the year 2002-03, and then gradually it decreased (Table 1). Table 2 shows the district-wise secondary schools in Manipur by management in 2010-11.

Table 2
District-wise Secondary Schools in Manipur by Management (2010-11)

District	Sec./ Hr. Sec. Schools	Govt. Colleges having 10+2 Classes	Govt. Central	Local	Private Aided	Private Unaided	Total
1. Bishnupur	27	2	1	1	11	34	76
2. Chandel	7	0	1	0	6	16	30
3. Churachandpur	28	2	3	0	7	47	87
4. Imphal East	34	1	2	1	32	86	156
5. Imphal West	44	0	3	0	30	92	169
6. Senapati	12	1	1	1	11	73	99
7. Tamenglong	13	1	2	0	5	15	36
8. Thoubal	32	1	2	0	29	62	126
9. Ukhrul	27	1	0	1	5	17	51
Total	224	9	15	4	136	442	830

Source: SEMIS Data 2010-11

Enrolment Trend

According to Table 3, the enrolment of students at Class IX and X from 2001-02 to 2007-08 shows a steady growth except for the year 2002-03. Enrolment at Classes IX and X in 2002-03 shows slight decrease from the earlier year whereas in case of Classes XI-XII, it shows a sudden jump from 16,982 to 37,826. When we make a comparison for both the classes, it shows that enrolment at Classes XI-XII is very small. This may be due to children being sent out of the state for further schooling or may be some of them do not continue further schooling. The Gross Enrolment Ratio in Classes IX to XII shows an increasing trend from 40.49 in 2001-02 to 50.97 in 2007-08. According to SEMIS 2010-11, the GER of the state at secondary education has reached up to 79.56.

Table 3
Number of Enrolled Students in Secondary School

Year	Enrolment of Students in Secondary Schools		Gross Enrolment Ratio in Classes
	IX – X	XI – XII	IX-XII
2001-2002	67244	16982	40.49
2002-2003	62921	37826	51.32
2003-2004	70910	21238	46.24
2004-2005	73565	23178	48.61
2005-2006	75924	23918	49.43
2006-2007	78353	24683	50.70
2007-2008	78765	24804	50.97

Source: Statistics of School Education, 2010

Table 4
Number of Teachers at Secondary Schools

Year	Number of Teachers in	
	Secondary Schools	Sr. Secondary Schools
2001-2002	9534	2528
2002-2003	9175	3104
2003-2004	9175	3104
2004-2005	9058	3075
2005-2006	8933	3033
2006-2007	8801	3006
2007-2008	8725	2991

Source: Statistics of School Education, 2010

Teachers in Secondary Schools

Table 4 shows the number of teachers serving in secondary schools. During 2001-02, the number of teachers employed was 9,534 but the number decreases to 9175 in 2002-03 and remains the same in 2003-04. Then from 2004-05 to 2007-08, it shows a gradual decrease. However in case of senior secondary school, the number of teachers shows an increasing trend from 2001-02 to 2007-08.

Number of Teachers, Enrolment and TPR at Higher Secondary Schools

Tables 5 and 6 show the number of teachers, enrolment and TPR at higher secondary schools and high schools.

Table 5 shows a decreasing trend of the number of teachers at Higher Secondary Schools from 2005-06 to 2007-08 in Manipur as well as in all India. It is also evident that male teachers are more than the female teachers and the percentage of Higher Secondary School trained teachers are below 50 per cent of the all India average showing slight decreasing trend. However, the number of female teachers per hundred male teachers has increased from 81 to 82 within two years in case of Manipur whereas it shows a decreasing trend in all India figure from 62 in 2005-06 to 58 in 2007-08.

The all India figure for enrolment at Secondary/Senior Secondary has increased by 30 times from 1.5 million in 1950-51 to 44.5 million in 2007-08. The figure for enrolment of students for two years as given in the Table 6 also shows the same trend. Boys' enrolment shows a slight decreasing trend for all India figures which is contradictory with the case in Manipur. However, the girls' enrolment at Higher Secondary Schools shows an increase at both state and all India level.

On the basis of Higher Secondary School enrolment and the number of teachers, the teacher pupil ratio for the years 2005-06 and 2007-08 is indicated in Table 6 and the ratio has now increased from 34 to 37 and 22 to 23 in India and Manipur, respectively.

Table 5
Number of Teachers, Enrolment and TPR of Higher Secondary Schools

State/ Country	No. of Teachers			% age of Trained Teachers	Female Teachers per 100 Male Teachers	Enrolment			TPR
	Men	Women	Total			Boys	Girls	Total	
Manipur 2005-06	1673	1360	3033	40	81	36865	29225	66090	22
India 2005-06	637911	393868	1031779	90	62	19885679	15155482	35041161	34
Manipur 2007- 08	1643	1348	2991	38	82	38352	31165	69517	23
India 2007-08	603306	348511	951817	93	58	19750216	15638872	35389088	37

Source: Selected Educational Statistics 2008 and Statistics of School Education, 2010

Table 6
Number of Teachers, Enrolment and TPR of High Schools

State/ Country	No. of Teachers			% age of Trained Teachers	Female Teachers per 100 Male Teachers	Enrolment			TPR
	Men	Women	Total			Boys	Girls	Total	
Manipur 2005-06	5366	3567	8933	42	66	118302	108033	226335	25
India 2005-06	695551	427325	11228766	89	61	19904974	16056744	35961718	32
Manipur 2007-08	5210	3515	8725	42	67	122935	111825	234760	27
India 2007-08	728228	446830	1175058	89	61	21507636	16887044	38394680	33

Source: Selected Educational Statistics, 2008 and Statistics of School Education, 2010

Number of Teachers, Enrolment and TPR at High School

Table 7 shows an increasing trend of the number of teachers at High Schools from 2005-06 to 2007-08 in Manipur as well as in all India. It is also evident that male teachers are more than the female teachers and the percentage of High School trained teachers is below 50 per cent of the all India average showing no change in the number for the last two years. However, the number of female teachers per hundred male teachers has increased from 66 to 67 within two years in case of Manipur whereas the number remains the same in all India figure.

The all India figure for enrolment at High School for two years as given in the Table 7 also shows an increasing trend where the boys' and the girls' enrolment is on increasing trend from 1.99 million to 2.15 million and 3.59 million to 3.83 million, respectively for all India. In Manipur, it also shows an increasing trend from 2.26 lacs to 2.34 lacs in total where the boys' and girls, enrolment increased from 1.18 lacs to 1.22 lacs and from 2.26 lacs to 2.34 lacs, respectively. The teacher pupil ratio for High Schools for the years 2005-06 and 2007-08 is indicated in Table 6 and the ratio has increased from 32 to 33 and 25 to 27 in India and Manipur, respectively.

Number of Schools, Number of Teachers and Enrolment at District Level

Table 7 shows the district wise-number of schools, number of teachers and students enrolment for the years 2005-06 and 2007-08.

Table 7
District-wise Number of Schools, Number of Teachers and Enrolment

District	2005-06			2007-08		
	School	Teachers	Enrolment IX-XII	School	Teachers	Enrolment IX-XII
Bishnupur	59	873	10443	68	851	10822
Chandel	23	405	2228	27	378	2331
Churachandpur	79	1390	7066	84	1357	7329
Imphal East	132	1671	19813	157	1641	20531
Imphal West	148	4071	30467	187	3999	31604
Senapati	67	843	6712	78	837	6946
Tamenglong	53	376	3144	29	365	3260
Thoubal	110	1657	15576	124	1621	16157
Ukhrul	47	680	4393	50	667	4589
Total	705	11966	99842	804	11716	103569

Source: Selected Educational Statistics 2008 and Statistics of School Education 2010

Teacher-Pupil Ratio in Secondary Schools

Table 8 shows a gradual increase of TPR from 20 in 2001-02 to 27 in 2007-08 except for the year 2002-03 in secondary schools but for higher secondary school the case is different where the data show a decreasing trend. This analysis depicts that there are more enrolled students than the number of teachers in secondary schools than the senior secondary schools.

Table 8
Pupil-Teacher Ratio of Secondary Schools

Year	Pupil-Teacher Ratio at Secondary Schools		
	Secondary Schools	Sr. Secondary School	Gender Parity Index
2001-2002	20	24	0.87
2002-2003	19	20	0.94
2003-2004	23	22	0.93
2004-2005	24	23	0.93
2005-2006	25	22	0.93
2006-2007	26	23	0.94
2007-2008	27	23	0.95

Source: Statistics of School Education, 2010

Gender Parity Index in Secondary Schools in Manipur

Gender Parity Index (GPI) measures progress towards gender equity in education and when its value equal to 1 at any level of education, then it shows that there is no gender disparity at that level. Table 8 indicates an increased trend from 0.87 in 2001-2002 to 0.95 in 2007-2008 and in the following years, the state may completely eliminate gender disparity.

Secondary School Examination Results

HSLC examination is conducted by the Board of Secondary Education Manipur and Higher Secondary Leaving Certificate Examination is conducted by Council of Secondary Education. The following tables show the High School Leaving Certificate Examination (HSLC) for the last six years from 2005-2010 and district-wise HSLC examination result in 2010.

Table 9
HSLC Examination Result for the past Six Years

Year	Enrolled		Appeared		Division						Total	PC
					I		II		III			
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
2005	13254	13067	13093	12976	1082	695	2723	2027	2023	1599	10159	39
2006	12250	12676	12082	12571	1446	1036	2740	2029	1490	1103	9844	40
2007	11415	11813	11266	11689	1993	1480	3038	2640	1551	1217	11919	52
2008	12354	12510	12206	12403	2198	1644	3765	3157	1824	1805	14393	58
2009	14041	13935	13888	13796	2381	1644	4096	3459	2222	1886	15688	57
2010	14264	13290	14093	13188	1052	591	4207	3205	4079	3443	16577	61

Source: Result of HSLC Examination, Board Secondary Education, Manipur, 2010

Table 10
District-wise HSLC Examination Result & Pass Percentage, 2010

Sl. No.	District	Appeared	Passed Students at Different Division				Pass P.C.
			I	II	III	Total	
1.	Imphal East	4279	290	769	944	2003	47%
2.	Imphal West	5794	476	1225	1354	3055	53%
3.	Bishnupur	2028	117	405	546	1068	53%
4.	Churachandpur	2161	168	764	481	1413	65%
5.	Thoubal	4106	240	1058	1194	2492	61%
6.	Chandel	2080	33	800	709	1542	74%
7.	Senapati	3779	268	1516	1015	2799	74%
8.	Tamenglong	1228	12	234	588	834	68%
9.	Ukhrul	1826	39	641	691	1371	75%

Source: Result of HSLC Examination, Board Secondary Education, Manipur 2010

Table 9 shows that during the year 2005-208, number of girls enrolled are more than boys for HSLC examination but in the years 2009 and 2010 the number boys' enrolled rose up. It also shows that the number of male candidates appearing in the examination are more than the female ones except for the years 2006 and 2008 due to large number of female dropout from the examination. Total pass percentage of students over the last six years in HSLC examination shows a significant increased trend.

According to Table 10, Imphal West district recorded the highest number of students appeared for HSLC with a pass percentage of 53per cent whereas Tamenglong district, the lowest with a passed percentage of 68 per cent in the year 2010. The Chandel and Senapati districts recorded as having the highest passed percentage of 74 per cent whereas Imphal West district as having the lowest passed percentage of 47 per cent. However, the highest number of students passed out with first division is from the Imphal West district, and Tamenglong district having the lowest number students passed out in first division.

Dropout Rates in Schools in Manipur

Dropout rates given in Table 11 show an increasing trend for classes I to V and I to VII from 27.06 and 37.75 in 2001-02 to 37.49 and 41.93 in 2007-08 respectively. However, dropout rates for the Classes I to X shows a decreasing trend from 53.90 in 2001-02 to 44.60 in 2007-08.

Table 11
Dropout Rates in Different Classes

Years	Dropout Rates in Classes		
	I-V	I-VIII	I-X
2001-02	27.06	37.75	53.90
2002-03	25.60	32.93	60.54
2003-04	26.41	30.61	49.02
2004-05	31.18	32.80	43.02
2005-06	31.06	35.97	41.91
2006-07	45.69	41.22	43.80
2007-08	37.49	41.93	44.60

Source: Selected Educational Statistics 2008 and Statistics of School Education 2010

Table 12
Dropout Rates during 2005-06 and 2007-08 at all categories

State/UTs	Classes I-V			Classes I-VIII			Classes I-X		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
All Categories Manipur 2005-06 2007-08	29.84 35.80	32.36 39.25	31.06 37.49	36.34 41.03	35.56 42.88	35.97 41.93	44.42 47.91	39.09 40.83	41.91 44.60
India-2005-06 2007-08	28.71 25.70	21.77 24.41	25.67 25.09	48.67 41.34	48.98 42.68	48.80 56.55	60.10 56.55	63.56 57.33	61.62 56.71
SC-Manipur 2005-06 2007-08	32.89 63.99	21.26 51.72	27.26 58.18	0.00 3.07	0.00 3.07	0.00 3.07	0.00 -1.12	0.00 1.47	0.00 0.13
India-2005-06 2007-08	32.11 34.37	33.81 24.52	32.86 30.09	53.68 53.56	57.12 51.12	55.17 52.47	68.15 68.05	73.76 68.90	70.57 68.42
ST-Manipur 2005-06 2007-08	46.77 63.77	56.79 69.90	51.58 66.70	56.27 62.64	62.69 65.37	59.51 63.95	71.50 67.61	71.27 73.56	70.40 70.61
India-2005-06 2007-08	40.21 31.04	39.29 31.68	39.79 31.34	62.88 62.62	62.86 62.31	62.87 62.48	78.02 76.02	79.21 77.97	78.52 76.85

Source: Selected Educational Statistics 2008 and Statistics of School Education 2010

As given in the Table 12, the dropout rates in Classes I to V, I to VIII and I to X show an increasing trend in Manipur which is in contrast to all India figure. And the dropout rates in all categories show higher than all India figure in both the years.

In case of scheduled-caste students, dropout rates in Manipur have increased from 2005-06 to 2007-08 with more than 50 per cent increased in dropouts for Classes I to V and negligibly increased for Classes I to X. Similar trend of dropout rates observed in the case of ST students with 70.40 per cent and 70.61 per cent of dropouts for Classes I to X in 2005-06 and 2007-08, respectively. But the number of dropout rates of ST students is more than SC students in Manipur.

However, all India dropout rates for SC students show a decreasing trend with large number of SC dropout students for Classes I to X as 70.57 in 2005-06 and 68.42 in 2007-08. The similar trend is observed here for the ST students where the highest number of students dropout was for the Classes I to X.

In all categories, the girls' dropout rates are more than boys in Manipur. However, in all India figures, boys, dropout rates are more than the girls for Classes I to V but for Classes I to VII and Classes I to X, girls, dropout rates are more than the boys.

In SC categories, the boys' dropout rates are more than that for girls in Manipur for both the years for Classes I to V, However, for classes I to VIII, there is same rates (3.07) of dropouts for both boys and girls and for Classes I to X, girls dropout rates are more than boys. In all India figure, it shows

that the girls' dropout rates are more than the boys in 2005-06 for Classes I to V and Classes I to X but in 2007-08, the boys dropout rates are more than girls for Classes I to V and I to X.

In Manipur, the ST girls, dropout rates are more than that for boys for Classes I to V and I to VIII in 2005-06 and 2007-08 but for Classes I to X, boys dropout rates are more than that for girls in 2005-06 and vice versa in 2007-08. The all India figure shows that ST boys' dropout rates are more than girls in 2005-06 for Classes I to V and I to VIII but more girls' dropout rate for Classes I to X. In 2007-08, more girls' dropout rates among the ST students for Classes I to V and I to X but lesser girls' dropouts for Classes I to VIII.

Main Policies and Schemes for Secondary Education

The Department of Education (School), Government of Manipur has different policies and programmes for the secondary education in the state. Under the sponsorship of Ministry of Human Resource Development, Government of India, the Department of Education(S) has conducted National Means-cum-Merit Scholarship Examination since 2008 in Manipur. Meritorious students belonging to economically weaker sections are awarded scholarships to arrest their dropout at Class VIII and the main objective is to encourage them to continue their studies till Class XII. In the year 2010, the Department has conducted the examination and selected 164 students for the scholarship.

The Department of Education(S) also awards merit scholarship for the students who passed Class X examination and Class XII examination conducted by Board of Secondary Education, Manipur and Council of Higher Secondary Education, Manipur. The scholarship was given to first 300 students. The merit scholarship is Rs 6,000 per annum for Class X and Rs 12,000 per annum for Class XII.

The Department has been giving awards to the first division students of Classes X and XII examination conducted by BOSEM and COHESM. The students who score 60 per cent to 74.9 per cent. Receives Rs 3,000 and Rs 5,000 for the students who score 75 per cent and above and this grant is shared between the school management, teaching faculty and the student of the school.

The Department also conducts School Meet. It is organised to inculcate a sense of integrity among school-going youths; to expose the youths to different opportunities and avenues and to let youths of different areas acquaint with each other's culture, identity, ethos, etc. In the Meet, students and teachers in charge from each districts of the state took part in inter-district sports competition and other extra-curricular activities.

The State Government is also concerned for the quality education in the schools. The State Government has established seven Special Category English Medium Schools (Model School) in various districts so far aiming at imparting quality education to students. The admission to these schools are done through an Admission Committee headed by Zonal Education Officer concerned and teachers for these schools are selected from among the

young and dynamic government school graduate teachers through a screening committee.

A special coaching class under the remedial teaching scheme has been taken up in close co-ordination with the district level educational establishments and students bodies as a part of the continuing process for improvement of the students preparing for HSLC and HSSLC Examination 2010-11.

Under the mission for ICT in school education, the State Government has plan to provide all the Government and Aided High and Higher Secondary Schools of Manipur, the facility of computer education by way of installing ten computer systems with requisite accessories to each school. And under computer education programme, the government shall also provide one laptop each to the students of Elementary level under One Laptop per Child (OLPC) scheme. At the first phase of this programme, two hundred laptops have also been distributed to the students of four schools (Govt/Private) (Annual Administrative Report 09-10, Dept. of Education(S), GOM).

The Department of Education(S) has also selected five schools for upgradation of infrastructure of school buildings in hill districts during the year 2010-11 under the Special Plan Assistance for improving infrastructure of schools.

The Board of Secondary Education, Manipur has the scheme of continuous and comprehensive evaluation since 1993 in Classes IX and X and the scheme has been modified from the academic session 2010-11 in Classes III-X in all schools affiliated to BOSEM.

Policies and Programmes of RMSA at Manipur

A centrally-sponsored scheme, RMSA launched by the Government of India on 2 March 2009 is envisaged to enrol students into Classes IX to XII for achieving universalisation of secondary education by 2017 and full retention by 2020. The scheme was started in Manipur formally on 20 April 2010.The financing pattern between centre and the state for RMSA is 90:10.

RMSA is implemented in Manipur under the administrative umbrella of *Sarva Shiksha Abhiyan* Society, but with a separate State Project Director and Additional State Project Director who are assisted by a mixture of staff drawn from SSA and contract employees especially appointed for implementation of RMSA. At the district level, there will be District Programme Coordinators. Existing district education structure and manpower will be mostly utilised for implementation of the scheme, and if required, qualified staff may be appointed from the open market on contract basis.

In the context of the Universalisation of Secondary Education (USE), RMSA in Manipur has been progressing by doing works during the year 2010-11 in terms of additional schools, additional classrooms, science laboratory, library, arts and crafts room and students' toilet facilities and drinking water facilities. The activities in the pipeline for the scheme are to employ adequate number of qualified subject teachers, separate male and female staff rooms, boys, and girls, separate common room for recreation that gives a little relief from studies during the course of the day, as

also to facilitate vocational studies and activities, a big auditorium to train themselves to address public functions and other facilities need to be provided to meet the challenge of education with credibility and quality. It, inter-alia, requires assessment and provision of educational needs, physical infrastructure, human resources, academic inputs and effective monitoring of implementation of the programmes. The scheme will initially cover up to Class X. Subsequently, the higher secondary stage will also be taken up preferably within two years of the implementation.

Concluding Remarks

Manipur has shown considerable progress in terms of literacy rates, number of schools, number of teachers and students enrolment since 1951. The dominance of private schools in terms of number, enrolment of students and performance in the examinations is one of the significant features of school education in the state. In terms of access of secondary education, Manipur is fairly poised to achieve more than the national target of 75 per cent over the next five years. The Gross Enrolment Ratio for secondary level could have achieved a much higher if the schools are located and spread over at strategic places for access easily. In terms of efficiency, participation and access, the state has made a progress but the main issue here is the lack of quality education. Lately, the state has focus more on qualitative achievement than the quantitative achievement with the broad aims and objectives of RMSA goals. Quality secondary school education can be brought through large number of trained specialised teachers in their subjects. There is a need for giving in-service training programmes on massive scale besides providing adequate infrastructure facilities in the schools like science labs, libraries and other facilities. In this regard, for bringing quality education and for achieving aims of universalisation of secondary education in the state, much effort is needed to implement properly the State and Central government policies and plans through both Education Department (S) and RMSA scheme with full cooperation from the stakeholders.

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Gifted Disadvantage in Education Safety Net: a Reality Check

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Abstract

Although the notion of giftedness is a reality, yet it swings along the pendulum of equality and excellence. At times, nurturance of gifted abilities becomes a struggle of better catchment of resources and facilities. Those from affluent set-ups are blessed with better support system whereas gifted children from disadvantaged group suffer from submissive upbringing. In developing countries like, India, with diverse demographic profiles, socio-cultural diversity and economic disparity, the very concept of equality in education faces severe challenge. The present paper presents the dichotomy of ideology of equality and excellence in education practices. It highlights the need of wider vision, better policy making and decentralised implementation services to allow gifted children to enjoy what they are; dream what they can be; and promote what they will be.

A day in Garima's life..........

Garima is a seventh grade student in a Government School. Her father is a clerk; mother is a homemaker with four children to look after. Garima gets up at 5 0'clock in the morning, helps her younger siblings to get ready for school, combs their hair, ties up their shoes, checks their school bags, helps her mother to pack the lunch for herself and her siblings, fills the water bottles, clears the room and rushes for school.

In school, Garima is a high achiever, and easily understands everything being taught. She mostly helps the teacher to assist the slow peer of her class. She enjoys every minute of her school time. She tries to finish most of her homework in school itself so that she can learn playing the *guitar*, her music teacher has gifted her seeing her music abilities.

Once back home, Garima eats her lunch, takes rest for half an hour and

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sets off for her helping role. She helps her siblings in their homework, does reading for the youngest one who is just five years old, takes their revision lessons and also, mediates when they fight. Once she finishes with their school work, she cleans the room. Her younger siblings go out to play.

Now, this is the time to join her mother in the kitchen work. She takes charge of the kitchen and allows her mother to go for an evening walk and do some necessary shopping as this is the only time when her mother can get some relief from tedious household chores. She quickly winds up cooking and spends sometime playing guitar. She had choreographed a group dance for her class which was selected for zonal competition. This is how she meets the demand of her creative needs.

She consciously makes an effort to spend some quality time with her mother and both mother-daughter share a close bond. Garima takes a break for the day only after cleaning the kitchen with her mother.

Garima in her inner world...........

Garima is a happy, well adjusted, sensitive, caring and highly able child who is growing beautifully taking up household responsibilities, at the same time doing justice with her studies. But the highly demanding home environment and non-challenging school environment is not able to provide any opportunity to optimally facilitate her potential.

Once in her inner world, Garima wants to become a space scientist. She loves to read and discuss about space science. Her curious mind is full of questions about space facts, theories and discoveries but she has no source to get her answers. She struggles with herself on such issues. Given an opportunity, she dreams to buy a reflective telescope and explore the space.

She wants to be a working woman, but only in a career which her parents can afford for her. She does not dare to make her dream of space scientist a reality. She is very well aware of her financial limitations. Although she always scores above 95 per cent in science, she does not want to pursue science as a career as she feels that higher education in science is expensive and also very demanding, which she may not afford due to family responsibilities.

In spite of all the limitations, Garima faces the world with a smile

Garima is an example of million of children in economically disadvantaged families where parents, dream to educate their children but can not provide them appropriate support to maximise their potential. Although these children are safely placed in education safety net, even schools fail to provide them appropriate enrichment, resources and guidance to channelise their potentials. In such a struggling system, where lack of facilities joined with lack of awareness, force these children to slip into a system of adjustments, restrictions and limitations.

Socio-cultural forces play dominant role in shaping gifted child's perception about self because no conception of giftedness or talent works in a cultural

vacuum (Freeman, 1998). Family, teachers, peers and other social forces influence child's belief in self abilities. According to research findings, families play one of the most significant roles in development of their gifted children (Bloom, 1995; Csikszentmihali and Csikszentmihali, 1993; Freeman, 2001). They not only have a crucial influence on children's academic performance, but also central to the facilitation of social-emotional development (Feldman, 1999: Moon, 2003; Oiszewski-Kubilins, 2002; Silverman, 1993).

In India, families act as a natural authority to make choices about career options for a child. In many cases, these children are either first generation learners or parents have very basic education and thus, have very little or no knowledge about career options or education facilities.
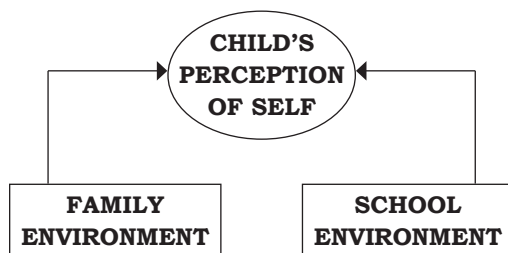
Family being the first school of child is considered to be the closest. Parents have strong influence on child, as family culture, parents' beliefs and available resources set the foundation of child's future development. Even the choice of school depends on family's reach as well as beliefs. School as formal institution, expands child's limited exposure and unlimited curiosity. School environment includes school culture, curriculum, teachers, peers and overall social set-up

of the school. These two agencies act as prime institutions to guide and nurture the child.

In economically disadvantaged families, choice of school cannot be asked as a right; rather access of school is a luxury. Even coming to school does not guarantee provisions for ability-based curriculum. So, struggling parents wish for nearest possible career, which can permit the child for a decent-earning future.

The possible reasons for submissive parenting are

* Financial limitations
* Lack of resources
* Lack of knowledge about funding agencies
* Lack of knowledge about available subject options and careers
* Prejudices
* Social barrier
* Lack of social networking
* Limited exposure of the parents.

Within this complex scenario, reading the minds of our children, picking up the right talent and protecting this talent with appropriate mentoring is a challenge. Another important factor in such cases is absence of well-placed identification and nurturance programmes to identify potentially able children. Education system of modern India borrows vision from democratic values of its constitution. It reflects the inherent democratic values and sanity. It aims to provide easy access of education services to all children between 6 to 14 years. It spreads umbrella of protection to children from disadvantaged section

of society but does not give much thought to potentially-gifted children. Although there are some programmes / schemes such as National Talent Search, National Level Olympiads, KVPY and INSPIRE available to identify academic talent among school children but average about these programmes are available to many children.

All these schemes are initiated at government level and target children above 13 years. By this age, most of the innocent, natural talent is already being lost. In most of these programmes, efforts are being made to reach to the exceptionally potential child, but, in-between, we lose so many promising potential children. These programmes demand more comprehensive planning and better execution to reach to every possible child. In developing countries like India, sharp discriminatory variables such as complex social profile, demographic diversity and economic disparity strongly effect children's understanding of knowledge. In such a pluralistic system, we cannot think of one uniform set of criteria of giftedness, as the very idea of giftedness must be culturally rooted.

At the same time, it demands to widen our vision from *Equality in Education to Equality and Excellence in Education.*

EDUCATION FOR ALL > EQUALITY IN EDUCATION > EQUALITY AND EXCELLENCE IN EDUCATION
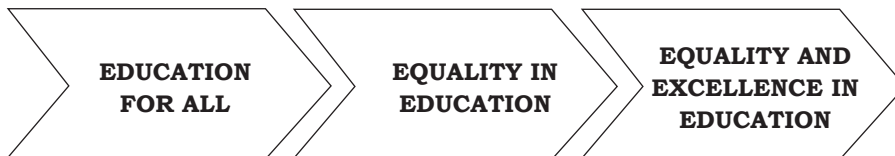
The education system in India aims for achieving *education for all* by implementing the Right to Education for children between 6-14 years. All possible efforts are being planned to make this dream a reality. Education for children with special needs is also an area of concern. Rehabilitation Council of India, a statutory body of Ministry of Social Justice and Empowerment, Govt. of India, runs certificate, diploma, degree and master's level courses in the field of special education and disability rehabilitation in collaboration with universities and NGOs to educate and rehabilitate children with disability. This is how an attempt is being made towards equality in education.

At this historic juncture, we must confront our belief in system of equality. A system which ignores the sentiments of gifted minority cannot claim to be fool proof. A system which adopts and implements a common policy for gifted education, ignoring socio- cultural and economic diversity cannot achieve equality. The notion of equality in education will remain just a theoretical layout unless it is well-placed across the range of abilities, liberal policies and willingness to work for betterment of every child. India's democratic ideology and spirit, that *every child is potentially gifted*, does not encourage special schools or pullout programmes for gifted children. We need flexible, multidimensional, in-built curriculum

which is differentiated in nature and allows every learner to stretch to the maximum.

At the same time, what we require is a thoughtful analysis of our beliefs in the very conception of giftedness and how to prepare ourselves to secure the rights of every gifted child. The vision of education for all should be defined very objectively so that gifted children don't feel isolated and discriminated in regular system. The very spirit of equality in education should be truly sensitive to the needs of gifted minority in schools. The presence of gifted children in our classes should be acknowledged and respected. Diversity of their abilities should be celebrated. We as adults, teachers, parents, policy makers, educationists and society, as a whole, must open our hearts and minds to embrace these children so that they don't become victims of our ideology clash.

Some major considerations

- Widening our vision on equality and excellence in education.
- Preparing safety net for potentially able children through proper identification.
- Sensitising and empowering regular teachers for the needs of gifted children.
- Decentralising existing policies and practices for better implementation.
- Mobilising parents and community.
- Preparing pool of mentors.
- Making education available to children from deprived segments of society.

I may conclude my paper with a hope that a sensitive and far sighted approach towards our fundamental conception of giftedness, will definitely benefit gifted population in schools, particularly, gifted disadvantaged who don't have access to resources.

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Gopabandhu's Innovations and Experimentation in Educational Practices

Sarat Kumar Rout*

Abstract

Utkalmani Gopabandhu Das was a firm believer of God or Jagannathanism and his sacrifices and suffering for the cause of Swaraj testified to the remarkable saga of his selfless service to people, society and nation. To liberate people from all types of social evils, i.e. ignorance, blind belief, starvation and all forms of exploitation he started a social revolution by establishing Satyabadi Vanavidyalaya at Sakhigopal, eleven miles from Puri, on 12th August 1909, with nineteen students on the roll and himself as the Secretary along with a group of young Oriya scholars namely Pandit Gopabandhu Das, Acharya Harihar Das, Pandit Nilakantha Dash, Kripasindhu Mishra and Godavarish Mishra. The entire staff, under the inspiring leadership of Pandit Gopabandhu, was devoted to reconstructing the nation through education.

Their philosophy of education was based on education for humanisation, open-air schooling, free and universal education, earning while learning, community-centred education, to achieve the objective of humanisation and completely developed personality by giving training to the mind and the body of the students. The school will be a beehive of active community-living and sustain co-operative effort. Thus he adopted an activity-centred curriculum for transaction of learning experiences. The teachers followed individualised instruction as per the needs of students which was very personal and cordial. A very healthy and intimate relationship developed between the teachers and the students in the Satyabadi School. The personal example of the teachers influenced the students for healthy personality development. The Satyabadi School provided an ideal training in self-discipline to the students. Students used to solve their problems in the "Boy's own court."

The Satyabadi school hostel was organised on a novel plan with the aim of humanising the learning process. The boarders developed many good qualities

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through its programmes like debates, musical evenings, indoor games, paper reading, community dinner and the cultural programme, etc. Thus Satyabadi school hostel supplied right conditions for the development of the whole personality of the boarders. It was a training ground for humanism, socialism, self-discipline, ideal student life and democratic management.

Introduction

Utkalmani Gopabandhu Das (1877-1928) was born in a small village Suando in the Sakhigopal Police Station in Puri District, Orissa on 9 October 1877. Gopabandhu passed his Matriculation examination in 1898 from the Puri Zila School and joined the Ravenshaw College to study Arts.

After passing B.A. examination he took his law degree in 1906 which ended a chapter of his life. He sacrified his life for the cause of his motherland 'Utkal' presently Odisha and became known as Utkalmani. He was a legend in the Indian culture. He served his people even at the cost of his family. Utkalmani Gopabandhu Das was a unique man in many respects. He was a poet, a social reformer, freedom fighter, legislator, educationist, founder of leading Oriya daily newspaper 'Samaj' and above all a selfless and self-effacing person ever dedicated to the cause of suffering humanity. He was a great creative writer. His poem and prose were superb and he had an inimitable style altogether. His lyrics, epics and poems contain through of patriotism, love of our heritage and dedication to divinity. Though Gopabandhu qualified himself the legal profession, his first love for education made him anxious to gain some experience of running an educational institution 'Satyabadi Vanavidyalaya'. He strongly believed that education is one and only one instrument for social change in wider scale. Thus, he approached education for emancipation of all types of unwanted social evils from the soil of Bharat Varse. According to Gopabandhu, "By education I do not mean the teaching in school, education is what was imparted in the ancient Indian institutions and centres of religion". Essentially, however, it was a revivalist educational philosophy, taking people back to vedic culture, the ideal of 'simple living and high thinking' and of turning each individual life into a continuous sacrifice in the service of the nation and of humanity as propounded in the Bhagawad Gita. His concept of personality was based on 'ideal man' or 'integrated personality' — *Sthitaprajna* of the Gita, one fully developed. Therefore, he advocated that the educational institutions should help the student to develop qualities such as self-control, universally non-violent, selfless social activity, fearlessness and a truth-centred life.

Gopabandhu's Unique Experiment in Education: Satyabadi Vanavidyalaya

Gopabandhu founded a Vihar, a garden-school at Sakhigopal eleven miles from Puri on 12 August 1909, with nineteen students on the roll and himself as the Secretary. He made a survey of the 'Bakul grove' and selected a small area, which was covered with a thick

overgrowth of the branches of Banyan, Peepal, Chhuriana and Bakul trees. These leafy trees protected the school from sunlight. This area was popularly known as Gupta Brundaban or 'Secret grove'. The school became known as the 'Satyabadi Vanavidyalaya' or the 'school in the grove' which had a great impact on the national life of Odisha. This Satyabadi system, in the words of Gandhiji was a 'serious experiment in open-air teaching'.

This Satyabadi Vanavidyalaya started with a band of highly educated scholars and selfless young men namely Pandit Gopabandhu Das, Acharya Harihar Das, Pandit Nilakantha Dash, Kripasindhu Mishra and Godavarish Mishra who distinguished themselves in later life as scholars and national leaders popularly known as Pancha-Sakha or five comrades contributed their best for the cause of national aspirations who worked on small pittances, forgetting lucrative jobs under the alien master which they could have got for the asking. The entire staff, under the inspiring leadership of Pandit Gopabandhu was devoted to reconstructing the nation through education.

Aim of Education

Humanisation not specialisation was the aim of education in the Satyabadi system. The realistic idealism of Gopabandhu aimed at "producing men, and not merely workmen". His aim was to so train the mind and the body of the students that they would have a completely developed personality and "the stamp of Satyabadi would make them acceptable wherever they went".

He developed a centre of multi-purpose education where student had been given training in craft and agriculture; social service, humanism, patriotism, games and sports, vocational training, debate competition, cultural activities etc. which had helped them to acquire lifelong education.

Curricular and Co-curricular Activities

Gopabandhu felt that life training will be the central thing in the curriculum. Book learning and intellectual equipment will be there, but just as an important aspect of that life training. The school will be a beehive of active community-living and sustain co-operative effort. Thus he wanted an activity-centred curriculum. The important components of Satyabadi Vanavidyalaya curriculum were

- **Community service:** To make education meaningful, Gopabandhu wanted to develop a sense of social welfare in the minds of the students. Therefore, he introduced community service as a compulsory subject in the Satyabadi school. Students went to different villages to help the poor and destitude and to render voluntary service to cholera and small pox patients. They use to provide relief to the people of flood and drought-affected area. They also carried the dead body of needy families to the burial ground. In community service programme, the teachers of the school helped the public.
- **Vocational education:** Gopabandhu considered that vocational education should be made compulsory in a

developing country like India. It will enable the students to find self-employment after completion of their education. With this aim in view, he introduced crafts like carpentry, spinning and weaving, agriculture, coir and cane work, etc. in the Satyabadi school. For agriculture, twenty-five acres of land was allotted. Spinning was made compulsory for all students where as weaving was meant for some selected students. Sixteen looms and hundred charakhas were used for weaving and spinning purpose.

- **Music:** To discover the talent, organising skill and resourcefulness that lie dormant in the students, music was introduced in the Satyabadi school curriculum. To make the students efficient in that art of music, a blind singer Shri Gayakaratna Apparnna Panda was appointed as the music teacher.

- **Moral education:** Pandit Gopabandhu introduced moral education in the Satyabadi school curriculum. In prayer meetings, which were conducted daily, the teachers used to explain the importance of sound moral character. Attempts were made to humanise the learning process through moral education. Lives and works of great men were narrated to the students to enable them to follow their way of lives. This moral teaching had left a very great impact on the mind of the students.

For harmonious development of body and mind of the students, Satyabadi system emphasised on following co-curricular activities:

- **Debates:** Gopabandhu organised debating societies to develop oratorical abilities of the students. The society sat on every saturday. Meeting was compulsory for every student of Satyabadi school. In the debating society, discussions of different problems were held. Eminent scholars were occasionally visiting the society to address the students. Gopabandhu also used to participate in their meetings.

- **Literary Activities:** A school magazine was published in the Satyabadi school in which valuable articles of the students and the teachers were published to develop the writing abilities of the students. A class magazine in manuscript was also published. Occasional 'Kabi Sammilanies' or 'Poets' gatherings' were organised by the school where students and teachers participate. It was organised with the aim to discover the innate potentialities of the students and to produce men of calibre.

- **Games and Sports:** Gopabandhu organised Akhara's or rural gymnasium to make the student physically efficient. A teacher named Basudev Mohapatra was incharge of physical education. Activities like country games, use of 'Lathis' and 'swords' athletics and four mile race in groups, etc. were organised. Teachers of Satyabadi school also used to participate in these community exercises. The students used to take these exercises everyday after school hours. Sometimes morning hours were utilised for the purpose.

- **Excursion:** To sense new thing, to have new experiences to meet new people, to know the past glory of one's own country, man wants wonder. School excursion gives these opportunities to our young pupils. Therefore, Gopabandhu thought excursion as an indispensable part of education. Students of Satyabadi school used to walk the distance on foot to sea sides to enrich their outlook and to supplement their classroom learning. Teachers also participate in these activities. The movement of the student on foot looked like grand procession. The villagers used to entertain the students and also participate in this padayatra. An advanced party was arranged to make necessary arrangements. This Satyabadi system of excursion was a 'living education' which could change the attitude and interest of the students and which gave them instructions in different branches of education.

Method of Teaching

Satyabadi School was a residential institution, where all students and teachers lived together. As a result the school life was interesting, pleasant and enjoyable both for the teachers and the taught. The headmaster was the headman of the institution and used his knowledge and influence to make the teachers useful and competent. The headmaster and teachers of the school sat together in a big hall to carry on mutual discussion about school and students' problems. Teachers used to devote ten to fifteen minutes time in the beginning of a period to discuss the courses covered in the previous class. They also corrected the written work of the students with great care. Before the completion of the period the teacher asked some 'application test' questions. The headmaster tried to maintain uniformity in the method of instruction.

Teachers regularly visit the hostel and help the students in their study. Even the headmaster work together with the teachers in supervising the hostel and helping the students.

Student-teacher Relationship

A very healthy and intimate relationship developed between the teachers and the students in the Satyabadi school. Both the teachers and the students used to organize debate competitions and stage drama, celebrate cultural function and publish magazine. The teachers were always ready to help the students. The students also acted as volunteers in the annual celebration of Utkal Sammilani. During the Car festival at Puri, the students acted as ideal volunteers under the guidance of their teacher. The personal example of the teachers influenced the students for healthy personality development.

Discipline

The Satyabadi school provided an ideal training in self-discipline to the students. Students used to solve their problems in the 'Boy's own court.' The teachers and the monitor looked to the discipline of the school. In the school hostel, the monitor used to hold secret meeting to discuss the problems of discipline in the hostel. Serious problems were controlled

by the superintendent or by the headmaster.

The School Hostel

The Satyabadi school hostel was organised on a novel plan with the aim of humanising the learning process. The boarders developed many good qualities through its programmes like debates, musical evenings, indoor games, paper reading, community dinner and the cultural programme, etc.

The life at Satyabadi school hostel began with a prayer which made the students spiritual. Students were busy from morning till they go to their beds with the continuous timetable like the study hour, dining time, the school periods, the games and sports, discussion and co-curricular activities, etc.

The school hostel was managed on democratic principles. Students were allowed to run their own mess. They used to settle their problems in the 'Boy's own court'. *Gudakhu*, *bhanga*, *bidi* and 'betel' were strictly prohibited. Students found guilty of sex crime were totally isolated from the boarders and lived in a mud-hut constructed for the purpose. During their period of isolation, lessons in Brahmacharya (observation of celebracy) was given to them. Wicked students were appointed as monitor. As a result they were able to modify their own behaviour.

Attempts were made to eradicate all the social evils through the hostel programme. Community dinner was one of the important features of hostel life, where students belonging to all castes eat together and wash their plates. In community dinner they followed the ideal of Jagannath temple at Puri where Mahaprasad could be taken together by the people irrespective of caste. It was a revolt against the then caste-ridden society.

Thus, Satyabadi school hostel supplied right conditions for the development of the whole personality of the boarders. It was a training ground for humanism, socialism, self-discipline, ideal student life and democratic management.

Gopabadhu and his colleagues converted the Satyabadi school into a national school like the 'Gujarat Vidyapitha' and 'Kasi Vidyapitha'. The idea of universal education league is the most wonderful creation of Pandit Gopabandhu in the field of education. His aim was to cover the whole country by his ideal system of education which will provide so many selfless leaders. The products of this system can grow a new society after a few years. But his ideals remain unfulfilled because of his pre-matured death. On Satyabadi system of education Gandhiji wrote in the column of 'Young India' 1921 in the following way:"Pandit Gopabandhu has an open-air school at Sakhigopal, twelve miles on this side of Puri. It is a grove school. It is worthy of visit. I passed a most delightful day in the midst of boys and their teachers. It is a serious experiment in open-air teaching".

Gopabandhu's Contribution to Modern Education

Let us have a brief discussion about Gopabandhu's contribution to modern education in India.

1. Social modernisation through education

Gopabandhu spearheaded a movement for social modernisation through education by establishing the Satyabadi Bana Vidyalaya which possibly became the first ever experiment in our country for conducting open-air school. A celebrated educationist of that time Sir Asutosh Mookerjee understood its significance for the nation when he wrote "The promoters of this school have set a laudable example to the country...one cannot but wish that every village in Bengal should possess a genuine place of instruction like the Satyabadi School". The thoughtful observation highlighted the nationalistic approach of Gopabandhu whose ideas are of immense importance for our age. The dearth of literature and research on Gopabandhu's worldview is a sad reflection on our intellectual tradition which has failed to adequately appreciate and make people aware of the genius of Utkalmani as a fine exponent and practitioner of a movement for modernisation of our social tradition through education.

2. Education for all

Gopabandhu committment to national development through education strongly opposed the then caste-based organisations for the spread of education. In the address cited above he painfully observed that Brahmana Samiti, Karana Samiti, Kayastha Samiti, etc., were engaged in extending educational facilities to the members of their respective castes. His observations "these associations are communal, not universal", *Ehi Sabu Samiti Sampradayika—Sarvajanin Nuhen,* brought out the limited scope of caste associations and therefore advocated and pursued the wider vision free from all constrictions. He specifically emphasised on spread of education among all castes and communities and the establishment of Satyabadi School was a splendid example of his broad-minded approach to education. Today we talk of the division of society in terms "haves' and of have-nots". In 1912, Gopabandhu talked about division of society in terms of literates and illiterates. The cause of the dichotomy was obviously due to lack of education among vast masses of ordinary men and women. He therefore expressed the opinion that efforts should have been made much earlier to dispel ignorance among people. He forcefully argued for a campaign in all villages and among people of all castes and creed to make them understand about the value and utility of education for them.

3. Equal access of educational facilities

One of the distinguishing features of the movement for spread of education in twenty first century has been to make education accessible for those who are in the margins of society. Utkalmani Gopabnadhu Das had nurtured that vision at least nine decades back and much before Mahatma Gandhi reached the shores of India from South Africa. He carefully analysed the report concerning spread of education in India and learnt with a heavy heart that for every five villages of India there existed only one school.

Referring to the Puri district he said with lot of sadness that in 10, 25 and even 50 villages one hardly heard of the pronouncement of the alphabets. He informed that the first syllable represented by AA and AAA was never uttered in those villages. Continuing to reflect on the deepening ignorance of people in remote villages he told that the dim ray of education had not reached there. He entertained the doubt that in hundreds of villages of Odisha people even would not be aware of the basic fact that they were being ruled by the British authorities.

Gopabandhu in his speech at the Puri District Education Conference in 1912 had referred to the Education Code of Japan announced by the Emperor of that country. He said that the code outlined the vision of the modern Japan in which not a single subject would remain unlettered and deprived of education. Stating that Japan laid the foundation of its national development the day it announced and implemented the code, he asked with a heavy heart "When would our so called benevolent Government announce such a code for us?" That stirring question represented the agitation of his mind and his restlessness for liberating the people of India from the thraldom of ignorance which paralysed their mental faculties and crushed their spirit even as they struggled to physically survive. It also meant that had Gopabandhu's desire to have a education code been implemented, Odisha and indeed the whole of India would have had the indices of development no less significant than that of Japan.

4.   *Promoted vocational education*

He favoured for broadening the scope of the campaign to include in it not only book learning but also vocational education. For he believed that excessive reading of books puts heavy burden on the brain and therefore suggested that public instruction should give equal emphasis on the use of hand, feet, ears and eyes to make mind steady, stable and focused. In 1921, Mahatma Gandhi wrote a book for school children called Bal Pothi in which he wrote that household work is education. Elaborating it further, he explained that both boys and girls by doing household work could exercise their hand, feet, eyes, muscles and brain and grow up as healthy and balanced human beings. The comprehensive understanding of education by Gopabandhu Das and Mahatma Gandhi and the stress they laid on both the physical, intellectual and spiritual development of the student need to be followed by the present generation which is plagued by the decline of values and crisis of standards of behaviour. Keeping in mind the special concerns of the people belonging to the labour class he specifically wanted that they would be taught about the new methods for using their skills in local industries. In this connection, the Government of India is doing concretising effort since last one decade to integrate newer technologies to increase the productivity of traditional work. It is almost 10 decades ago Gopabandhu had stressed for spread of modern science and technologies for social upliftment of large mass of half-skilled and unskilled population in India.

5. *Emphasis on total literacy mission*

Above all he wanted that education, be made the principal instrument for building our national character. The all encompassing approach and the nobility of the challenging vision of Gopabandhu contained the seeds of total literacy campaign which took the form of a mighty tree in Ernakulam district of Kerala in the 1980s and gradually branched out to different parts of India including Odisha and emerged as a giant movement for spreading literacy in the country. The current focus at the national level on *Sarva Siksha Abhiyan* embodies the vision of Gopabandhu Das which covered all communities and which emphasised on their inherent right to be the recipients of knowledge and wisdom. The ideal of fraternity enshrined in our Constitution can only be realised in full measure only if the objectives set by Gopabandhu to educate every citizen of the country are realised in practice.

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The Secondary School Biological Science Curriculum of Odisha A Critical Study

Gitanjali Mohanty*

Abstract

The study spreading over 31 secondary schools, and involving 31 biological science teachers, 143 students (60 boys and 83 girls) and 10 experts and educationists, is an attempt to discover and reflect facts about the biological science curriculum at the secondary level in the State of Odisha and improve the effectiveness. The study revealed many shortfalls like absence of laboratory in almost all the schools, textbooks with many deficiencies, want of appropriate and adequate teaching aids, non-performance of co-scholastic activities, absence of access to community resources, lack of initiative to visit places of biological and scientific importance in order to connect knowledge to life outside the school and to make learning more practical rather than textbook-centric. The educationists interviewed voiced concern regarding the existing process of evaluation needs improvement as felt by eminent educationists. The curriculum transactions in the schools did not indicate the input of the intended curriculum to be operationalised in real sense of the term. The operational aspect of curriculum needs be emphasized in its right perspective so as to provide benefit to learners.

Rationale

Effective science education is the need of the day. Human thirst to acquire more knowledge for better life has been encouraging research in various branches of science and the results, discoveries and inventions in the twentieth century have been eye-openers for the humanity. Science, particularly biological science, assumes the high importance.

In India, there have been persistent efforts in this direction from the later part of the twentieth century. Beginning

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from the Kothari Commission 1964-66, every effort has been taken to develop and upgrade science curricula. In the National Policy on Education (NPE) 1986, the *National Curriculum Framework (NCF)* for school Education-2000 and the *NCF-2005* all have emphasised the need to promote science education.

Biological science at the secondary school level occupies a significant place along with physical science. It requires a differential treatment so as to create genuine curiosity in learners towards the living world. Research findings show that the secondary schools in Odisha do not possess adequate provisions for effective transaction of biological science curriculum.

Effective transaction of biological science curriculum bears a great relevance at the present juncture. The curricular issues require a fresh look to help the students to cope up with the challenges arising out of biological science so as to make them fit for higher studies in the field. The present study intends to explore the provisions in an insight biological science curriculum for the high schools affiliated to the Board of Secondary Education, Odisha.

Objectives of the Study

The objectives of study were to

1. study the objectives of biological science curriculum at secondary level;
2. analyse the intended biological science curriculum on the basis of the syllabus prescribed for H.S.C. Examination by of Board of Secondary Education (Odisha);
3. find out the deficiencies of incorporated biological science concepts in the textbooks prescribed by Board of Secondary Education, Orissa; and
4. examine the operational biological science curriculum of Board of Secondary Education, Odisha, with reference to
   – teacher and their qualifications
   – laboratory and other facilities
   – biological science-related concepts
   – methods adopted for teaching biological science
   – co-scholastic activities related to biological science
   – performance of students.

Delimitations of the Study

- The study was conducted only in Odia medium schools affiliated to Board of Secondary Education, Odisha.
- The study was limited to biological science courses' study of Classes IX and X prescribed by Board of Secondary Education, Orissa for High School Certificate Examination.
- The study was limited to the district of Khordha only which is considered as one of the most educationally advanced district in the state of Odisha.

Plan and Procedure of the Study

Sample

The data were collected on the basis of the technique of stratified random sampling. The sample for the study was drawn from secondary schools of Odisha, based on the level of achievement

in the annual High School Certificate Examination, conducted by the Board of Secondary Education, Odisha. Eleven high level schools (securing more than 80 per cent result), ten average level schools (having 40-60 per cent result) and ten low level schools (with result below 30 per cent) were selected. The sample consisted of both Government and Private Schools, was drawn from both urban and rural areas and included boys, girls and co-educational schools.

Tool

An inquiry form for heads of the sample schools, and a questionnaire were used as a tool for collecting both qualitative and quantitative information from biological science teachers. In addition, an opinionnaire for the experts, interview schedule for the students and an observation schedule for classroom transaction were developed for eliciting data.

Administration of Tools

The biological science teachers were contacted personally to obtain first-hand information through questionnaire. Observation of bio-science-related activities were done in the sample schools by using the observation schedule. The students were interviewed and their responses noted. The experts were requested to note their considered views in the questionnaire.

Organisation of Workshop

A workshop was conducted by including ten curricular experts and biological science teachers. The participants discussed the issues after being divided into four groups and assigned to make group discussion on the topics as follows:

Group 1: Compared the objectives of biological science curriculum for secondary schools prescribed by the Board of Secondary Education, Odisha with that prescribed by the Central Board of Secondary Education, New Delhi

Group 2: Analysed the content of the syllabus and the textbooks prescribed by Board of Secondary Education, Odisha.

Group 3: Difficulties of biological science concepts provided in the textbook prescribed by Board of Secondary Education, Odisha.

Group 4: Comparative analysis of question papers developed by Board of Secondary Education, Odisha and Central Board of Secondary Education, New Delhi.

After the analysis was done, the focus group discussion was held and inferences were drawn.

Major Findings

Objectives of the Curriculum

The nine objectives of the curriculum laid down by Board of Secondary Education, Odisha were appropriate.

Syllabus

- There is provision for practical/ project work in Class IX in Science, but there is no specification of activities/ experiments.
- There is provision of internal evaluation in Class IX, but no specific direction has been provided due to which evaluation is done in an unsystematic way.

- There is no provision for practical/ project work in Class X in Science.

Teacher

- The study revealed untrained biological science teachers in the sample schools.
- Majority of teachers had not got an opportunity to participate in in-service training. Only 48.38 per cent sample teachers attended seminars, 29 per cent refresher course, 32.25 per cent attended a workshop, 6.45 per cent conferences, 12.9 per cent lecture programmes and 3.22 per cent summer institutes.

Textbooks

- Eighty per cent of the sample teachers used textbooks on different occasions like reference, classroom preparation, discussion of exercises and asking questions in class, preparation of text items, etc.
- Seventy-seven per cent of the sample teachers felt the textbook is adequate in translating the objectives of teaching biological science. They felt that the topics and sub topics are arranged logically.
- Eighty-seven per cent of the teachers perceived that language of the textbook is appropriate in regard its correctness (Spelling, grammar, sentence structure).
- There was proper and sequential internal arrangement of sub-topics within a topic.
- The significant information was given in the boxes so as to draw the attention of the students.
- All sample teachers viewed that there was no gender bias in illustrating the examples and all the examples in the text were relevant to the text.
- There were varieties in the items given in the exercises.
- Ninety per cent of the sample teachers felt that the exercises catered to the need of most of the learners in the class.
- The life sketches of biologists like Mendel, Darwin, Linneous, Pranakrusna Parija, Comillo Golgi, Heekel and others need to find place in the textbooks.
- Thirty-eight per cent students felt difficulty in understanding the language of the textbooks.
- The topics in the textbooks need to be presented in a simpler way with the help of activities.
- Majority (80 per cent) students felt difficulty in understanding the chapter *Diversity in the Living World* in Class IX and 68 per cent of the students felt difficulty in understanding the chapter "*Heredity*" in Class X.
- The illustrations were not accurate and led to create confusion among the students to understand the relevant concepts.
- The pictures in the textbooks were not coloured and clear for better conceptual clarity.
- The textbooks were deficient in glossary of technical terms, list of practical activities and indices.

Infrastructural Facilities

- Majority (81 per cent) of the sample schools were running without a science laboratory even with out science store.

- Teaching aids though available were not adequate.
- Sixty-five per cent sample schools had botanical garden in name sake.
- None of the sample schools had biological science museum.

Curriculum Transaction

- Majority of teachers used coloured chalk, chart, map and model while teaching biological science.
- The sophisticated teaching aids like TV, slides, films and projector etc. were not available during curriculum transaction.
- The teachers encouraged the students to collect specimens for teaching.
- The teachers used to assign project work to the students.
- Improvisation of apparatus was very good (72.72 per cent) in high level schools but was poor in average and low level schools.
- Among community resources garden, river, ponds were utilised the most but factory, water supply centre, hills etc were used in negligible percentage and teachers had not shown any interest for utilisation of community resources even if it was available to make the learning more meaningful.
- Observation, discussion, demonstration, activity, project, Inductive-deductive, inquiry and problem-solving methods need to be used for better conceptual clarity in learners.
- Sixty-five per cent sample teachers expressed that they used discussion method most of the times and other methods were used at times. Sixty-three per cent sample teachers used lecture method and 36.84 per cent discussion method as observed in bioscience classes.
- Though there was pupils' participation during teaching learning process in 68.42 per cent sample schools, it was adequate only in 36.84 per cent schools.
- The skill of questioning was found to be used in 73.68 per cent schools, but it was adequate only in 36.84 per cent schools.
- The skill of explaining was done by 57.89 per cent sample teachers relevantly but it was adequate only in 42.11 per cent cases.

Co-scholastic Activities

- Fifty-eight per cent sample teachers used to arrange field visit.
- Almost 58 per cent of schools had organised science exhibition, 66 percent sample students participated in the science exhibition organised by other schools.
- Only 19.35 per cent schools had science club for the name sake. The clubs were mostly disorganised.
- Publication of biological science magazine was done in only 10.33 per cent schools and extension lecture programmes were organised with low frequency in 22.58 per cent sample schools.
- Few teachers (42 per cent) expressed their inability to arrange field visit.

Evaluation

- The teachers used to diagnose learning defects and take remedial measure by arranging coaching

classes, special classes and making the lesson interesting.

- Home assignment was given and checked regularly in most of the schools.
- There is no scope for evaluating psychomotor skill.

Recommendations

After a detailed study of The Secondary School Biological Science Curriculum of Orissa the following measures are recommended for its improvement.

Objectives of Curriculum

- The Secondary School Biological Science curriculum of Orissa is examination oriented and mainly based on gaining knowledge and facts rather than developing scientific thinking, appreciation, Interest, problem-solving skill and experimentation. It needs to be redesigned with due weightage to all aspects including importance to practical experiences.
- The curriculum should discourage rote method and be more learning centered.
- The curriculum should be framed according to the real life experiences of the students, with alternative topics for urban and rural areas. It should deal with local population and culture, local flora and fauna, local crops, pests, local source of water, local soil and local environment at large.

Textbooks

- Review of the existing textbooks for Class IX and Class X is essential by experienced working teachers and eminent experts of biological science.
- The objectives should preface each unit in Science and Technology text-book along with a word to teacher regarding method of teaching, co-scholastic activities and practical suggestions for improvising the relevant bio-science apparatus.
- The chapters "*Diversity in Living World*" and "*Organisation of Living World*", of Class IX and "*Heredity*" and "*Reproduction*" of Class X should be made attractive and well explained by rewriting, keeping the mental level of the students in view.
- Bigger, simpler, well labeled and self explanatory multi coloured clear diagrams should be provided in the textbook.
- The textual material should possess clarity and should be organised in a systematic manner.
- A summary of the subject matter should be given at the end of each unit. Glossary of important scientific terms should be appended at the end of the book.
- The supplementary activities for the topics must be suggested at the end of the unit.
- Life sketches of Biologists like Linnaeus, Camillo, Golgi, Robert Hook, Lamark, Hill, Mendel, Darwin, Edward Jenner and their contribution should be briefly placed in the textbook to set role model in front of the learners.
- The text of the book needs to be reviewed for use of simpler and colloquial words as far as possible.
- The textbooks should be attractive with hard cover binding.

Teacher Qualification

- Keeping the present Biological Science Curriculum in view, the minimum qualification of the secondary school biological science teacher should be post graduation in Botany /Zoology / Life Science with a degree in Education.
- The existing trained graduate biological science teachers should be reoriented with a comprehensive refresher course followed by a test.
- The existing untrained Science graduate teachers should be provided in-service teacher training at the earliest. Further recruitment of untrained teacher in any sector to be banned.

Facilities

- A biological science laboratory cum bioscience room is the basic requirement of the high school. In bioscience room charts, diagrams, graphs are to be displayed. Laboratory equipments and chemicals are to be stored as per requirement. There should be an aquarium and terrarium in each school.
- Till laboratories are established in the schools, alternative arrangements like high school students doing experiments in the nearest college laboratory and interacting with college students and teachers may be explored.
- All the schools should be furnished with charts, models, microscope, projector, tape recorder, computer, films and television, etc.
- Every school must have a garden with plants, involving the bioscience syllabus. The students should be encouraged to take interest in maintenance of garden to acquire practical knowledge of plants and gardening.
- Every school should endeavour to maintain a bioscience museum displaying at least objects, specimens available in the surroundings and students should be encouraged to collect materials/specimens of scientific interest. The community members should be associated in maintenance and growth of the museum.
- Every school must have a library with books supplementary to the textbooks with arrangement of sitting and reading by the students. Periodical magazines on biological science should be available in the library.

Techniques of Teaching

- There should be improvement in techniques of teaching over and above the conventional method of classroom lecture. The process of teaching should be developed to suit the modern curriculum. Experimentation, demonstration, project work, field visits and improvisation of apparatus should be given due weightage and adequate time schedule in the school timetable.
- The teachers should inspire and encourage the pupils to read, to listen and to speak often to attain higher levels of cognitive and affective domain objectives.

Co-scholastic Activities

- The existing arrangement of holding annual state level and circle level science exhibition/fair should be

extended to school level. There should be a science club in every school.

- Every school should organise seminar or lecture programme on Biological science by inviting eminent persons in bioscience, community doctor, agriculturalist, nurse, veterinary doctor, pharmacist, ICDS personnel, etc., at least once in three months.

- Students should be encouraged to draw diagram, write article, story and poem on biological science to be displayed on the wall magazine to develop creativity and competitive spirit.

Professional Growth

- In-service teacher training should be made mandatory and compulsory for all bioscience teachers.

- There should be a vigorous follow-up programme with a view to helping the teacher to continuously apply the new knowledge in the class room.

- In order to keep the teachers aware about new developments, concepts and problems in their areas they should be provided opportunity to attend/participate in seminar, workshop, conference, refresher course, summer institute, etc.

Evaluation

- The items for evaluation should be framed by giving equal weightage to understanding, knowledge, application and skill objectives.

- Ten per cent of total marks should be earmarked for practical aspects to be internally evaluated.

- Internal assessment to be conducted with right spirit.

Contribution to Field of Education

The findings of this study may be useful to;

- Education Department and Director, Secondary Education, Government of Odisha in the matters of provision of infrastructural facilities and augmenting in-service training of teachers.

- The Board of Secondary Education, Odisha to take care to improve the textbook and syllabus.

- TE and SCERT in matters of preparation of quality textbooks, teacher's guidebooks and augmentation of in-service teacher training.

- Supervising authorities in transaction of scholastic and co-scholastic activities.

- Headmasters/Headmistresses and teachers in all-round improvement in curriculum transaction.

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Science and Ethics: Implications for Teacher Education

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Abstract

The discipline of Science has generally been viewed as absolute and value-free. 20th century has seen sciences endowed with materialist and technological bent of researches. Technology as a fruit of it seems to have abstracted itself completely from the society at large. This has been a direct result of the positivist character of science that completely neglects the naturalistic order. Scientists and technologists have never been concerned with the ethical or moral questions that arise in the society. But it has now been agreed rather proved that science and technology without ethics cannot be liberating in a true sense and since then there has been a constant urge to include this component in science education. One suggested way of integrating the ethical component into science is the integration of socio-scientific issues** in the science curriculum with a sound grounding in ethics. The present paper attempts to elaborate upon two such contentious issues: genetically modified crops and animal experimentation, along with the socio-ethical debates centered on them. The purpose of the present paper is to highlight the areas of confluence between science and ethics, portray their significance in science education as well as to show the need for pedagogical improvement and innovation with regard to dealing with these issues in the classroom.

Introduction

Sciences have always enjoyed an elite status in our society, owing to their liberating potential, in terms of getting our society rid of the superstitions, dogmatic beliefs, certain theological and theosophical firmaments, in a way having a major contribution in our evolution. Although this status has been acquired after very many conflicts

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** Socio-scientific issues (SSI) refer to the issues at the interface of science, technology, and society, such as global warming, amniocentesis, euthanasia, etc., along with the consideration of ethical issues and construction of moral judgments about scientific topics via social interaction and discourse (Zeidler, *et al*, 2004) . They are controversial in the sense that they are being understood and viewed differently by different people, and thus share multiple perspectives.

and criticisms, which was for the first time triggered when Copernican theory of Heliocentrism replaced the Geocentric theory propounded by the church. This marked the beginning of the scientific revolution that was one of the contributing factors in eradicating the idiosyncrasy in society and its people.

The advances in science and technology have always been regarded as progressive steps toward the development of society. However this notion has now been getting dialectically viewed owing to recent science and technology disasters, not requiring a great mention is Japan's Nuclear Reactor peril and simultaneous hazardous radiation effect on the masses, which as is a well known fact, will be carried over to the generations to come. All of this and many more such incidents, compel us to think whether the trajectory of development or more precisely the researches in science and technology are heading in the right direction? Do we require taking a detour and placing the humane component at the centre of each and every scientific research?

A scientist is considered as good and his/her contribution or discovery sane only when he/she is also philosophizing on the chosen area of research. Beneficial researches are those which do not pose any harm to the society, as an immediate outcome and even in the long run. This requires sound decision making on the part of scientists and researchers, who are actively involved in the process. The people practicing science as well as part of some scientific researches is the only ones who are well informed about the pros and cons of their respective researches and their overall impact on the society. Hence, their role becomes pertinent in deciding whether a particular research should be taken up or not. Here comes the question of **"ethics"**, which can be defined as the inherent value-process, thought structure, including norms and conduct of a society.

Ethics in Science

Ethics and science have usually been regarded as dichotomous and disjoint by many philosophers and scientists. The arguments given in favour of this is the difference in the nature of the two disciplines, of which Ethics delves into the analysis of moral values, justification of certain norms in the society and universal rules of conduct such as honesty, integrity, benevolence, cooperation, etc., whereas sciences historically have been treated as objective and positivist, and have generally adopted observation and experimentation as the chief modes of enquiry. However, now that we know all those principles and values dictated by ethics play pertinent role in determining the authenticity of a particular research. A scientist also needs to observe these ethical values such as doing the experiment with honesty i.e., correctly recording the data, does not plagiarize it, cooperate with fellow researchers and scientists, should not hide the results of his /her experiment, etc.

The first to exhibit the ethics of science was the great American sociologist Robert K. Merton (1973), who founded the scientific sociology of science. He stated in a landmark paper on science and the social order, published in 1938, that science has an

ethos that consists of intellectual honesty, integrity, epistemic communism, organised skepticism, disinterestedness, impersonality, and universality (Richards, 1983).

Ethical Issues in Biological Sciences

The knowledge and application of the ethical principles become even more important whenever there is a question about one's survival, choices between alternative lines of treatment, whether to do experiments on animals and humans, decision-making regarding patenting of human genes and human genome project, using cloning vectors and producing recombinant organisms, etc. All the aforementioned techniques make use of some scientific principles to give rise to a new technology that can be used for the betterment as well as detriment of human race and thus require appropriate decision making. Since there could be many choices available vis-à-vis utilization of a particular technology, hence they come under the ambit of ethical issues and should thus follow ethical model of enquiry. Some of the philosophers of Science even regard sciences as pure, unintentional and means driven but technology as determined by societal demands and hence ends driven. Here it is important to understand the relationship between science and technology that are often used synonymously in scientific literature. Mario Bunge makes the distinction clear by stating it as

"Science is always innocent, whereas technology can be guilty. The reason for this difference is that basic science is the search for truths about reality, whereas technology is the search for efficiency through the design of artifacts. Thus, whereas for science truth is both means and goal, it is only a means for technology (Kurtz, 2007)."

Bioethics has emerged out to be as a separate branch dealing with issues such as donation of organs, tissues and cells, including gametes, research in embryology, participation of humans in experimental research projects and treatments, diagnostic and therapeutic use of genetics, introduction of genetically modified organisms (GMOs) in agriculture, etc (UNESCO, 2001).

Ethical Decision Making

Such contentious issues can only be solved by way of ethical enquiry, so as to arrive at favorable solutions. There are mainly two schools of thought with regard to the application and method of ethics – the first and most prevalent method of ethical enquiry is **"Deontological"** which means laying more stress over the rules and intentions behind a particular action without bothering about the result or outcome of the act itself. The second school of thought is the **"Utilitarian"** that gives more importance to the consequence of a particular act and more so with the principle of beneficence that is maximum benefit to the majority of people (Minkoff and Baker, 2004).

Our concern here is to apply these methods of ethical enquiry to address and solve the controversial issues related to science and technology. This has led to the emergence of a separate branch termed as *applied ethics (Frey and Wellman, 2003)* , that goes beyond

theory and step into real world ethical practice, such as questions of whether or not sex-determination is correct, which is just one case where ethics plays a pivotal role or has the privilege of application.

These methods of ethical enquiry help in making value judgments and sound decisions regarding many science and technology issues having societal impact (collectively referred to as Socio-Scientific Issues). Thus, a training with respect to the ethical decision making needs to be given to the people practicing sciences, whether they be scientists, researchers, science teachers or students. At the level of school and college education this would mean ethics to be ingrained in the science curriculum not to say it in the form of a separate subject or course rather intertwined with the regular teaching learning, so that they form an implicit part of science subject content knowledge.

In order to support the above laid argument about the interlink ages between science and ethics the present paper has the following as the *primary objectives*:

1. To study and understand the relationship between science and ethics, with special reference to two case studies.
2. To study the researches in the area of "ethics in science and education" from the period 2000-2010.

In order to cater to the first objective of this study, two ethical issues are being chosen viz., Genetically Modified (GM) Crops and Animal Experimentation. These issues come under the ambit of socio-scientific issues (SSI) and have generated a volley of arguments both within the scientific community as well as outside it. The idea behind bringing these issues here is to articulate and congregate the conflicting arguments and address the ethical dilemma which arises after going through them.

About GM

For understanding the ethical issues and major debates around GM Crops, it is important to understand the terminologies. GM crops, as the name indicates are the genetically modified crops, involving the insertion, deletion or silencing of genes to give rise to a new organism with modified characteristics. These modified traits in plants can include pest resistance, enhanced water retention capacity, better yield, increased shelf-life, added nutrient value, etc.

Major Debates Centered Around GM Crops

Arguments in Favour of GM Crops

The major objective behind the introduction of GM Technology in India particularly, has been multifold, including the concerns of hunger, poverty, and economic trade off. These have been discussed in the following manner:

Issue of Hunger

On the Global Hunger Index 2008 (Grebmer et al. 2008) India ranks only slightly above Bangladesh, and below several Sub-Saharan African states, such as Cameroon, Kenya, Nigeria and Sudan. The conventional agricultural methods of crop production do not offer much promise in eradicating the

problem. The Government of India (GoI) strongly feels that for India, Agbiotechnology is a powerful enabling technology that can revolutionise agriculture (DBT 2007).

Issue of Poverty

GM technology offers an incentive to the poor farmers, by increasing the crop yield, offering climate resilience, as well as profit making, thus annihilate their agony and dependence on infrequent climate changes and extra funds to raise the crop. The cost of production also reduces on account of lesser need for pesticides in GM crops.

The numbers of applications of pesticides in non-Bt. crop were 19.8 as against 6.6 in Bt. cotton. The cost of pesticide use per hectare came to $ 726 and $ 136 for non-Bt and Bt. cotton, respectively.[1]

Issue of Acreage and habitat generation

It is now a well known fact that GM crops require lesser land area as compared to the non-GM crops, which saves the rest of the area for forestry and habitat for the wilderly. Norman Bortang, associated with the Green Revolution, has also postulated that the new technology — biotechnology — should be allowed to advance in the welfare of human race so that the vast stretches of areas can be reverted to forest and wildlife habitats.[2]

Added Nutrient Value and Healthier Foods

GM food is said to have equivalent nutritional value as the conventional non-GM food, although crops with added nutrient value can be produced, such as GM- Golden Rice having additional Vitamin A.[2]

Besides, due to lesser usage and application of pesticides, the foods produced are healthier.

Advantage of Trait Selection

The principles of Biotechnology involved in the creation of GM crops help in the selective transmission of only selected traits in a controlled and sophisticated[3] way that is not a possibility with conventional methods.

Arguments against GM Crops

Recent researches with regard to GM crops, their production, processing as well as field trials have raised serious doubts and concerns in the minds of scientists, environmentalists, and the major stake-holders i.e., consumers.

Food Quality and Nutrition

Genetic modification of plants may result in alteration in nutritional profile of the plant product which can also result in altering the nutritional status of the consumer. This can result in nutrient imbalance in the body as well as impact the overall dietary intake (FAO Corporate document repository, 2000). Currently developed plants with improved nutritive value include GM rice with enriched vitamin A and GM soyabean and rapeseed with modified fatty acid.

Food Safety

This has been the foremost area of concern in the marketing and consumption of GM Crops, and raises serious health related issues. A variant of this concern is that the inserted gene,

or even the insertion process itself, may re-engineer the biology of the plant and generate poisons or toxins.[4] The case of GM potatoes experiencing *Galanthus nivalis* lectin gene for insecticidal properties is an example of the potential of GM foods to cause toxicity. For example, in a group of rats fed with GM potato caused damage to their immune systems and stunted growth and the experiment had generated considerable controversy (ICMR, 2004).

Gene Pollution and loss of Biodiversity

The contamination of non-GM varieties of plants through pollen drift can cause loss of biodiversity. This was the reason behind the disapproval of GM Corn variety for commercialization in Mexico, as the native corn varieties might get contaminated by the foreign genes.[5]

Antibiotic Resistance—Potential for Gene Transfer

Sometimes it has also been reported that GM food (particularly Bt-Brinjal) lead to the generation of an antibiotic-resistant protein leading to alteration in blood chemistry including blood clotting time (prothrombin), total bilirubin (liver health), and alkaline phosphate in goats and rabbits.[6]

Emergence of Superweeds

As per some recent reports on GM field studies, the herbicide resistant gene that is being genetically transferred to the GM crop, can sometimes cross the species barrier and get integrated with the genome of some wild relatives of GM crops, which then become resistant to the effect of pesticides or herbicides.

Mixing of Genes "breach of religious faith"

Many religions have explicit dietary prohibitions against certain foods or consuming particular foods [Pascalev, 2003, taken from Knight (2009)]. Consensus conferences in Australia and the United Kingdom highlight lay concerns about mixing human and animal DNA with plants, being seen as tantamount to cannibalism.

Agricultural Knowledge Dissonance leading to an upsurge in farmer suicides

This is not to say that GM seeds are the sole cause of farmer's suicide, one of them, and can be explained on account of agricultural knowledge dissonance[7]. This is increasingly leading towards rejection of indigenous methods of production, and following the suite of developed nations by adopting advanced agri-based technology. Thus, all of these contribute towards farmer's distress.

Ethical Dilemma

Ethical decision making on such controversial issues will require an in-depth analysis of the various arguments and search for the truth or falsity inherent in them. The one presented here is researcher's own viewpoint with respect to the ethical perspective, and there can be varying views on the same.

S. No	Argument	Type (Category)	Ethical Perspective
1.	GM Crops will help in solving the problem of hunger in the country.	Social cum economic	Is there really any shortage of food that our country is facing, or is it the faulty distribution mechanism and polity of the country? (Principle of Equity)
2.	GM crops require lesser use of pesticides, and solve the problem of fund raising by poor farmers.	Economic	Is it ethical to forsake our indigenous methods of crop improvement and adopt western technology whether our croplands are suited for it or not?
3.	Crops with added nutrient value can be produced via GM technology.	Health	There can be many alternative natural sources that can provide the same nutrient value as GM crops.
4.	Consumption of GM crops can raise many health related concerns.	Health	Can the lives of millions be put at risk for the sake of technological advance of the country? (Principle of Health and Safety)
5.	GM Crops as a threat to country's own bio-diversity.	Environmental	Man-made exchange of genetic material as opposed to the natural ways having unforeseen consequences.
6.	Patenting of GM crops by western companies and forcing the Indian farmers to pay the price for it.	Economic and Political	A direct blow to the human rights as well as violation of the autonomy of Indian farmers.
7.	GM crops involve the mixing of animal and plant genes leading to breach of religious faith.	Social	Marketing Unlabelled GM food violates the trust of the consumer and goes against the ethic of virtue.
8.	GM crop as one of the contributing factor for farmer's distress.	Social cum emotional	Is GM-technology really in the right of general public or just another gimmick to bolster the economic and political gains of a few influential groups? (Principle of Beneficence)

Thus, it becomes important that addressing the ethical concerns along with the concept being covered needs to be the main aim of science education in order to sensitize students toward these issues and make them able decision-makers.

The second issue being taken up in the present paper that has recently generated a furore amongst animal right

Food Security v/s Health security
Technology advance v/s Seed Patents
Increased crop yield v/s Farmer's Autonomy
Genetic Modification v/s Agricultural Knowledge Dissonance
Increased Pest resistance v/s Breach of Religious Faith
Herbicide resistance v/s Emergence of Superweeds.

activists, ecologists, and animal conservationists is *"The Issue of Animal Experimentation"*.

The publication of Peter Singer's book, "Animal Liberation", in the year 1975 has been a milestone in generating heated voices and arguments from philosophers, scientists, and animal protection groups debating the scientific and moral legitimacy of animal experimentation.

A Brief History of Animal Experimentation

Experimentation on animals is known since ancient times, dating to around 500 B.C were the older records of real anatomical observations. Studies on animals were also a central part of Aristotle's work (384-322 BC), as he is believed to have dissected over 50 species of animals. Erasistraus is considered the founder of experimental physiology and the first vivisectionist (Singer, 1996: 48-52, taken from Paixao and Schramm, 1999).

Some of the path breaking researches that can be attributed to animal experimentation include study of movement of heart and blood in animals by William Harvey (1578-1657); Conditioning in dogs by Ivan Pavlov (1890); isolation of three forms of polio virus by Jonas Salk (1940) and many others.

Arguments in favour of Animal Experimentation

Advances in Medicine and Health care (Therapeutic): Sigma Xi, the scientific research society defends the use of non-human animals in biomedical research by citing what they take to be the enormous benefits of that research:

"Results from work with animals have led to understanding mechanisms of bodily function in humans, with substantial and tangible applications to medicine and surgery (e.g., antibiotics, imaging technologies, coronary bypass surgery, anti-cancer therapies), public health (e.g., nutrition, agriculture, immunization, toxicology and product safety)…"

Research with animals has made possible most of the advances in Medicine that we today take for granted. An end to animal research would mean an end to our best hope for finding treatments that still elude us.

Generation of Knowledge and tracing Evolution through Vivisection (Non-therapeutic): Most of the medical researches as well as those done in a lot number of animal research institutions torture or kill animals for the sake of knowing the anatomical as well as physiological characteristics of certain organisms. This is usually done as part of comparative studies at the graduate and post-graduate levels, and even in

higher researches where such experiments are used to trace the lineage (evolutionary studies).

Animals as easy Models for Drug Testing: It is better that lab animals should be used than that the tests should be made directly on human beings. So far as insulin is concerned, it was only by experimentation on dogs that it came to be learnt that removal of something manufactured by the pancreas caused diabetes... In the continuing debate between experimentalists and champions of the rights of animals, the discovery of 'insulin' remains a shining example of the benefactions experimental animals have conferred upon man (Lafollette and Shanks, 1996).

Anti-Vivisectionists' Ethical Arguments

Do Animals Have Rights? Is it morally justified to cause pain or harm to one set of animals in order to provide some kind of benefit to humans? Is it justified to devalue or denigrate the life of an animal as compared to that of Humans (Regan, 2005)? All such questions pester the conscience to give a second thought to the practice of animal experimentation as a method in research.

Species Barrier as a deterrent for extrapolation of drug-testing experiments: Animals do not serve as appropriate models for medical testing of drugs and other invasive treatments, due to difference in basic physiological and psychological make-up.

One major example of animal and human differences is that of heart research being done on animals, frequently dogs. There could be varied factors responsible for heart diseases in humans such as fatty diet, irregular lifestyle, smoking, drug consumption, lack of exercise, persisting stress or anxiety, etc., none of which can be replicated in an animal[8].

The Underestimation of Human Harms: Many medicines that are not toxic for test animals prove to be highly toxic for human beings. A medical disaster, in the case of thalidomide research[9], Zomax and DES which were all tested on animals and judged safe, had devastating consequences for the people who used them. Animal testing wastes time, too, by leading researchers in the wrong direction.

Anti-Vivisectionist Organisations and Forums

Some scientists, social activists, ecologists, and wild-life conservationists joined hands together to fight for animal rights, and initiated a number of concern forums and organizations such as PETA[10] and another U.K based National Anti-vivisection Society (NAVS). These have helped in generating awareness about animal abuse and ill-treatment in our so called modern scientific society and have also unveiled the deplorable state of animals in some of the highly acclaimed research labs in India and other countries. These attribute to the faulty scientific procedures used leading to wastage, poor laboratory practices, and a lack of appropriate animal care.

Ethical Dilemma

The arguments produced herewith show us both the positive as well as the

S.No	Argument	Category	Ethical Perspective
1.	Majority of the advances in medicine and health care can be attributed to animal experimentation.	Health	Do human rights supersede animal right to live?
2.	All the physiological experiments at school and college level require animal vivisection for acquiring skills and knowledge.	Educational	Instead of killing and vivisecting the mute animals can't we use alternatives here such as CD ROMs, Bio-informatics, other in-vitro methods?
3.	Animals are easily available targets for drug research.	Medical	What if the positive results of animal experimentation happen to be hazardous on humans?
4.	Animals are being indiscriminately used in the labs and sometimes even in pointless wasteful experiments.	Deontological	Do we humans have any right to play God or do we have any obligation towards animals?
5.	Animals face unnecessary suffering and pain in the labs that are akin to slaughterhouses.	Emotional	Can we show moral sensitivity toward animals while utilizing them for research?

negative side of animal research along with the emotional, ethical and sensitivity quotient attached to it. This creates a kind of mental dissonance and ethical dilemma in deciding as to whether animal experimentation should constitute a method in scientific practice or not?

The major ethical issues being raised include pain and suffering to the animals, treating them as experimental objects devoid of any feeling, vivisecting them to study about the anatomical make-up, disregarding and flouting the animal rights laid down precisely by the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA)*.

On the one hand, the advances in the field of medicine, drugs, and many sophisticated and non-invasive therapies can be attributed to the animal experimentation, then on the other hand an ethicomoral question

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* The CPCSEA was set up 40 years ago under the provisions of the Prevention of Cruelty to Animals Act, 1960. It was meant to ensure that animals are not subjected to unnecessary pain or suffering before, during and after the performance of experiments on them; that they are procured from registered breeders; that there is no duplication of research and consequently unnecessary sacrifice of animals for the sake of research; and that experiments on large animals are avoided when the same result can be obtained by experimenting on small laboratory animals.

that arises is that do we humans have any right to play God and play with the lives of other animals, who constitute a larger proportion of sentient beings on this planet?

Another ethical issue that deserves attention is the treatment of animals in the science and research institutions and labs that are more akin to slaughterhouses, and are unhygienic and unfit for care or upkeep of animals. Thus, caging them away from their natural habitat and subjected to a life of drudgery.

Human Life v/s Animal Life
Human Medical Aid v/s Animal Suffering and Pain
Human Model v/s Animal Model for Experimentation
Human Rights v/s Animal Rights
Animal Drug Trials v/s Fatal Human Outcomes

One of the perspective in this regard has been limiting the use of animals in research given by Milburn (1989:78, taken from Paixao, R. L. and Schramm, F. R., 1999), supporting a 3r rule as per which:

The first r, 'replacement', suggests that one should seek to replace the use of vertebrates with methods employing other, non-sentient materials, including plants, microorganisms, etc. (Russel and Burch, 1992:69, taken from Paixao, R. L. and Schramm, F. R., 1999).

The second r, 'reduction', recommends one attempt to reduce the number of animals used in a given experiment by the choice of right strategy. Thus, calling for a better experimental design (Russel and Burch, 1992:105, taken from Paixao, R. L. and Schramm, F. R., 1999).

The third r, 'refinement', recommends that one seek to minimise the amount of animal discomfort or suffering (Russel and Burch, 1992:134, taken from Paixao, R. L. and Schramm, F. R., 1999). The use of anesthetic or analgesic drugs is relevant in this sense (Paton, 1993:129, taken from Paixao, R. L. and Schramm, F. R., 1999).

Recent Research Trends—Foraging Links between Ethics and Science Education

The literature review of the current trend in science education researches shows that adequate attention has been given to socio-scientific issues (Donnelly, 2004a; Donnelly, 2004b; Levinson, 2004; Levinson, 2006; Sadler, 2004b; Sadler et al, 2006; Sadler and Zeidler, 2005; Zeidler, 2003; Zeidler and Keefer, 2003; Abd-El-Khalick, 2003), although many more efforts need to be initiated in the area of applied ethics in science education both at the high school and at college level.

Science education is characterised by freedom of thought, imagination, inquiry and discovery. For years, science education has been regarded as a model for the democratic decision-making in the society we live in. But in order to acquire sound decision-making skills, training in the ethical issues in science is required. This can only be achieved

by embedding these Socio-scientific issues (SSI) in the science curriculum, so that they can be tackled with adequate care, responsibility and sensitivity.

It has been argued that science education should provide an opportunity to develop not only arguments and understanding for scientific concepts (Simon et al. 2006) but also for socio-scientific issues (Sadler and Zeidler, 2004).

Regarding values related to science, socioscientific issues (SSI) has been suggested as an important development of science education (Zeidler, *et al.* 2005). As per Sadler and Zeidler (2004), *"The most important feature of SSI is that it promotes the self-actualisation of students by providing opportunities to negotiate the morality of socio-scientific decisions on their own."*

Ethics and Science Curricula

Crosthwaite (2001) has listed three main problems in deciding the content of ethics of technology courses:
- What ethical issues to address?
- How much technological or scientific information to include?
- What to teach about ethics or morality?

Crosthwaite suggests two main aims of the courses on "Ethics of Science and Technology"
1. To produce an ethically informed community, by teaching ethics to both scientists and non-scientists (to ameliorate the present situation)
2. To produce ethical scientists and technologists, in the sense of inculcating ethical values in the students who will pursue careers in these arenas.

The second aim seems to be the most challenging, as many are uncertain about the attempt to teach morals, in the sense of instruction. What should be taught? Who decides what is right and what is wrong and how? Should one teach one's own values? What if these are minority values? What does one teach in an ethically pluralist society? All these are questions that need to be researched upon.

Teaching Ethics

There always exists a great risk of "indoctrination" in teaching which aims to inculcate morality, and some approaches to teaching morality, and some moral or ethical positions may be incompatible with other aims of teaching. For instance, can one teach the skill of informed and critically aware thinking at the same time, as one is trying to inculcate a particular view?

But, it is also not possible to teach about ethical issues in a completely morally neutral way. These tend to take a subjective stand, by supporting one particular view more often than the other. The popular methods of instruction being proposed for teaching the ethical virtue behind these socio-scientific issues by many pedagogues as well as scientists and researchers is the discussion and argumentation mode (Wallace and Louden, 2002). This includes taking into consideration students' as well as teachers' models of thinking and views/beliefs concerning a particular issue. The clashes in views is almost inevitable here and need to be resolved by inculcating decision making skills amongst the students, i.e., by

weighing the pros and cons of each and every problem.

Models of Teaching Ethics and Assessment

Levinson (2008), devised a novel method in the teaching of these controversial socio-scientific-ethical issues by way of *personal narratives*. Narratives can be considered as personal, contrived or socially constructed experiences carved around a chief educational goal. The objectives that are to be met through these narratives are predetermined, along with a sequence of events that are pre-planned and well directed. Narratives can take several forms such as drama, song, poems, or a simple interesting story line. The inherent phenomenon in each and every form of narrative is the connection with the context, which is the soul of these activities.

This method allows in bridging the gap between the local/personal and the emergent science. In the context of a controversy personal narratives help in generating diverse opinions and reaching for the best possible way out.

In some of the preeminent universities, such as the Florida State University, in USA, ethics in science has been integrated into an interdisciplinary science course called "Science, Technology and Society" (STS) (Gilmer, 1995). Students in this course become aware not only of the science itself, but also of the process of science, some aspects of the history of science, the social responsibilities of the scientists, and the ethical issues in science.

However teaching such integrated courses and at the same time assessing the students on the mastery of the same are two daunting tasks before the high school as well as university teachers. Sharing teacher's own experience of practicing science, while highlighting key incidents such as misconduct in science, discrepancy or faking of experimental data, as well as plagiarisation are some such issues. Collection of materials for teaching, such as relevant books and articles, can be sought.

Assessment procedures also vary depending upon the given issue or problems but have to be truly unconventional. Portfolios can serve a great purpose in this regard, as they display only selected pieces of student's work and demonstrate his or her learning[11].

Influence of Teacher's Identity

Cross and Price (1996) conceptualised a relationship between the teachers' social conscience and their dealing with the controversial issues in the classroom. The study included taking in-depth interviews of science teachers from two different locales, viz., Scotland and America, where many of them reflected contrasting viewpoints on dealing with the controversial issues in the class-room. Some regarded them as purely irrelevant while many remained sensitive to the issue, and felt their responsibility to educate the young generation about the pros and cons of each product of technology. The availability of teaching resources also play a pivotal role in dealing with these issues effectively, so that the issues do not just receive a two sided debate rather provide more and more

opportunities for exploration and interface between science and society.

In yet another study conducted by McGinnis and Simmons (1998) stated in a vivid manner the impact of local culture influencing the teachers' teaching pedagogy with respect to controversial issues (such as STS issues). The study is based on an ethnographic research model, and takes into account an in-depth analysis of the perceptions, working, attitude, knowledge, and strategies adopted by six middle-school science teachers in dealing with the controversial STS (Science, Technology and Society) issues. The study also regarded parents as the chief source of information and inputs on the culture of a particular community. Different cultures held different or to say defiant views regarding some of the controversial issues which they called as "taboos", and hence resisted discussions on them, whereas some of the issues had the sanction to be included in the science curriculum which were referred to as "Noa" topics.

There has always been a question of maintaining teachers' identity and authority in dealing with such controversial socio-scientific issues as the methods required in effectively dealing with them require a less obvious role of teacher in the class. This has been studied by a group of researchers (Pedretti *et al,* 2006), who developed a multimedia programme of a case in an issue-based classroom. Data was collected using observation scales, checklist with a likert-scale, open-ended questionnaires, reflective writing, work-sheets, and audio as well as video-taped conversations and interviews. The findings revealed that at some points teacher's own identities as well as personal values do intersect while dealing with the issues. Also, there happened to be some discontent regarding the course content of such issue based instruction and the mismatch with the current examination pattern. The teachers also revealed their incompetence as well as helplessness on their part, due to lack of adequate resources, training, and time. They however agree that inclusion of such issues in the curriculum would definitely address the ethical dimension of science leading towards better decision making.

Pedagogy for Classroom Instruction

In dealing with the class-room situations as well as adapting it toward the socio-scientific-ethical paradigm, the following researches are noteworthy:

1. *Media coverage* of controversial environmental issues provides *teaching contexts* which are both motivating and relevant for students (Barros and Germann, 1987). At the same time, these issues provide an appropriate setting for the emphasis on *decision making* that prominent science educators have argued is an essential component of any science curriculum (Schwab, 1974; Watson, 1980).

2. One way of helping students explore the complexity of multifaceted environmental issues is with *simulations* that involve students in *role-playing* the various stakeholders in the controversies (Bybee, Hibbs, and Johnson, 1984 taken from Geddis, 1993).

3. The use of *informal argumentation* has also been as area of active research in dealing with the SSI in the class-room, this involves generating arguments from the social, political and ethical realms rather than focusing merely on the objective and logical scientific knowledge (Sadler, 2004). Since the issues labeled as SSI can no longer be dealt by just focusing on scientific or technological part of it, as these have an impinging effect on the society at large, hence the debates or arguments need to take into account a wider purview. This creates a forum of interaction and knowledge access for the non-science majors who can simultaneously participate and learn from these discussions.

4. To free the sciences from the elitist tag as well as from the hegemony of objective, value-free and coherent approach, these socio-scientific issues need to be addressed in their most naturalistic way. Since these issues derive their essence from the community, therefore it is important that the schools or other higher educational institutions encourage and provide a whole range of learning situations that promote *involvement in community life* (both within the scientific community as well as the general public) and employ diverse forms of *team work.* This will enable sharing of opinions and at the same time being tolerant to others (Tal and Kedmi, 2006).

Towards the end of the study, a need was felt to view the present class-room scenario of the researcher's own geographical context with respect to the treatment been given to such socio-scientific-ethical issues as well as to generate teachers' opinions about integrating such issues in the Science curriculum alongside gauging their understanding on the significance of ethics in Science. Hence a pilot study at this point became mandatory.

Insights from the Pilot Study

A pilot study was conducted with a small sample of PGT-Biology teachers, University lecturers taking Biological Sciences, and students of Class-XII having Biology as one of the electives, and undergraduate students enrolled in B.Sc. (Hons.)-Zoology, IIIyr. The methodology involved taking interviews and filling up of open-ended questionnaires.

The responses gathered from the pilot study were a clear indication of the fact that ethical issues are not given their due importance both at the higher secondary and undergraduate level. The underlying causes for the same were identified as teachers' lack of awareness, focus on the content and concepts more rather than dealing with ethical dilemmas, degree of incompetence and discomfort in dealing with conflicting issues in the class-room, and no place been accorded to ethical issues in assessment and examination system.

On the other hand, student interviews and questionnaires revealed a different story altogether, they were keen to discuss such matters in the class-room, disliked plain lecturing and didactic, enjoy activity oriented teaching-learning, however one thing that seemed to be common here is the

lack of an understanding and decision-making on ethical issues amongst students both at senior secondary and under-graduate level.

Epilogue

The present paper attempts to resolve the dichotomy between the two areas of science and ethics by way of two case studies namely GM crops and animal experimentation. The main objective of it being the elaboration of each issue on scientific, social, political and most importantly ethical grounds. It presents an open forum to discuss such controversial issues on a wide platform, without displaying any biased opinion. The major debates centered on such issues, provide different perspectives to view the given problem, all of which appear to be logical and justified. However, it is left upon us to emerge through the ambiguity by taking a particular stand.

Studying the recent research trends, it can be concluded that a genuine attempt has been made to create sensitivity as well as awareness about the socio-scientific-ethical issues. The means chosen can be many such as public forums, mass media, non-governmental organisations, street plays, public participation, etc. However our focus in this paper has been creating sensitivity by way of science education and curriculum. The main stakeholders in this case being the curriculum planners, text-book writers, policy makers, headmasters, science teachers and students. Dealing with these issues requires great expertise on the part of teachers, and hence a radical change needs to be actualized in the current teacher education programme.

The classroom strategies in order to cater to socio-scientific-ethical issues also need a revamp and a renewal. Plain lecturing, demonstrating, or didactic won't serve the objective, rather discussion, argumentation, and informal reasoning should form the trend. Thus, enabling extensive student participation and involvement through community programmes. Thus, a need to adopt the socio-ethical model along with the logico-scientific method can offer some help in emancipating science and technology and creating a liberal society freed from the shackles of materialism, self-centeredness, and irrevocable destruction in the name of development.

NOTES

[1,3] Refer to Khosla, P.K. (2002), "Eco-friendly Bt. cotton and GMCs saviour of Indian farmers" in Agriculture Tribune, Monday, May 20, 2002, Chandigarh, India.

[2] Refer to Das, N. M (2006, Jan 02), 'Food Security through Genetic Engineering', The Hindu. Retrieved from http://www.hindu.com/edu/2006/01/02/stories/2006010200410200.htm

[4] Refer to Purkayastha, P and Rath, S (2010, May 15), 'Bt Brinjal: Need to Refocus the Debate', Economic and Political Weekly, XLV (20), 42-48.

[5] Anuradha, R. V (2002), 'GMOs – Promises and Concerns', Frontline', Volume 19 - Issue 08, Apr. 13-26, 2002.

[6] Refer to "India says No to Bt-Brinjal", Retrieved from http://www.bhoomimatha.com/india-says-no-to-bt-brinjal/

[7] Rejection of indigenous methods of production, and following the suite of developed nations by adopting advanced agri-based technology, whether they comply with Indian climatology and topography or not. See Vaisavi, A. R. (2004), Suicides and the Making of India's Agrarian Distress, National Institute of Advanced Studies, IISc Campus, Bangalore, India.

[8] Refer to An Anti-vivisectionist Reply to pro-vivisectionists most common arguments, with a focus on Anti-vivisectionists Unmasked (Produced by Seriously Ill for Medical Research- SIMR).

[9] See 'The thalidomide story explained', Down To Earth, April 16-30, 2010.

[10] PETA or People for the Ethical Treatment of Animals, founded by Ingrid E. Newkirk in January, 2000 is an organisation that works towards educating the policy-makers and the general public about abuse of animals in different spheres and aiming towards an understanding and promotion of animal rights and respecting them.

[11] Refer to Collins, Angelo (1991) "Portfolios for Assessing Student Learning in Science: A New Name for a Familiar Idea?", in Kulm, G. and Malcom, S. F. (Eds.) Science Assessment in the Service of Reform, American Association for the Advancement of Science, Washington, D.C.

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