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## EDITORIAL

The *Indian Educational Review* is a biannual refereed journal of the National Council of Educational Research and Training, New Delhi. It aims at providing a dynamic medium for effective communication among the community of students, teachers, educational researchers and policy planners. It focuses on enriching the discipline of education by disseminating findings of educational research, providing opportunities for exchanging research experiences among fellow researchers, motivating young researchers, and providing inputs to all those involved in policy making and planning.

The present issue contains eight research papers and three each of abstracts of completed ERIC studies and book reviews. Majority of the studies included in this volume focus on the cognitive competencies of the learners.

In the context of our commitment to the cause of children with disabilities, the very first paper discusses the significance of sign language as a medium of teaching and learning for children with hearing impairments. The second paper examines the relevance of Gardner's multiple intelligences in the Indian context. The effectiveness of multidimensional activity-based approach in the development of creative abilities in social sciences among elementary school children has been discussed in the third paper. The other papers too attempt to find out correlations between thinking styles and achievement in Physics among eleventh grade students; demonstrates the effectiveness of a multi-mode programme in enhancing pre-reading skills among pre-schoolers; and explores the contribution of scientific attitude and scientific aptitude in developing environmentally sensitive practices among secondary school students and studies the personal and institutional factors responsible for science achievement among secondary school students. The last paper examines the effectiveness of school experience programme in building attitude of prospective teachers.

In addition to the regular papers, this issue carries abstracts of three recently completed studies under the financial support by the Educational Research and Innovations Committee (ERIC) of NCERT. Of these, one study is concerned with examining the pre-service secondary teacher education programme in Karnataka, the second focuses on participation and consequences of education of scheduled caste children in Rajasthan, and third study examines the effect of self-regulatory strategies on enhancing teaching competence among B. Ed. Students. The reports of these studies are available with ERIC. The book review section carries review of the books on the theme of private tuition, school health services, and higher education in India.

We look forward to receiving your valuable comments and suggestions to enhance the quality of this journal in terms of making it more useful for the researchers and policy planners.

ASHOK K. SRIVASTAVA  
*Academic Editor*

## **Indian Educational Review**

*Indian Educational Review* aims to enhance the theory and practice of research in education. It is a journal of opinion and research in the field of education. Contributions may comprise scholarly discussion of new issues, reports of research, reviews of researches in particular field, reports of developments, and debate on educational research generally or on specific issues. Contributions are also invited reporting all kinds of empirical research in education, whether sociological, psychological, economic or organisational. The journal is intended to cover a wide range, including interdisciplinary studies.

In addition, the purpose of this journal is to provide a medium for dissemination of educational research and exchange of experiences among research workers, scholars, teacher educators, teachers and others interested in educational research and related fields and professions.

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## **Creating a Multilingual Society**

ANITA JULKA\* and GIBU SABU M\*\*

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### **ABSTRACT**

*The commitment of our country (India) to the cause of children with disabilities is not new. This is unequivocally expressed through Constitutional provisions, National Policies on Education 1968 and 1986, National Plan of Action (1992), the Persons with Disabilities Act, 1995, the Convention on the Rights of Persons with Disabilities (2006), and more recently the Right of Education Act, 2009, all ensuring holistic development of a child with disability. Despite strong policy directives, realisation of the rights of children with hearing impairments is daily challenged in our schools by depriving them the opportunity to learn in their own language called the sign language. The article discusses the significance of sign language as a medium of teaching and learning for children with hearing impairments studying both in regular and special schools. It also examines the current scenario of education of children with hearing impairments in the light of recent development in the field of education that stresses the need for a sign language oriented teaching-learning experiences.*

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### **Introduction**

*'Our children need to feel that each one of them, their homes, communities, languages and cultures, are valuable as resources for experience to be analysed and enquired into at school; that their diverse capabilities are accepted; that all of them have the ability and the right to learn and to access knowledge and skills; and that adult society regards them as capable of the best'.*

*National Curriculum Framework – 2005, p.14*

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The significance of language in the lives of men can not be underestimated. Human beings need some mode of language to make his/her needs understood by another individual. It is one of the special traits that all human beings seem to possess and that distinguish them from other forms of life. Language is a medium through which most of our knowledge is constructed. "The ability to comprehend and produce language stands as a defining characteristic of human cognition and enables the transfer of knowledge and culture within human society". (Corina, 1998). The, National Curriculum Framework (NCF), 2005 states that

*"Languages also provide a bank of memories and symbols inherited from one's fellow speakers and created in one's own life time. They are also the medium through which most knowledge is constructed, and hence they are closely tied to the thoughts and identity of the individual. In fact, they are so closely bound with identity that to deny or wipe out a child's mother tongue(s) is to interfere with the sense of self" (p.36).*

The goal of universalising elementary education and of creating schools that are inclusive wherein learning is child-centred and caters to the needs and requirements of each individual child would remain elusive until the linguistic diversity of India is recognised. Multilingualism which is so closely bound to the identity of the child must be used as a resource in the classroom to make each child secure and accepted. For children with hearing impairments, spoken languages are difficult to use but they can learn and develop if efforts are made for an alternative sign and symbol systems for expression and communication called the sign language system. However, in spite of the Government of India formulating the Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act in 1995, to address the various key dimensions for ensuring a better life for persons with disabilities, more than a decade later we find children with hearing impairments are still struggling to access quality education in their natural medium of language and dropout of regular schools. Researches have shown that though many children with moderate to severe hearing impairments do benefit from intensive speech training, a large number fail to develop intelligible oral communication, or effective literacy skills (Quigley & Paul, 1987).

This article highlights the significance of sign language in the lives of persons with hearing impairments for relating to the world around them. While doing so, it frequently outlines the various issues

and challenges faced in the development of sign language as a separate language. It also brings to light the debate surrounding the use of sign language as a medium of communication and learning for children with hearing impairments. Subsequently, it reviews the status of development of standard sign language in different countries via-a-vis in India based on intense interactions with the stakeholders through research studies. Finally, it draws attention to importance of sign language in education and suggests ways of equipping the teachers to meet the special needs of children with hearing impairments in the area of language development.

### **Sign Language (SL)**

The manner in which a human child acquires a language follows the same pattern throughout the world regardless of the culture, the custom, the locality into which the child is placed. Noam Chomsky, the well-known linguist, explained that though languages differ in their surface manifestation, they have more than a few underlying similarities. With this idea he postulated a universal grammar (UG): a set of principles underlying the organisation of all natural languages (including sign language). Regarding sign language (SL) he stated

*“Now that language has been investigated in considerable depth, and it appears to be just like any existing language. It has the same structural properties. The infants even babble in sign just like they babble in spoken language. There don't seem to be any detectable differences. It's just that the mode is different – sign and visual, instead of articulate and auditory.” (Excerpted from an interview with David M. Ewalt on Oct. 3, 2005. [http://www.forbes.com/2005/10/19/chomsky-noam-language-invention-comm05-cx\\_de\\_](http://www.forbes.com/2005/10/19/chomsky-noam-language-invention-comm05-cx_de_))*

The principles stated by Chomsky are innate to the human child and help him/her to acquire a language. Parents initiate the process of 'language acquisition' (especially spoken) in a child from the very birth by speaking to him/her and giving him/her necessary (but not the whole array of sentences) inputs (Primary Linguistic Data, PLD) to mould the innate principle in a language specific way. However, when a child is born with some kind of hearing impairment this very process is hampered as the child is deprived of the necessary inputs. This is generally not the case with a hearing impaired child born to hearing impaired parents, as s/he will get the necessary input for language acquisition by means of 'signs' (corresponding to words in spoken

language). So it is important for us to be aware of what a 'language' is, as opposed to communication or speech (Sinha, 2003) and also that language does not develop on its own with a solitary person. According to NCF, 2005:

*“Children with language-related impairments should be introduced to standard sign languages, which can support their continued growth and development to the fullest. Recognition of the linguistic abilities of learners would encourage them to believe in themselves and their cultural moorings” (p.36).*

If communication goes awry it affects the intellectual growth, social intercourse, language development and emotional attitudes of the individual in question, all at once, simultaneously, and inseparably (Sacks, 1989). It is also known that the nature of cognitive development is essentially the same for children with hearing problems and those without these. The differences in academic achievement and intellectual testing may be reflecting deficiencies in linguistic development and not necessarily the inherent capabilities (Siegel, 2001).

Research across the border shows that the mother tongue of a child having hearing impairment is SL. For example, the path breaking investigation done by American linguist William Stokoe in the year 1960 revealed that American Sign Language is a fully developed language just like that of the spoken English, which is the mother tongue of the hearing impaired community in America. Thereafter there was a tremendous leap in the field of SL in different parts of the world (Zapien, 1998). The NCF (2005) adds that one should respect and honour the child's mother tongue(s) and that all the other learning activity needs language and in a way learning a subject is to learn language from a different perspective. Hence, it would be beneficial if these children are given the opportunity to have at least their primary education in SL in order to achieve their full potential.

The grammars, vocabularies and cultural value of SL are equally well-developed as those of spoken languages. SLs are at equal footing with spoken languages in its potential as a tool for learning-teaching. However, Michelle Pandian (2007) has put across the view that the SL specific to the Indian context is still in the evolving stage and hopes that it will reach the Indian population as soon as possible. The interest in Indian Sign Language (ISL) created by the works of Madan Vasishtha in the late 1970s continued its momentum and

researches by Ulrike Zeshan and others in the late nineties has established and expanded earlier work, showing that ISL is indigenous to India and is used in the form of regional dialects all over the Indian sub-continent, that ISL has a complex linguistic structure of its own and is not based on any spoken language and that its grammar can be described by means of linguistic analysis.

### **The International Scene**

Internationally, the Salamanca Statement and Framework for Action on Special Needs Education (1994), to which India is a signatory, highlighted the importance of SL as a medium of communication amongst the deaf. It stated that provisions must be made to ensure that all deaf persons have access to education in their natural SL.

Tracing the advancement of SL as a preferred medium of teaching learning in different countries, it appears that its recognition is not recent. In 1980, the Australian Federal government recognised Australian Sign Language as the primary or preferred language of the hearing impaired community. As an aftermath of this we can see an increase in the number of hearing impaired people moving to the tertiary education and professional employment (Schembri, 2002).

In a similar uproar Norway introduced or rather reintroduced SL in the deaf schools in the 1970s with the total communications method. According to Roald (2002), the teachers who teach Science in schools for the hearing impaired believe that a thorough discussion on a topic using SL prior to reading the textbook was crucial. The discussion of the topic in SL coupled with the setting up of high goals for the hearing impaired to attain is making new waves in Norwegian education system though it should be complemented by the teacher's ability to communicate fluently in SL with the students, the subject knowledge of the teacher, and access to information by the students themselves among others.

Similarly, in America, in 1993, the South Dakota State passed the Bill of Rights of a Deaf child. It stated amongst other things that American Sign Language is the primary mode of communication for the deaf and hard of hearing children. It further stated that they shall have education in which this unique mode of communication is respected, utilized and developed to an appropriate level of proficiency. However, Seigel (2001) indicated that despite this and similar bills and reports in different States, the education of the hearing impaired remains embryonic in the US and attributes the educational system's failure to the lack of knowledge about the

educational and communication needs of the hearing impaired and a few other factors.

In case of the British Sign Language (BSL), despite of its existence for a long time, it was finally recognised by the British Government as being a full, independent language in March 2003. This recognition has been important for the status that it has given BSL and its Deaf users. It also means that money is now being invested in training more Deaf BSL tutors and BSL-English interpreters. Schools have been important to BSL because most Deaf children have hearing parents and only learn to sign when they meet other deaf children at school. For most of the 19th century, BSL was used in schools and widely accepted in society. However, for most of the 20th century, hearing educators banned BSL in schools for Deaf children, insisting that they should speak and lip-read instead. Children were ridiculed and punished for signing in schools, but the language did not die out. In UK, 5-10% of deaf children have deaf parents, and it were these children who helped to keep BSL alive in secret in schools, teaching signing to other children when teachers were not looking. When children left school, they often joined their local deaf club where BSL was also valued.

[[http://www.bbc.co.uk/voices/multilingual/bsl\\_today.html](http://www.bbc.co.uk/voices/multilingual/bsl_today.html)].

### **The Indian Scene**

*Deepak (name changed) was born with hearing impairment to an Indian railway employee and a teacher in Bihar. The parents wanted their child to learn and acquire knowledge and with this end in mind he was sent to a regular school where he spent his early childhood listening with the help of hearing aids. He remembers those early years as increasingly frustrating because, try as he might, he could not understand what his teachers were saying. By fourth standard he was falling behind academically, but his parents kept on pushing him to go to the school. He continued it for the next few years till he reached class seventh. Seeing his inability to grasp anything meaningful, the parents understood that this exercise was futile and put him in a special school where he started learning in SL. Now he is in the ninth standard and is very happy that he is doing something worthwhile. He is now able to grasp all the abstract concepts and can also further explain to his classmates the things that they have learned from the teacher.*

The above description supports the observation that “historically we have taught deaf students materials way below their conceptual level since we taught them through English,(Martin, G.A. chair of

the communication-disorders and deaf-education department at Lamar University as cited in Burton Bollag, 2006). “Right to language”—is necessary for any educational growth and central to the human experience. To impede communication, even unwittingly, is to harm the human spirit; to foster communication is to reveal all the possibilities of life (Seigel, L., 2001). Further, the United Nations Convention on the Rights of Persons with Disabilities (Ratified by Indian Government on October 1, 2007), under Article 24 on Education, stated the need to facilitate learning of SL and the promotion of linguistic identity of the deaf community.

The number of persons with hearing impairments in India amounts to 1.3 million (5.8 per cent of the total 21.9 million persons with disabilities in India, Census of India, 2001). Out of them, only a few are privileged to gain information through SL. After interacting with the functionaries during the visits to regular and special schools in different parts of India including states like Andhra Pradesh, Kerala, Tamil Nadu, Maharashtra, Madhya Pradesh, West Bengal, etc., (Julka, 2007) it is concluded that the miserable state of affairs with the hearing impaired can be attributed to the following facts:

- Non-availability of teachers trained in SL
- Aversion of the schools to teach in SL
- Lack of facilities to learn/to teach SL
- Lack of facilities for early interventions
- Negative attitude that is prevalent among the masses towards SL
- Societal attitude towards persons with hearing impairment.

### **Learning Sign Language: Attitudinal Dispositions**

The experts in the area of education of children with hearing impairments are having conflicting views on the issue of teaching in SL both at the national and international level. Primarily, there are two points of views. One view is that the hearing impaired students should be taught how to speak and the other is that they should be taught in SL. Before analysing these totally contradicting views we can look at some of the background realities. In 1880, the two (the former caller the oralist and the latter manualist) were engaged in a battle of viewpoints at the Conference of Milan. The Conference concluded that use of signs for the hearing impaired should be forbidden in schools because if a profoundly deaf child signed, he

would not learn how to speak since speaking is a difficult skill for a hearing impaired child to learn and that spoken language is superior to SL. However, in the latter half of the twentieth century, sign usage was revived with the revelation that for a hearing impaired child to speak is not difficult but impossible (Zapien, 1998). Unfortunately, the debate on Oralists vs. Manualists is still prevailing in India and by doing so we are going back in time a couple of centuries.

Research taken up by NCERT explored the attitudinal dispositions of teachers and school administrators towards SL (Julka, 2007). Questionnaire was sent to various schools and also some special and inclusive schools were visited for gathering information on use of SL. The teachers in most of the schools gave importance to development of speech at the primary level for all children without exceptions. According to them SL can be learned at any stage (even when the person reaches his/her teen ages) in a person's life. This is precisely the reason why these schools follow oral-aural method, although the excuses for not using SL may vary from the above to that of the parents' reluctance in wanting their child to sign. But learning a language late in life is heavily dependent on the language that the person acquired in the early childhood and it has been seen that learning SL in initial stages leads to better development of speech.

It was interesting to note that teachers at a special pre-school that was visited quoted as saying 'It is easier/ possible for the minority group (Hearing Impaired Students) to learn the language of the majority (spoken language) and not vice versa' and this is the impression that one gets as the motto of the school. This pre-school gives admission to those who are of the age two and a half years or even less. They don't follow any admission date like the other schools as they believe that each and every day in a child's life is important and need to be counted. So they allow a child who is below the stipulated age to be admitted whenever he or she is brought to the school. This pre-school which is an early intervention centre for children with hearing impairments is in reality robbing off the child's critical period in vain speech drills.

According to the Principal of another school "the primary aim of teaching a child with hearing impairment is to use to its full extent the residual hearing and all the other talents inherent in the child to develop speech". He stated that for a hearing impaired child, to teach how to pronounce clearly should be the primary aim of a school. Rhythm, clarity and stress are the primary part of oral communication. These qualities are very much associated with singing and being a choirmaster himself and he insists on music

training for these children for the improvement in the clarity of speech. He also added that training in singing also develops the mental and emotional well-being of the child in question.

The negative attitude towards the SL is also evident from the fact that out of the forty-eight schools for the hearing impaired who had responded to the questionnaire sent by NCERT, only twenty-four (50%) used some form of signs. If we take the number of schools having trained teachers the percentage comes down to a mere fifteen per cent. The others rely on gesture and lip reading and speech practice. The effectiveness of speech drills as earlier explained depends on the degree of hearing loss and the lesser the degree of hearing loss the greater the success of the drill. It has been time and again proved that even the most efficient person in lip reading cannot fully understand the whole message. So all these practices are going to be in vain and the most precious time of the individual is lost. So in an oral-aural setting 'the education of the deaf will be reduced to training deaf children to speak without a language' (Narang, 2005). Added to this is the fact the schools that use SL have no teachers who are trained in Indian Sign Language (ISL). They use an amalgamation of those signs that are being used by the students when they are inducted to the schools.

"Whatever we do is heavenly for these children", was the statement of a principal of a school. Holding this outlook makes the schools reluctant to introduce new practices and methods in teaching leading to their stagnation. This attitude is also underscored by the fact that in the name of vocational training some schools give training in areas such as printing in the outdated, old block press method that prove inadequate for the child as a source of living as these things are no more in use.

### **Importance of SL in the Education of Hearing Impaired**

Stressing hearing impairment as pitched against the various other impairments is not the aim of this paper. Hearing is essential not only to the perception of different kinds of sound including speech sounds but also to the development of speech and oral communication and hence the time old phrase deaf and dumb. The more the hearing loss the less the child is able to speak. A child learns to speak when s/he gets the adequate feedback of his/her own speech as well as the sounds that are in the neighbourhood. This process is a continuous one. If the child has residual hearing then it is likely that the child acquires speech with the help of some hearing aids

and constant drills. Here the question of post-lingual<sup>1</sup> or pre-lingual<sup>2</sup> hearing impairment also arises. Those who are post-lingually hearing impaired have their language capability fully developed and so their speech will be intelligible though there will be some deterioration, as speech has to be constantly monitored by the self. The pre-lingually hearing impaired suffers the most, as s/he has not been introduced to the system of language through speech.

The main aim of the methods and strategies in the education of the children with hearing impairments should thus be to provide those students access to language by circumventing the “wall of silence”. Speech training that the schools give mainly concentrates on lip reading, the feel of the hands when placed on the voice box, etc. Lip reading will be possible only of those sounds in which lips are an active articulator, which includes only two distinct articulatory class namely bilabial sounds and labio-dental sounds for example p/, /b/, /m/, /f/ and /v/. However, it is true that many words look identical on the lips. There is again the problem of voiced versus voiceless which wholly rely on the number of vibration of the vocal folds. This to an extent can be overcome by placing the hand on the voice box and feeling it. But for languages like Hindi where phonemic distinction is based on aspiration<sup>3</sup>, differentiating the sounds become vague. This perception is even blind to a trained ear even with normal hearing to identify.

According to Vygotsky (cited in Zaitseva, 1999) teaching a hearing impaired child through oral method is ineffective and it diverts the attention from all other aspects of education and becomes an end in itself. He also argued that one must exploit all the possibilities for linguistic activity in the deaf child, not taking a loftily contemptuous view of SL and not treating it like an enemy and therefore must consider the question, both in theory and in practice, how SL and spoken or written languages are to be used in conjunction.

Research done on deaf college students has shown that many of them finished high school not realising the direct connection between learning English and being able to communicate through reading and writing. There is a fundamental lack of connection between what is taught in the English classroom and what the deaf student needs to have for communicative competence. At the core of this problem is

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<sup>1</sup> Post Lingual means persons who lost their hearing at a later stage in their lives after they have acquired the mother tongue or the first language.

<sup>2</sup> Pre Lingual refers to people who are deaf right from birth.

<sup>3</sup> The amount of air pushed outside from the initiator is called aspiration. Depending on this there can be two classes of words aspirated pronounced with more force and unaspirated pronounced with less force

the fact that learning English and learning to be a skilled reader have not been presented in the context of what the hearing impaired reader can see directly relates to his or her life (Pandian, 2007).

Visits to different schools in the country and meeting and interviewing several students and teachers (Julka, 2007) has brought to light the fact that those hearing impaired students who are taught in English or other vernacular languages (here we mean the spoken language of the place in question) are less equipped to face the world as compared to their peers in other schools where SL is used. A student who has completed his graduation from a college where ISL is the medium of instruction earlier shifted from a school where oral method was used, admitted that he had wasted six precious years of his life without understanding a single concept. Now he is able to understand different concepts clearly and easily and now helps his peers in gaining computer literacy. The main reason behind the poor performance of students not using SL can thus be stated 'that they were not able to find any correlation between the 'sound' (which were often a mishmash of sounds and some hodgepodge lip movements for them) and what it signifies, which is the essence of a language'.

Here the observation made by a trainer or a counsellor of hearing impaired students and their parents in a special school gains importance. She said that the parents are unaware of the fact that there is a full fledged language called SL and that their child can gain knowledge in this medium. With proper counseling one can make them understand what is good for their child. The special school where she works stands tall witnessing the success of such an initiative. A person with hearing impairment who works as a painter and is an excellent user of spoken language has stated emphatically that SL is necessary for teaching the hearing impaired as it is the only medium through which they can understand what is being taught. On the other hand lip reading to some extent is helpful in communicating with the hearing people. He also cautions that in order for him or for that matter anyone to lip read the other person must speak very slowly.

According to Wilbur (2000), capitalising on the students ISL background will help develop his/her "cognition, socialisation, and an age appropriate knowledge base, as well as providing a basis for learning English and English literacy." Cummins (1981) postulated that the underlying proficiency in one language leads to proficiency in any other second language. Research into the neural substrate

has time and again proved that parts of the brain responsible for the acquisition of language at birth gets deteriorated if they are not effectively utilised during the first four years, the critical period, for acquiring a language. The necessity of the hearing impaired being taught in ISL their mother tongue provides the rationale for bilingual education. Adding to this is the research by Marilyn Edmunds and Debra Krupinsky (2005) which concluded by stating, "The use of SL and finger-spelling is one of the many strategies that can be used to engage the young reader in developing early literacy skills. It is successful with learners of all types and levels." That is the learning languages of two different modalities improve the capacity of the brain.

Vaishna Narang (2005) gives the 'pre-conditions' for the easy and early movement from exclusive setting to inclusive setting and these can be stated as

- Recognising first language as means to cognition, thinking, conceptualising and formulating;
- Recognising SL as the natural mother tongue/first language for the hearing impaired, used as initial medium of cognition, thinking, conceptualising and formulating;
- SL as integral to the emotional well-being of the child;
- SL as a means to knowledge;
- SL as a means to knowledge of language (meta-language);
- SL as a tool to facilitate Bilingualism; and
- SL as a tool to facilitate early integration in mainstream.

### **Conclusion**

In recent years there has been a growing openness to the idea of children using language(s) of home, larger kinship group, street, community and neighbourhood. Multilingualism must be used as a resource and as stated by the NCF-2005, a classroom strategy and a goal by a creative language teacher. As far as communication modes are concerned, the issue is not which one of the communication modes is best, but that all communication needs must be addressed. These developments appeal the educators to take up a total communication method in classrooms which can address not only the individual needs but also the communication needs in general as well. As Zeshan has put it 'the use of ISL will also help, facilitate communication and socialisation of the hearing impaired, which leads to better self-esteem. Higher self-esteem leads to better educational achievement and overall adjustment (Zeshan, 2005).

There is a growing awareness from amid the hearing impaired communities on the need for education in their mother tongue. Those people who have learned SL in their early stages of life are better equipped to learn other languages and subjects. They contemplated that the schooling that they have undergone in mainstream settings has given just a certificate but no understanding. But at the same time when they were taught in SL they could better understand the concepts and now they are equipped with tools for meeting the growing needs of today's society. This concretises the view that the interpretation of the spoken words in a language is only a part of the human beings' ability of abstraction of the real world and the interpretation of signs.

Finally, one can look at hearing impairment from two different perspectives as a functional disorder that needs to be fixed or as a linguistic minority with a distinct language, culture and mores. In the former viewpoint, hearing impaired people are seen as handicapped. On the other hand, hearing impairment is seen as a difference, a difference which in no way connotes inferiority. At one hand, there are people who are "Diagnosed" as hearing impaired and at the other end, there are those who are "Identified" as hearing impaired with a different language, culture, norms, etc. (Zapien, 1998). So it is how we look at it that matters.

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# Correlation among Multiple Intelligences Through Parental Perceptions

SUJALA WATVE\*

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## ABSTRACT

*Howard Gardner assumes existence of eight intelligences. This study aimed at investigating the ways the parents perceive their ward related to different intelligences. Sample consisted of 100 high schoolers whose parents gave rating based on their observations regarding intelligences of their ward. A Multiple Intelligence (MI) rating scale based on activities, related to these intelligences was used for the purpose. Summated ratings on eight areas were subjected to correlational analysis. Almost all the correlations were found to be significantly high, except that between Linguistic and Interpersonal. Significant high correlations between Linguistic and Intrapersonal, but insignificant correlation between Linguistic and Interpersonal were revealed. Logico-mathematical appeared to be least correlated with others. Some probing into various such relationships is discussed to point new direction in case of parents' perception of multiple intelligences among their wards.*

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## Introduction

There is always a question whether the intelligence is a single entity or there are many? Psychologists like Thurstone (1931), Guilford (1967), Gardner (1993 a) have theorised that intelligences are many. The earlier two models have been rigorously studied by applying advanced statistics including factor analysis; the later is not, mainly because Gardner does not believe in measurement. There is no standardized tool available to assess intelligences.

Thurstone used factor analysis to extract seven primary mental abilities. Guilford postulated structure on theoretical assumptions.

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Gardner speaks on the basis of specific sites in the brain responsible for each of the intelligences. To support it empirically one needs some sort of measurement. Gardner sees intelligence through day-to-day activities. Who can observe these activities of children and decide level of excellence in these activities?

Parents are continuous observers of their children in daily activities from their infancy. The concern towards development of their children guides them to well understanding of the children's abilities and interests. They have questions regarding how to help the children in this respect. At the same time they could be biased in their perception when they compare their child with other children. They may not be able to determine standing of their child in the view of same age population; but they could prove good observers to assess the comparative abilities within the child. If the psychologists help the parents by providing some objective scale, the observations could be of help to review the theories regarding multiplicity of intelligences.

### ***Concept of Intelligence***

According to Howard Gardner intelligence is an ability to create an effective product or offer a service that is valued in a culture. It is also a set of skills that make it possible for a person to solve problems in life. He treats intelligence as a potential to gather new knowledge for getting solutions over problems.

Howard Gardner (1993a) defined intelligence as "ability to solve problems or fashion products that are of consequence in a particular cultural setting or community". By this definition intelligences of children need to be rated on the basis of expertise they show on the activities related to different intelligences.

### ***Many Intelligences***

Howard Gardner claims that all human beings have multiple intelligences (MI). They are independent of each other. How do they exist in human beings, especially children? To study this, profiles of persons need to be assessed.

These multiple intelligences can be nurtured and strengthened, or ignored and weakened. He believes each individual has eight intelligences. His assumptions were based on brain-injured patients. He stated that these intelligences are located in the different areas of human brain and can either work independently or together. He could not firmly state locations about some of these intelligences. As

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brain has uniform structure, all individuals are expected to possess all the eight intelligences. He also believes that these intelligences exist in individuals in different amount. Thus, each individual has a unique composition of these intelligences.

### ***Descriptions of Intelligence***

1. *Linguistic Intelligence*: The ability to work with words, grammar and language.
2. *Musical Intelligence*: The ability for working on pitch, rhythm, and timbre (sound quality).
3. *Logico-mathematical Intelligence*: The ability to work on abstract and logical relationships.
4. *Visuo-Spatial Intelligence*: The ability to work on visual or spatial information.
5. *Bodily-Kinesthetic Intelligence*: The ability to work with whole and parts of the body.
6. *Intrapersonal Intelligence*: The ability to distinguish among one's own feelings, intentions and motivations.
7. *Interpersonal Intelligence*: The ability to recognise and make distinctions among other people's feelings, beliefs, and intentions.
8. *Naturalistic Intelligence*: The ability to recognise and classify the flora and fauna.

MI theory grows out of a conviction that standardised tests, with their almost exclusive stress on linguistic and logical skills, are limited. As a result, the further development of MI theory requires a fresh approach to assessment, an approach consistent with the view that there are a number of intelligences that are developed and can best be detected in culturally meaningful activities (Gardner, 1993).

In biological terms, these may be thought of as different mental "organs" (Chomsky, 1980); in a computational metaphor, these may be construed as separate information-processing devices (Fodor, 1983). Although all humans exhibit the range of intelligences, individuals differ—presumably for both hereditary and environmental reasons—in their current profile of intelligences. Moreover, there is no necessary correlation between any two intelligences, and they may indeed entail quite distinct forms of perception, memory, and other psychological processes. Yet there are rarely any standardised tests to measure multiple intelligences. As a result, the further

development of MI theory requires a fresh approach to assessment, that too in culture fair way.

### ***Educability of Intelligence***

Gardner also considers intelligence as a trainable faculty. Appropriate exposure, opportunities for learning, and necessary guidance help in improving intelligence. Multiple laboratories in enhancing the intelligences are set up in USA. Several classrooms are working over children to nurture their intelligences, by various methods. New City Faculty, Bellingham Schools are prominent examples of such efforts.

### **Previous Studies**

Project Spectrum, co-directed by David Feldman of Tufts University, has developed a number of curriculum activities and assessment options suited to the “child-centred” structure of many pre-schools and kindergartens (Hatch & Gardner, 1986; Malkus, Feldman & Gardner, 1988; Ramos-Ford & Gardner, in press; Wexler-Sherman, Feldman & Malkus, Gardner, 1988).

Kornhaber (2001: 276), a researcher involved with Project Zero, has identified a number of reasons why teachers and policy makers in North America have responded positively to Howard Gardner’s presentation of multiple intelligences. The teachers have observed that students think and learn in many different ways. How the learning could be made more and more efficient? Curriculum assessment and pedagogical practices can be modified to match with children’s ways of thinking, which contribute to multiple intelligences. Implications of this theory have been translated into policy and practice. The approach entails a broad vision of education. Teachers, therefore, need to attend to seven intelligences, which seem to be closely associated with school subjects. The eighth intelligence, Naturalistic Intelligence is recent one and needs to be studied in the light of others.

In a pre-school study, Modified Spectrum Field Inventory was used to study the profiles of fifteen children in a combined kindergarten and first grade classroom. Children were assessed on ten different activities (story-telling, drawing, singing, music perception, creative movement, social analysis, hypothesis testing, assembly, calculation and counting, and number and notational logic) as well as the Stanford-Binet Intelligence Scale, Fourth Edition. Considering one standard deviation as a cut off point strengths and weaknesses of

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children were decided. Variety among the intelligence-profiles supports the multiplicity within intelligence. These results were reinforced by the fact that, for the most part, children’s performances on the activities were independent. Many such studies have supported the findings of this study to a large extent.

The Naturalistic Intelligence was not included and measured in this study.

**Purpose**

To study correlation among Multiple Intelligences expressed through activities, among high schoolers.

**Sample**

Sample consisted of parents of 100 high school boys and girls.

**Tool**

Multiple Intelligences checklist – This is a researcher made partially standardized checklist. The checklist consists of some activities children enjoy in their school age. (Checklist is constructed for in-house purpose).The checklist consists of 80 statements, 10 for each of the intelligences. Sample of the items and the answer sheet to be responded by parents is given here.

<i>Behavioural descriptions: Make a (✓) in the appropriate column in front of each of the statements to show applicability</i>	<i>Very poor</i>	<i>Poor</i>	<i>Okay</i>	<i>Good</i>	<i>Very good</i>
<p style="text-align: center;"><b>LINGUISTIC</b></p> <p>Writes Essay/stories/novels/ poems willingly</p> <p style="text-align: center;"><b>MUSICAL</b></p> <p>Can differentiate between two similar tones, voices</p> <p style="text-align: center;"><b>VISUO-SPATIAL</b></p> <p>Can arrange things by saving space, e.g. filling baggage, cupboard, etc.</p> <p style="text-align: center;"><b>LOGICAL-MATHEMATICAL</b></p> <p>Enjoys playing with numbers and symbols</p>					

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<b>BODILY KINESTHETIC</b> Shows good balancing skills(e.g. bicycle riding, skipping, hopping, etc)					
<b>INTERPERSONAL</b> Recognises and understands other's emotions and feelings					
<b>INTRAPERSONAL</b> Can recognise one's strengths and weaknesses					
<b>NATURALISTIC</b> Can recognise and classify plants correctly					

**Data Collection**

Parents were invited in small groups. They were explained the importance of knowing Multiple Intelligences among their children. Answer sheet was explained to them. The parents of the children were asked to indicate proficiency of their children on different activities stated in the checklist. They were requested to make a mark in the appropriate place as per their child's performance on each of the activities. Summated rating of each of the intelligence represented child's score on each of the individual intelligence.

**Treatment to the Data**

For MI checklist, the marked categories were assigned following scores.

**Rating System**

Very poor	1
Poor	2
Okay	3
Good	4
Very good	5

Score 1 was to be assigned if the child has never displayed the skill.

Score 2 was to be assigned if the child has displayed the skill or participated occasionally.

Score 3 was to be assigned if the child was continuously participating or following the activity for duration longer than 3 years.

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Score 4 was to be assigned if the child had occasionally secured prize or done well or appreciated by relatives and family members.

Score 5 was to be assigned if the child was consistently getting prize in competition at any level or they were publicly appreciated on any occasion.

Score for each area of the child was calculated as a summated rating. This score represents intelligence score on each of the areas. Each intelligence area consisted of ten items. Minimum and maximum possible scores for each area are thus 10 and 50, respectively. By MI checklist each child gets eight scores conveying parents' perception regarding the child's standing on eight intelligences. Total score for all the eight intelligences were recorded for each child. These total scores were used for further analysis. Table 1 speaks about descriptive statistics.

Correlations among the scores on eight intelligences are calculated. This gives correlational matrix as in Table 2. Range of correlation with other intelligences along with average correlation is shown in Table 3.

### Discussion

This study mainly focuses on correlations amongst Multiple Intelligences based on observations of parents.

Table 1 describes the mean, mode, medians of each of the Multiple Intelligences. Skewness and kurtosis show that these intelligences are normally distributed.

TABLE 1  
**Descriptive Statistics of Multiple Intelligences among Children as per Parents' Perception**

<i>N=100</i>	<i>Mean</i>	<i>Standard deviation</i>	<i>Median</i>	<i>Mode</i>	<i>Skewness</i>	<i>Kurtosis</i>
Linguistic	33.99	6.24	34	37	0.08	-0.33
Interpersonal	34.20	6.97	35	36	-0.22	-0.26
Intrapersonal	33.96	6.76	34	35	-0.05	-0.20
Spatial	32.08	7.45	32	30	-0.21	0.68
Bodily kinesthetic	32.82	7.63	33	37	-0.15	0.24
Musical	32.25	8.22	32	28	-0.12	0.34
Logical-Maths	31.75	8.25	32	30	-0.14	-0.10
Naturalistic	34.86	8.17	35	39	-0.43	0.16

TABLE 2  
Correlations among Intelligences for N=100

	Linguistic	Inter personal	Intra personal	Visuo-spatial	Bodily-kinesthetic	Musical	Logico-Mathematical	Naturalistic
Linguistic	1	0.23	0.47**	0.42**	0.36**	0.37**	0.27**	0.42**
Interpersonal		1	0.54**	0.48**	0.44**	0.46**	0.37**	0.46**
Intrapersonal			1	0.42**	0.45**	0.42**	0.43**	0.45**
Visuo-spatial				1	0.52**	0.63**	0.31**	0.49**
Bodily-K					1	0.57**	0.26**	0.61**
Musical						1	0.36**	0.48**
Logico-M							1	0.41**
Naturalistic								1

\*\* significant at 0.01 level.

TABLE 3  
Intelligence wise Average Correlations

Intelligences	Average correlations	Range of correlations	Lowest correlation with	Highest correlation with
Linguistic	0.36	.23 to .54	Interpersonal	Intrapersonal
Interpersonal	OA3	.23 to .54	Linguistic	Intrapersonal
Intrapersonal	OA5	A2 to .54	Visuo-Spatial	Linguistic
Visuo-spatial	OA7	.31 to .63	Logico-Mathematical	Musical
Bodily-Kinesthetic	OA6	.26 to .61	Logico-Mathematical	Naturalistic
Musical	OA7	.36 to .63	Logico-Mathematical	Visuo-Spatial
Logico-Mathematical	0.34	.26 to A3	Bodily-Kinesthetic	Intrapersonal
Naturalistic	OA8	A1 to .61	Logico-Mathematical	Bodily-kinesthetic

#### Correlation among Multiple Intelligences...

The table 2 shows overall significant and spectacular correlations among the intelligences. This needs further probing into existence of any single global factor, like Spearman's. Larger sample will be needed for this, hence not yet studied. Howard Gardner has questioned the idea that intelligence is a single entity, that it results from a single factor, and that it can be measured simply via IQ tests. "Nowadays an increasing number of researchers believe precisely the opposite; that there exists a multitude of intelligences, quite independent of each other; that each intelligence has its own strengths and constraints," says Gardner (1993, xxiii). At the same time Gardner claimed that the seven intelligences rarely operate independently a person has to apply his/her unique blend of intelligences while working on different tasks. These intelligences are used simultaneously and tend to complement each other as people perform or solve problems.

The above correlations support Gardner's postulate that if a child is low in certain area, the other area, which is his asset can be considered while educating him. It also indicates that balanced profile may prove more beneficial rather than giving education or training in single area. Parents may be guided in that fashion.

To go ahead with other findings, there is significant and high correlation among Visuo-spatial and Musical, as well as Musical and Naturalistic. There is also significant and high correlation between Bodily-kinesthetic and Musical. This suggests high co-existence of these three intelligences. This will prove useful in studying the new upcoming Naturalistic Intelligence. From another study (Watve, report submitted to UGC in April 2007) interviews of naturalists indicated that they use their sensory inputs and bodily sensations more while working on the 'Nature' .

All the correlations range from +0.23 to +0.63 for N= 100. All the values above 0.25 are significant at 0.01 level. A few of them have more influence on certain activities and a few of them have more contribution of other intelligences. From the above co-rrelations it is evident that Visuo-spatial and Musical Intelligences are likely to have remarkable co-existence while contributing to the activities. Similarly, Bodily-kinesthetic and Naturalistic Intelligences are likely to contribute more frequently in activities.

A few of them are likely to get expressed almost independently. Activities related to Logico-mathematical Intelligence show significant and average correlations; this means that Logico-mathematical Intelligence contributes independently in many activities; while

activities related to Naturalistic Intelligence seem to be loaded with many intelligences. Intrapersonal intelligence seems to be more or less similarly correlated with other intelligences; on the other hand, Bodily-kinesthetic seems to show widest range of correlation, having lowest with Logico-mathematical and highest with Naturalistic.

There is amazing finding that Linguistic and Intrapersonal are significantly correlated and there is no significant correlation between Linguistic and Interpersonal, when Interpersonal and Intrapersonal show significant high correlation. It indicates that two different factors are contributing to correlations amongst these two pairs. Logico-mathematical intelligence appears to be nearly independent factor and Intrapersonal having involvement in almost all the others.

### **Limitation**

As the sample consisted of mostly middle-class, school-going children residing in pune, limitations of homogenous sample have to be kept in mind.

### **Implementation**

This assures that the human intelligences jointly express in any performance at high school level. If an individual is lacking in either of them, another type of intelligence can help in improving the output. If a child is not able to understand a particular issue by one way of teaching, a method more appropriate to his thinking style can be used to make him/her understand it. Learning or training in either of intelligences may help the weaker areas to grow. The children having tendency of learning by visual observation are likely to be good in learning by listening. The children having good bodily synchronisation and having physical energy are likely to learn by exposure to nature and outdoor activities. There are likely to be two learning styles – learning by sensory inputs and learning by feedback of motor output. Parents could be made aware of the fact, which will give direction to parents for helping the children with special assets and special needs.

A child needs to be exposed to all sorts of activities to find out and nurture his intelligences. Offering each child 'know thyself, training, may prove basis of overall development. Logico-mathematical ability is likely to be innate, which needs to be studied in well-designed manner.

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**Development of Creative Abilities among  
Elementary School Students through  
Multi-dimensional Activity-based  
Integrated Approach  
*An Experimental Study***

TAPAN KUMAR BASANTIA\* AND B.N. PANDA\*\*

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**ABSTRACT**

*This study examined the effect of Multi-dimensional Activity-based Integrated approach (MAI) over Traditional Method of Teaching (TMT) in developing creative abilities among elementary school children through the subject. First, the creative abilities in the area of 'social studies' were identified and appropriate multi-dimensional activities were designed. A creative ability test was developed and used as both pre-test as well as post-test. Fifty-two students from class-VI of Demonstration Multipurpose school and 60 students from Class VI of Kendriya Vidyalaya, No.1, of Bhubaneswar city participated. Both the control group and experimental group were administered the pre-test. Then the control group was taught through traditional method of teaching (TMT) and the experimental group was taught through multi-dimensional activity-based integrated approach (MAI). Just after the treatment, both groups were administered the post-test. The results indicated that multi-dimensional activity-based integrated approach is a suitable approach for developing fluency and flexibility ability but not originality ability. The content area wise analysis of data indicated that multi-dimensional activity-based integrated approach was suitable approach for development of creative abilities in all content areas of history, geography and civics in social studies.*

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### **Introduction**

Creativity is the genesis of almost all the developments of the world. Recent theories of creativity in psychiatry and psychology in the United States and other western countries support the concept of creativity as a higher mental process as compared to earlier explanations of creative thinking that creativity is a regressive thought process and lower than logical and rational thought process (Torrance, 1979, P-4). These earlier explanations of creativity as the regressive thought process are losing their importance day by day. May (1975) has maintained that creative processes aren't irrational but are 'super-rational', bringing the intellectual, volitional and emotional functions into play together. He believes that the creative thinking represents the highest degree of emotional health and the expression of normal people in the process of actualising themselves. He further sees it as a process of involving a realistic encounter with a problem, intense absorption and involvement, heightened consciousness or awareness and interrelating. Albert Rothenberg (1976, a,b) a Yale University psychiatrist, has introduced two concepts that are definitely non-regressive in nature to explain creativity. One of these, Janusion thinking (Rothenberg, 1976a), consists of actively conceiving two or more opposite, contradictory and anti-thetical concepts, images or ideas simultaneously. He sees this not as a primary process mode of thought but as an advance type of abstract thinking. The second of these, homospatial thinking (Rothenberg, 1976b), consists of actively conceiving two or more discrete entities occupying the same space, a conception leading to the articulation of new identities. Neither Janusion thinking nor homospatial thinking is primitive or regressive. They are forms of thought that transcend logic and ordinary rational modes of thought. Both of them are important in creative thinking.

Individual and corporate creativity and imagination have now become a topic of study by cognitive psychologists, philosophers, educationists and management experts alike (Stern, 1992). Anna Craft in her book, *Creativity Across the Primary Curriculum* argued that the end of twentieth century is witnessing a massive shift in attitude to and importance of creativity and imagination in every lives and domains of knowledge. We need transformation both at personal and system level. Furthermore, the study of inventive and innovative aspects of human intellect is so important today that it has been described by Bruner (1962) as restoring dignity to human being in a computer dominated age and by Toynebee (1962) as vital aspect of nation's

resources. Moreover, in the light of '*knowledge explosion*' which is taking place nowadays and the consequent need for ever wide human, scientific and technological ingenuity, it has become essential that a nation must make the best possible use of all its creative resources if it is even to maintain its position in the modern world. Also, it is a fact that, we are living in a world of brain race in which creativity/ imagination plays a major role for our development.

Many of the researchers and experts in the field of creativity support the statement that 'the teaching of creativity as the good teaching'. Craft (2000) told "I would argue as other have done, that creative teaching is good teaching. Quite simply, teaching is a job, which requires and involves fostering creativity. Those who have written on creativity in education talk about creativity as a part of normality, as a part of every day action and ideas. Jeffrey and Woods', (1997, p,31) study draws attention to the need for creative classroom. The emotional climate of classroom needs to offer each child personal confidence and security; as Shall Cross writes 'the ground rules are personal guarantees that allow [children] to grow at the own rate, retain the privacy of their work until they are ready to share it, and prize their possible differences (1981, p,19). In this respect Craft (2000, p-126) stated, "I want to suggest that giving the fostering of creativity a higher priority in classroom may mean reframing practice at the level of individual as well as collective (school, LEA, educational system)". Moore (1961) and Orstein (1961) have shown that creative learning is more economical than rote learning, and it is even true to say that some children who learn poorly by conventional methods are effective learners when their teachers utilize their creative thinking abilities. Thus, it can be concluded from their views that teaching techniques, which utilise students' creative thinking abilities, promote more effective and efficient learning than those methods, which ignore them. Croplay (1970) rightly argued in favour of making the classrooms creativity centred and said, "in case of a student with marked creative potential, a creativity centred classroom will help him to develop his creative talents to the full while, in case of non-creative, approaching knowledge through creativity will help him to understand the way in which knowledge is organised and will make him a more efficient finder of adoptive solutions". Studies (Cawley & Chase, 1967; Rouse, 1965; Tisdall, 1962) suggest that even mentally retarded children are capable of thinking creatively. Modern psychotherapy also gives a positive signal for neurotic patients frantically craving for positive self image in freedom and

creativity. In this respect Allport (1958) states “psycho-therapy gives hope that a corrected self image, a more rational assessment of one’s behaviour, will reduce compulsions, induce order and free channels of development to accord with chosen aims”.

Research conducted in the area of creativity in classroom reveal that mostly the present-day classrooms are anti-creative (Alencar, 1999a; Cole, Sogioka & Yamagata-Lynch, 1999; Necka, 1994; Tolliver, 1985). Mackinnon (1978) acknowledged that most school environments don’t support creative development and many even suppress creative expression. The enormous waste of creative talents due to lack of opportunities for developing and expressing this creative potential has also been discussed by many authors (Alencar, 1995,1996; Alencar, Fleith & Virgolim, 1995; Montuory & Purser, 1995). It has been noted by them that schools emphasise knowledge acquisition; on the other hand, little attention has been placed on the development of strategies and techniques that can foster students creative potential. Alencar, Fleith and Martinez (2003) found that in Brazilian and Maxican societies university students do not have enough opportunities to express new ideas and are sufficiently stimulated and recognised for their creative expression.

In the area of creativity in school education, only a few studies have investigated the relationship between the teaching strategies and the fostering of creative skills; and the results found in such studies are encouraging. The studies of Parnes and Meadow (1959,1960), Sullivan and Tylor (1967) and Maltzman et. al. (1958, 60) have shown that creative abilities of the individuals can be enhanced through environmental stimuli. Maltzman, Bogartz and Breger (1958), for example, demonstrated an increase in the originality of responses to the ‘unusual uses’ test with appropriate training and Maltzman and other also demonstrated in a second study (Maltzman, Simon, Raskin & Licht, 1960) that this effect persisted over time and didn’t just apply to immediate re-administration of the test. Parnes and Meadow (1959) showed that training in ‘brain storming’ increased in scores on creative problem-solving, and improvement persisted even as much as four years after the training had been given. Torrance (1961) reported the result of a study, which has been conducted by him with the primary school children. He set out to show whether children in first three grades could be taught to produce ideas by the use of appropriate teaching methods and he found that in the second and third grades, trained children consistently surpassed untrained in all measures of creativity which he employed.

He concluded that school children .... can in a short time be taught a set of principles that will enable them to produce more and better ideas than they would have without training. Crawford (1954) maintains that it is foolish to say that the process of creative thought can't be taught as to say that medicine or engineering can't be taught.

The subject 'social studies' provides great scope for development of creative abilities of the individual. The research evidences also provide strong support to the subject social studies as a means for creativity development. The most significant research in this area of creativity has been reported by Hudson (1966). Hudson's study resulted that divergent thinkers showed an overwhelming preference to arts subjects (in other words they preferred literature, modern language, history, art and the like) while convergent thinkers strongly preferred science subjects (math, physical science and so on). Hudson (1973) suggested that children who excel in science, math and technology also do well on traditional IQ tests, where there is just one right answer or just one solution to the problems. In contrast, divergent thinkers find several possibilities for each question and are good at thinking of many possible solutions to a problem.

According to Hudson, arts and sciences demand different kind to thinking. One can easily draw the conclusion from Hudson's study that arts subjects provide greater scope for creativity development. Since social studies is a subject which generally remains in arts family, so, it has wide implications for creativity development of the learners.

The present study was designed to investigate the effect of multi-dimensional activity-based integrated approach (MAI) over traditional method of teaching (TMT) for developing creative abilities among sixth grade elementary school children through the subject social studies. The study was based on the assumption that multi-dimensional activity-based integrated approach is considered as a better strategy than traditional method of teaching for developing competency wise creative abilities (i.e. fluency, flexibility and originality) and contentwise creative abilities in social studies.

### **Method**

**Participants:** 112 students participated in the present study. Out of these 112 students, 52 students were from Class-VI, Demonstration Multi-purpose School and 60 students were from Class-VI, Kendriya Vidyalaya - No.1 of Bhubaneswar City. All the 52 students of

Demonstration Multi-purpose School constituted the members of control group whereas all the 60 students of Kendriya Vidyalaya No.1 constituted the members of experimental group. Purposive sampling method was followed for selection of these participants. The main concern for selection of these two schools was that, both the schools were affiliated to Central Board of Secondary Education New Delhi; and both the schools were English medium co-educational schools, well-equipped, with infrastructural facilities and situated in the heart of the city of Bhubaneswar.

### ***Phase-I***

#### ***Design of the Experiment***

***Identification of Creative Competencies:*** Three important types of creative competencies, i.e. fluency, flexibility and originality in the area of social studies (geography, history and civics).

***Development of Multi-dimensional Activities:*** Six topics from the Class VI 'social studies' textbook were taken as the medium for this creativity development. Out of these six topics two topics, i.e. (i) India our country; and (ii) Our climates, natural vegetation and wildlife were from geography, two topics, i.e. (i) India's cultural contact with outside World; (ii) Major religions, were from history, and two topics, i.e. (i) How people in cities meet their needs; (ii) Caring for things belonging to us all were related to civics. A number of multi-dimensional activities were developed on the principles of 'multi-dimensional activity-based integrated approach' for teaching the above stated topics for the development of creativity. In some cases, many parts of the above topics were also redesigned and modified according to the objectives of the study.

Some of the exemplar multi-dimensional activities used in the present study for creativity development are:

#### ***Activity 1***

**Area** - Different countries of the world

**Broad objectives** - Creativity development

**Strategy** - Listing the names of the countries

**Mode** - Individualised

***Activity Followed:*** English has 26 letters (from A to Z). Each student was given a paper containing the name of the letters-A to Z serially.

They were told to write the names of as many as countries referring to the name of the letters – A to Z within the given time. Here is given below the outline of such task.

Letter Name	Name of the Countries						
A.	.....	.....	.....	.....	.....	.....	.....
B.	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....
Y.	.....	.....	.....	.....	.....	.....	.....
Z.	.....	.....	.....	.....	.....	.....	.....

### Activity 2

**Area** - Uses of forest and evil effects of cutting forest

**Broad objective** - Creativity development

**Materials required** - Drawing sheet, colour pencil, rubber, etc.

**Strategy** - See a chart and prepare another chart

**Mode** - Individualised

**Activity Followed:** In the present activity, the students were instructed in the following ways:

‘Here is given a chart regarding uses and importance of forest. See this chart and prepare another chart (a model of blank chart is given) showing as many as evil effects of the cutting of forests.

### Activity 3

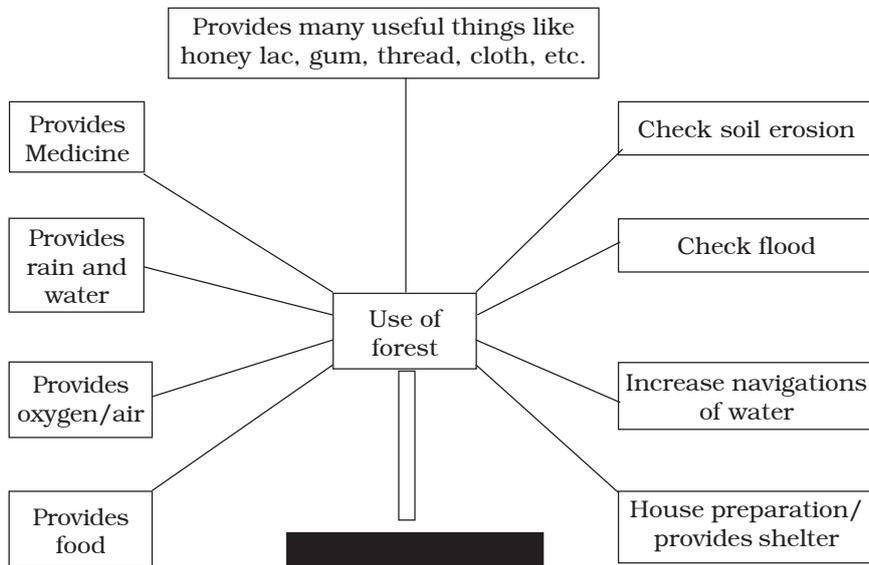
**Area** - City life Vs rural life

**Broad objective** - Creativity development

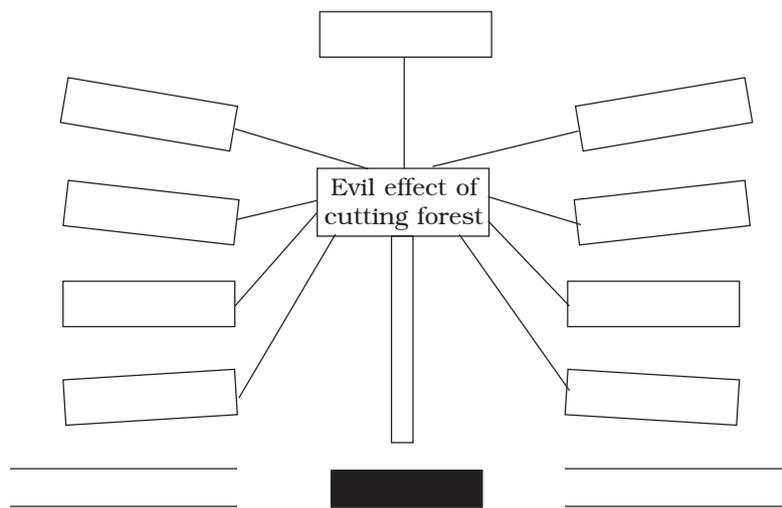
**Strategy** - Logical contradiction, open ended essay, direct analogies, attribute or strategy listing, and observation and reporting

**Mode** - Individualised

**Activity Followed:** In the present activity, the students were given a few tasks following the different strategies of teaching-learning. The students were instructed to complete such tasks in their home and



**A Chart Containing the uses of Forest**



**A Chart Would Contain the Evil Effects of Cutting Forest**

submit in the class for discussion and analysis. The tasks with the strategies are given below.

<b>Strategies</b>	<b>Tasks</b>
Logical contradiction	Contradict the statement – “City life is better than village life”.
Logical contradiction	Contradict the statement – “Village life is better than city life”.
Open ended essay	Compose an essay on the topic – “Present day city life is polluted”.
Direct Analogies Attribute/ strategy listing	List down the similarities between city life and rural life. List down as many strategies through which urban or city life can be properly maintained.
Observation and reporting	Go to the nearby slum area of your residence, observe as much as problems of the people facing in that slum area and report their problems.

**Development of Creative Ability Test:** A self-developed creative ability test named as “Basantia’s Test of Creative Ability in Social studies (BTCS)” was used both as pre-test and post-test in present study. The test included 13 items and out of these 13 items, 5 were from the content area of geography, 4 were from the content area of history and 4 were from the content area of civics. All the test items were related with the topics taught to the subjects for creativity development. The items included in BTCS didn’t have any fixed answer(s). The participants and examinees were free to give as many as answers for the same question according to their ability. An important characteristic of the items present in BTCS was that, from the same item three types of creative competencies (fluency, flexibility and originality) were scored. Fluency was scored on the basis of number of responses given by the respondent, flexibility was scored on the basis of categories of responses given by the respondent, and originality was scored on the basis of the unusual responses given by the respondent to the same item. Construct validity was established for the present test. The reliability of the test was calculated by administering the test on a small sample (N=20) of VI grade student of Kendriya Vidyalaya No.1, Bhubaneswar city, and the reliability co-efficient was found to be 0.72.

### **Phase-II**

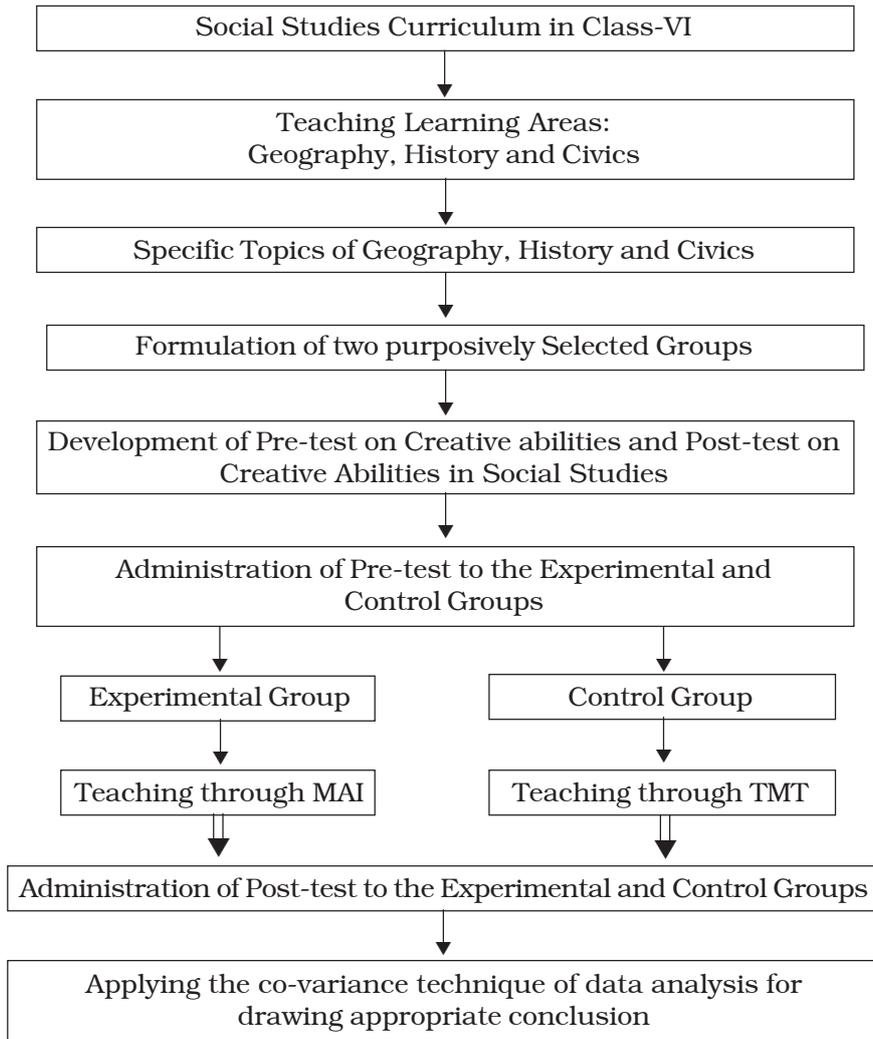
**Design and Data Analysis:** The experiment was conducted in natural classroom setting. Unequated two-group pre-test-post-test design was followed for this experiment. At first, pre-test was administered on both the control and experimental groups for collection of baseline data for further comparison. After the collection of base line data, the experimental group was taught through MAI and the control group was taught through TMT. In this experiment, the teaching strategies like MAI and TMT were considered as independent variables and the development of creative abilities in social studies among Class-VI students was considered as dependent variable. After the treatment was over, the post-test was administered on both the control and experimental groups. Scoring of the pre-test result and post-test result was done following the appropriate scoring procedure. Analysis of co-variance (ANCOVA) method was followed for analysis of data. The result of the study was also represented graphically for better understanding. The detail of the design of the experiment is given in Chart-II.

### **Phases-III**

#### **Results**

As regards the effect of MAI over TMT in developing fluency competency in social studies, the results of pre-treatment evaluation (F ratio=2.494,  $P<0.05$ ) signifies that the control group ( $m=107.75$ ) and experimental group ( $m=118.58$ ) did not differ between themselves in respect of fluency competency in social studies. The results of the treatment evaluation (F ratio =12.509,  $P<0.01$ ) indicate that significant variation was found between mean fluency competency scores in social studies of experimental groups ( $m=145.40$ ) and the mean fluency competency scores in social studies of control group ( $m=124.73$ ). When the post-test results of both experimental group and control group were co-variated with their respective pre-test results through analysis of covariance procedure ( $F_{y.x}=53.281$ ,  $P<0.01$ ), it was summarised that, the performance of the experimental group is significantly better than the control group. Hence, it is concluded that MAI is a suitable and effective strategy for developing fluency competency in social studies than the TMT strategy at the elementary level. One can easily remark from this conclusion that, teaching-learning process concerning to different types of target oriented multi-dimensional activities can yield better creativity

**CHART-II**  
**Design of the Study**



development among students than the traditional approach of teaching-learning.

Regarding development of flexibility competency in social studies, prior to the treatment, at the pre-test level, the mean level scores of the experimental group ( $m=54.95$ ) was significantly better

(F ratio =10.627,  $P<0.01$ ) than the mean level scores of the control group ( $m=46.37$ ). After the treatment, at the post-test level, also the experimental group ( $m=68.93$ ), superceded (F ratio=33.491,  $P<0.01$ ) the control group ( $m=54.13$ ). When the post-test results were co-variated with pre-test results through analysis of co-variance procedure, the analysis of co-variance results ( $F_{y.x}=45.872$ ,  $P<0.01$ ) indicated that significant difference was found between experimental group results and control group results. Taking into consideration, the analysis of co-variance results and the mean level performance of both groups form pre-test level to post-test level, it was safely concluded that, MAI is a beneficial method than TMT at the elementary stage for developing flexibility competency in social studies.

The pre-test level data with regard to originality indicated that the control groups ( $m=1.69$ ) and the experimental group ( $m=1.58$ ) did not differ significantly between themselves (F ratio=0.134,  $P<0.05$ ) in respect of possessing originality competency in social studies. After the treatment, at the post-test level also the control group ( $m=1.90$ ) and the experimental group ( $m=1.98$ ) did not differ significantly (F ratio = 0.046,  $P<0.05$ ) among themselves. When the post-test results of both the groups were co-variated with their pre-test results through the analysis of co-variance procedure, the analysis of co-variance results ( $F_{y.x}=0.065$ ,  $P<0.05$ ) also indicated that no significant difference was found between the performance of the control group and the performance of the experimental group. That means, the treatment had no effect. So, it was concluded that treatment effect of MAI had no significant merits over TMT in developing originality competency in social studies at the elementary level.

It was evident from the pre-level data regarding creative ability in geography that the performance of the control group ( $m=61.08$ ) and the experimental group ( $m=62.97$ ) did not differ between themselves significantly (F ratio=0.254,  $P<0.05$ ). But, from the post-test level data, it is evident that the performance of the experimental group ( $m=75.88$ ) was better (F ratio=4.830,  $P<0.05$ ) than the performance of the control group ( $m=68.65$ ). When the post-test results were co-variated with the pre-test results through analysis of co-variance technique, it was resulted that ( $F_{y.x.}=26.346$ ,  $P<0.01$ ) the experimental group performance differed from control group performance significantly. By taking into consideration the mean level performance of both the groups from pre-test level to post-test level as well as the analysis of co-variance results, it was concluded that

MAI is relatively a better strategy than TMT for developing creative ability of geography content area in social studies.

Regarding creative ability in history, the pre-test level data signify that there lies difference (F ratio=14.213,  $P<0.01$ ) between pre-test mean scores of control group ( $m=40.00$ ) and pre-test mean scores of experimental group ( $m=52.45$ ). The post-test level data also signify that there lies difference (F ratio=31.450,  $P<0.01$ ) between the mean post-test scores of control group ( $m=49.17$ ) and the mean post-test scores of experimental group ( $m=66.13$ ). The analysis of co-variance results ( $F_{y,x}=27.394$ ,  $P<0.01$ ) also suggest that there lies significant difference between control group performance and experimental group performance. The mean level performance of the experimental group was better than the control group from pre-test level to post-test level. Taking together the mean level performance of both the groups from pre-test level to post-test level and the analysis of co-variance results, it was concluded that the methodological difference leads to the difference in developing creative ability of history content area in social studies; and MAI is better than TMT in this respect of developing creative ability of history content area in social studies.

The pre-test level data in civics indicated that the control group ( $m=54.73$ ) and the experimental group ( $m=59.70$ ) did not differ significantly among themselves (F ratio=2.323,  $P<0.05$ ) in respect of possessing creative ability of civics content area in social studies. But, from the post-test level data, it was found that the experimental group ( $m=74.30$ ) supercedes significantly (F ratio=14.123,  $P<0.01$ ) to the control group ( $m=62.94$ ) in respect of attainment of the same creative ability of civics content area in social studies. When the post-test results of both the control and experimental groups were co-related with their pre-test results through the analysis of co-variance technique ( $F_{y,x}=35.857$ ,  $P<0.01$ ) it was also found that the performance of the experimental group differs significantly than the performance of the control group. Taking into consideration the mean level performance of both the groups from pre-test level to post test level and the analysis of covariance results, it was safely concluded that methodological difference leads to difference in bringing development of creative ability of civics content area in social studies; and MAI is relatively effective than TMT in this regard.

From the above analysis, it is concluded that MAI is an effective strategy than TMT for developing fluency and flexibility competency in social studies, but not the originality competency in social studies. Though originality is an important component of creative ability but

the present strategy of MAI did not show any significant effect than TMT for achieving this. This failure of MAI for achieving the target level originality competency may be due to two important reasons, i.e. (i) originality ability is an in-depth and unique ability of the individual which requires a long-term training for its development, but the existing training was only meant for six months which couldn't develop the originality ability of the children; and (ii) the existing multi-dimensional activities may have some sorts of limitations to develop the originality competency. Therefore, steps may be taken to extend the period of treatment and/or use more and more sophisticated or target oriented multi-dimensional activities which in MAI approach for developing originality ability in social studies among the elementary school students. The content area wise analysis of data states that MAI is a suitable strategy than TMT for developing creative abilities in all the content areas in social studies, i.e. creative ability of geography content area, creative ability of history content area and creative ability of civics content area.

### **Discussion**

The studies conducted by Gomes (2005), Niu and Sternberg (2003), Grawitch, Munz and Kramer (2003), Haward-Jones; Svensson; Norlander and Archer (2002), Morse; Morse and Jones (2001), Antonietti (2000), Fleith (1999), Eisenberger; Armeli and Pretz (1998), Bansal and Agarwal (1997), Sharma (1995), Gulati (1995), Mandai (1992), Gujurathi (1992), Jawaharlal (1990), Kumari (1990), Malhotra (1990), Tripathi and Shukla (1990), Shan (1989), and many other studies resulted that different aspects of creative abilities of the learners can be developed through using the different nurturing strategies and creative inducement programmes. All these studies more or less corroborate with the present study. Because, present study states that barring to originality aspect of creativity, the other two important aspects of creativity, i.e. fluency and flexibility can be developed to a significant level through the multi-dimensional activity-based integrated approach. The content area wise analysis of the results of the present study gives the indication that the creative abilities of different content areas, i.e. creative ability in geography content area, creative ability in history content area and creative ability in civics content area can be developed to a significant level through the present MAI approach of teaching-learning; and this result provides a strong base to the present study in order to be juxtaposed with the above mentioned studies.

Some of the studies in the area of creativity also indicated that creativity enhancement programmes and strategies are hardly able to enhance the creativity among the target group (Hobbs Trap, 1998; Chaudhari, Vaida, Navalakha & Mohapatra, 1999). Hobbs Trapp studied the effect of Feldman's art criticism model on the creative productions of selected junior high school students, and the results of this study suggested that the said art criticism model may not have significant effect on students' creative productions. Chaudhari, Vaida, Navalakha and Mohapatra studied the effect of synetic model (SM), gaming strategy (GS) and traditional method upon the creativity of the learners, and it was resulted from that study is that the SM, the GS and the traditional method produced no significant variations on the mean gain creativity scores of the learners. Only one aspect of results of the present study juxtaposes with these two above stated studies, i.e. MAI approach used in the present study couldn't be able to a develop the target level originality ability in social studies of elementary school students.

In many studies, steps have been taken to develop creative ability along with many other abilities like cognitive ability, social skills, self-concept, learning efficiency, etc. through the different teaching learning strategies and programmes. The studies conducted by Mishra and Basantia (2003), Bluman-Pardo (2002), Singer and Lythcott (2002), Tennyson and Breuer (2002) and Jaimini (1991) are best examples in this regard. The results found in these studies also corroborates with the present study since they fall in the line of the present study in one-way or other.

### **Implications of the Present Study**

The present study has the following implications for the teaching-learning process:

- The development of the creative abilities (in terms of divergent thinking) of the learner should be one of the significant aims of our teaching-learning process.
- Due care must be taken to develop creative ability of the learner through the teaching of different school subjects instead of teaching creativity as a separate discipline.
- Due care must be taken to use the subject 'social studies' as one of the best means for the creativity development of the young learners of our schools.

- The teacher should try the best to use multi-dimensional activity-based integrated approach for developing creative abilities of the learners.
- Planning must be made starting from national level to local level for flourishing all the creative talents and characteristics of the learners of our schools.
- Quality education for the learners in our schools should be interpreted from the point of view of the holistic development of the learners by giving special emphasis on the development of the creative abilities of the learners.
- The development of creative ability of the learners should not only the part of the objectives of our teaching-learning process but this development of creative ability of the learners should form an integral part of our teaching-learning procedure, textbook, evaluation procedure and in a single word all the inside and outside activities of the school.

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# Relationship of Thinking Style with Physics Achievement among Higher Secondary Students of Kerala

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## ABSTRACT

*This study examined whether thinking styles that favour short-term and long-term achievement in science are different, among senior secondary students in Kerala (n=617). The hypothesis that 'type I thinking (legislative, judicial, global and liberal styles) favours long-term but not short-term achievement and type II thinking (executive, local, monarchic, and conservative styles) favours short-term but not long-term achievement' could be accepted only partially. Legislative (among girls) and judicial (among boys) styles contribute to long-term achievement and executive (boys) style is unfavourable to long-term achievement. However, local style is favourable and global style is unfavourable to achievement in science among boys only. Anarchic style has negative influence on short-term and long-term achievements of girls and long-term achievement of boys.*

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## Introduction

Teachers often assume that students performance levels are based on their intelligence, effort, and motivation. Theories of intellectual styles are new entrants into the traditional family of theories of student development. Three most frequently used terms in this connection are cognitive styles, learning styles, and thinking styles. These styles although different are having one feature in common; they are individual's preferred ways of processing information and using abilities that they have. The research in differences in the ways of

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thinking of individuals has crystallised in terms of thinking styles. A thinking style is the preferred way of thinking and managing activities. Sternberg (1997) defines thinking style as a personality attribute to utilisation of abilities.

In actual instructional practice, schools and other institutions value certain ways of thinking over others. Students whose thinking styles do not match those valued by the institution are usually penalised. For example, among the university students, even after age, gender and academic discipline were controlled particular thinking style predisposed students to particular teaching style (Zhang, 2002). It is necessary that schools take into account student's style and consider the chances of fit between the ways of teaching a subject and the ways the students think. Science is more like a way of investigation and thinking than a body of knowledge. The process aspect of science concentrates on the way of thinking. The awareness of styles of thinking is useful in perceiving the students as they are. Schooling is to teach students how to think than teaching them what to think (Clemen & Lochhead, 1979). Since educational institutions give high priority to academic achievement, the contributions of thinking style to achievement demands research attention.

In mental self-government theory, Sternberg (1997) contended that as there are many ways of governing a society, there are many ways of governing and managing our activities. These different ways of managing our activities are our thinking styles. Thus, Sternberg (1997) defines thinking styles as our preferred ways of governing or managing activities. He proposed thirteen thinking styles grouped within five dimensions of mental self-government, viz. function, form, level, scope, and leanings.

*Function* refers to how mind copes with the world. Like any government the mind legislates, plans, implements, executes, judges, and evaluates. Hence, Sternberg identifies the three distinctive thinking styles in the functioning of mind as legislative, executive and judicial. *Form* refers to the preferred ways of approaching and dealing with problems. The theory specifies four forms: monarchic, hierarchic, oligarchic and anarchic. Just as government function at multiple levels, for example, federal state, country, city and so on, so does people. The *levels* of mental self-government are global and local. Although global and local styles are often viewed as two ends of the same continuum, most people tend to be either more global or local. However, some people function at both the levels. Sternberg classified the *scope* into internal and external on the assumption that

governments need to deal with internal or domestic affairs and with external or foreign ones. Similarly, mental self-governments need to deal with both internal and external users. *Learning* encompasses liberal and conservative thinking styles.

### **Differences in Thinking Style**

Thinking styles are not good or bad in themselves. Instead, the utility of a style for an individual depends upon the interaction of the task the individual is performing with the situation in which the task is performed (Zhang, 2002). Review shows that there are differences in preferences for thinking styles between males and females, among different age groups, and between people belonging to different socio-economic strata. Gender based style differences are more in functions of thinking and negligible in leanings of thinking styles. Cilliers and Sternberg (2001) found significant gender difference only in one out of thirteen thinking styles; females showed significantly stronger preference for executive thinking style. Male students scored significantly higher on the global thinking styles (Zhang & Sachs, 1997). Verma (2001) also noted that female college students had greater inclination towards the use of legislative and executive thinking styles where as male students had tendency to adopt monarchic thinking styles. Gender had significant influence on executive, anarchic, and external thinking styles (Verma & Monika, 2006). Secondary school students from high socio-economic status families obtained significantly higher score on legislative thinking style than students from lower socio-economic status families (Sternberg & Grigorenko, 1995). Rural urban differences in thinking styles are almost negligible (Verma, 2001). Indian senior secondary students had significantly stronger preference for legislative and conservative thinking styles and lower preference for global and external thinking (Verma, 2004).

### **Thinking Styles and Academic Achievement**

Substantiating Sternberg's (1997) claim that styles contribute to achievement beyond what can be expected by student's intelligence, most of the studies on thinking styles showed a significant relationship with academic achievement (Berenado & Celcieng 2002; Cano Garcia, 2000; Zhicheng & Stephen, 1997). However, there are studies that could see lesser or no relationship between thinking style and academic achievement (Betoret, 2001; Gakhar, 2006).

Styles show significant correlation with academic achievement of secondary school students evaluated by marks in final examination and independent project (Grigorenko & Sternberg, 1997). Executive, local and conservative thinking styles significantly and positively predicted students' achievement in advanced level tests. The liberal and global thinking styles negatively contributed to achievement (Zhang & Sternberg 1998). Zhang (2002) found that legislative and executive styles correspond to high achievement. Cano Garcia's study (2000) found internal, legislative and executive styles contributing to achievement. Percepts of Sternberg's theory and the observed influence of thinking styles on academic achievement apply to non-western cultures as well (Berenado & Cellcieng, 2002).

When one attempts to gauge the contribution of individual styles to achievement, the picture is less than clear. There are evident contradictions among the findings emerged from the studies in this field. Most of the studies show that thinking styles contribute to achievement, especially of executive and legislative styles. There is lack of sufficient studies to suggest an unambiguous view regarding the contribution of forms of thinking style to achievement. Zhang and Sternberg (1998) found that local style predicts achievement and global style negatively contributes to achievement. Regarding the scope of thinking style dimension the only study supporting its contribution to achievement is by Cano Garcia (2000) that internal style contributes to high achievement. Zhang and Sternberg (1998) found that liberal style contributes negatively to achievement.

Studies (Zhang, 2004; Cilliers & Sternberg, 2001) remind that thinking styles are subject specific. Thus, the use of hierarchical thinking style significantly contributes to better achievement in social sciences and humanities and the use of judicial style uniquely contributes to achievement in natural sciences (Zhang, 2004). Park et al., (2005) found legislative, judicial, anarchic, global, external and liberal styles contribute to scientific giftedness.

Students who tend to employ legislative, judicial, global and liberal styles (referred to as Type I thinking styles) also tended to report a deep approach to learning. Students who indicated a tendency to use executive, local, monarchic, and conservative styles (referred to as Type II thinking styles) tended to report a surface approach to learning (Zhang & Sternberg, 2000). Analytical style students were more likely to achieve information than students with more global cognitive style do (Shain, Farber & Barry 1989). Hence, the less than converging findings on the influence of thinking styles on achievement are attributable not only to the subject-specific nature

of style-achievement relationship, but also to the nature and scope of the index of achievement used by different investigators. The present study was an attempt to explore this possibility. Thinking style being subject specific (Zhang, 2004; Cilliers & Sternberg, 2001) and susceptible to be influenced by gender (Verma & Monika, 2006; Cilliers & Sternberg, 2001; Verma, 2001; Zhang & Sachs, 1997) these factors were taken into account in the design of the study.

### **Hypothesis**

It was hypothesised that type I thinking styles (legislative, judicial, global and liberal) are favourable to long-term achievement in science but not short-term achievement and type II thinking (executive, local, monarchic, and conservative styles) might be favourable to short-term achievement in science but not for long-term achievement.

## **Method**

### **Sample**

A representative sample of 617 eleventh grade students drawn using stratified random technique from 12 schools of two revenue districts of Kerala State of India participated. The total sample included 344 girls and 273 boys from government and government-aided senior secondary schools. These students belonged to the age group of 17+ years. They had just completed their 10 years schooling successfully and enrolled in senior secondary school for pursuing their studies in science subjects including physics, chemistry, biology and mathematics.

### **Measures**

#### *Thinking Styles Inventory*

Developed by Gafoor and Lavanya (2007), this measure has thirteen thinking styles under five dimensions namely functions, forms, level, scope, and leanings. There are 48 items that can be completed in 30 minutes. The language employed is mother tongue of respondents. Retest reliability was estimated between .69 and .97. The criterion related validity obtained with "Sternberg-Wagner Thinking Style Inventory" developed by Sternberg and Wagner (1991) was between .58 and .72. The validity coefficients show that the test is valid for the purpose of study.

*Physics Achievement*

This study included two indices of achievement in science. The first was the score on 'Test of Achievement in Physics' (Gafoor & Lavanya, 2007). It covers uniform motion, motion in two and three dimensions and laws of motion of standard XI of higher secondary school physics in Kerala with maximum score of 20. Reliability coefficient of whole test (using split-half method, N=40) is 0.93 and criterion related validity coefficient is 0.77 (N=40). The score obtained from this objective test is taken as the index of short-term achievement as the test is limited to the unit of motion only that was taught in the schools one month before the collection of data.

The second index of achievement in science considered in the study was the numeric grade obtained by the student in physics for the Secondary School Leaving Certificate (SSLC) examination. This grade point is derived as an aggregate of scores of a written test conducted by the Board of Examinations (Kerala State), and continuous evaluation of the student in the school based seminars, projects and other assignments done in science. This numerical grade is an index of more stable achievement in science. In order to make comparison between the indices of short-term and long-term achievements meaningful, the scores obtained on both were transformed into standard scores (z scores).

**Results*****Science Achievement by Gender***

The mean scores of achievements (in terms of z scores) obtained by male and female students did not show gender difference in short and/or long-term term achievements in science. (Long term:  $\bar{X}_{\text{boys}} = -.03$ ,  $\bar{X}_{\text{girls}} = 0.02$ ,  $t = 0.60$ ; Short term:  $\bar{X}_{\text{boys}} = 0.03$ ,  $\bar{X}_{\text{Girls}} = -.02$ ,  $t = 0.60$ ).

***Thinking Styles among Boys and Girls***

As the second step of analysis, girls and boys were compared with respect to their thinking styles using test of significance of difference between means. Boys prefer legislative thinking (mean= 3.75, S.D=1.53) more than that of girls (mean= 3.46, S.D=1.58) [ $t = 2.30$ ,  $p < 0.05$ ]. Girls (mean= 3.47, S.D=1.70) are ahead than boys (mean= 3.20, S.D=1.72) in executive thinking, but the difference is not

statistically significant [ $t = -1.92, p > 0.05$ ]. There exist no gender difference in the preference for, judicial ( $t = 0.41, p > 0.05$ ), hierarchic ( $t = 1.43, p > 0.05$ ), oligarchic ( $t = -1.47, p > 0.05$ ), monarchic ( $t = 1.27, p > 0.05$ ) and anarchic ( $t = 0.89, p > 0.05$ ) styles of thinking. Gender difference is not significant in global thinking ( $t = .78, p > 0.05$ ), local thinking ( $t = -.78, p > 0.05$ ), external thinking ( $t = 1.06, p > 0.05$ ), internal thinking ( $t = -1.06, p > 0.05$ ), conservative thinking ( $t = -1.08, p > 0.05$ ), and liberal thinking, ( $t = 1.08, p > 0.05$ ).

### **Achievement in Science of High and Low Groups of the thirteen Thinking Styles**

High and low groups on each thinking style were formed by dividing the sample based on mean score obtained on the thinking style. Mean scores (short-term and long-term) of achievement in science obtained for high and low groups on each thinking style were compared using t-test. The results are in Table 1.

Among girls, high and low groups on four thinking styles differ in the short-term achievement. Short-term achievement is significantly higher among the girls having higher external style of thinking. Conversely, short-term achievement is significantly lesser among girls having higher preference for anarchic, internal and conservative styles of thinking. In short, higher preference for external style is favourable while the higher levels of anarchic, internal and conservative styles of thinking are unfavourable for short-term achievement in science among girls. Further, among girls, high and low groups on two thinking styles namely – legislative and anarchic styles significantly differ in the long-term of achievement. Long-term achievement is significantly higher among the girls having higher legislative style of thinking. Long-term achievement is significantly lesser among the girls having higher anarchic style of thinking. Thus, among girls, higher anarchic style thinking results in lesser short-term as well as long-term achievements, and, higher legislative style of thinking is associated with higher long-term term, but not short-term, achievement. Higher external style of thinking enhances short-term, but not long-term achievement among girls. Higher internal and conservative styles of thinking among girls are associated with lesser short-term, but not long-term, achievement in girls.

Among boys, high and low groups on four thinking styles differ significantly in the short-term achievement. Short-term achievement is significantly higher among boys with high judicial and local styles of thinking. Conversely, short-term achievement is significantly lesser

TABLE 1  
**Comparison of Mean Score of Achievement in Science of High and Low Groups based on thirteen Thinking Styles**

Thinking style	Comparison of Means of Short-term Achievement between High (H)-Low(L) Groups on Styles				Comparison of Means of Long-term Achievement between High (H)-low(L) Groups on Styles			
	Girls sample		Boys sample		Girls sample		Boys sample	
	Mean difference H-L	t	Mean difference H-L	t	Mean difference H-L	t	Mean difference H-L	t
Legislative	0.09	0.61	-0.14	-1.03	0.37	2.96**	0.08	0.59
Executive	-0.07	-0.66	-0.31	-2.51*	-0.13	-1.22	-0.31	-2.47*
Judicial	-0.04	-0.40	0.34	2.61*	0.10	0.92	0.33	2.54*
Hierarchic	0.13	1.23	0.19	1.52	0.09	0.88	0.11	0.89
Monarchic	0.03	0.23	0.15	-1.14	0.07	0.67	-0.21	-1.68
Oligarchic	-0.09	-0.82	-0.10	-0.75	-0.03	-0.28	0.02	0.13
Anarchic	-0.32	-2.56*	-0.22	-1.54	-0.34	-2.65*	-0.30	-2.13*
Global	-0.03	-0.25	-0.29	-2.29*	-0.03	-0.29	-0.51	-4.21*
Local	-0.10	-0.98	0.26	2.13*	0.13	1.22	0.36	2.96**
External	0.29	2.78**	0.06	0.50	-0.02	-0.14	-0.23	-1.85
Internal	-0.24	-2.24*	-0.01	-0.01	0.06	0.56	0.21	1.66
Conservative	-0.21	-1.99*	-0.15	-1.17	-0.12	-1.13	-0.12	-0.98
Liberal	0.12	1.09	0.20	1.59	0.11	1.04	0.13	1.07

\* p< .05 \*\*p<.01

among boys with high executive and global styles of thinking. That is, higher judicial and local styles thinking are favourable and higher executive and global styles of thinking are unfavourable for short-term achievement among boys. Among boys, long-term term achievement in science significantly differs between high and low groups based on executive, judicial, anarchic, global and local styles of thinking. While long-term achievement in science is significantly less among boys with higher executive, anarchic and global styles of thinking it is significantly high among boys who are high on judicial and local styles of thinking. Thus among boys, high judicial and local styles of thinking favour high short-term as well as long-term achievement in science. High executive and global styles of thinking are unfavourable to both short-term and long-term achievement in science among boys. High anarchic style of thinking is unfavourable for short-term but not long-term achievement in science among boys.

**Thinking styles favourable and unfavourable to short-term and long-term achievement in science**

Table 2 presents a summary of thinking styles that are favourable and unfavourable to short-term and long-term achievement in science among boys and girls.

TABLE 2  
**Summary of the Thinking Styles that are Favourable and Unfavourable to Short-term and Long-term Achievement in Science among Boys and Girls**

Sample	Short-term Achievement		Long-term Achievement	
	Favourable thinking styles	Unfavorable thinking styles	Favourable thinking styles	Unfavourable thinking styles
Boys	Judicial Local	Executive Global	Judicial Local	Executive Anarchic Global
Girls	External	Anarchic Internal Conservative	Legislative	Anarchic

Results show that the style of thinking that makes a difference in achievement in science of both boys and girls is anarchic style. High anarchic style is unfavourable for both short-term and long-term achievement in science among girls, and it is unfavourable for

long-term but not short-term achievement in science among boys. External, internal, conservative and legislative styles of thinking influence achievement in science of girls but not boys. In these styles, external (favourably), internal, conservative styles (unfavourably) influence short-term achievement only; while legislative style influences long-term achievement (favourably) only. Judicial, local, global and executive styles of thinking influence achievement in science of boys but not girls. Higher judicial and local style thinking are favourable for both short-term and long-term achievement in science among boys. High executive and global styles thinking are unfavourable for short-term and long-term achievement of boys.

### **Discussion**

Results indicated that certain thinking styles make significant difference in achievement in science. Thinking styles, viz. legislative, executive, judicial, global, local, anarchic, external, internal, and conservative did influence science achievement at higher secondary level. All the three thinking styles in the functioning of mind, viz. legislative, executive and judicial had influence on achievement – either short or long-term – among boys or girls. Executive style negatively and legislative and judicial styles positively influence achievement. The findings regarding influence of functions of thinking on achievement go along that of Grigorenko and Sternberg (1997) on secondary school students that legislative and judicial styles show significant correlations with final examination. Results show that judicial and legislative thinking styles are associated with better academic achievement whereas executive thinking style is associated with lower achievement.

Under forms of thinking, of the four styles, the only style that makes a difference in achievement, both short and long-term term, in science is anarchic style. Studies that support the role of this dimension on achievement are very few. Zhang (2004) found that hierarchic style contributes to achievement in social science and humanities. Studies regarding the contribution of Monarchic and Anarchic Thinking Styles to achievement were not available. Hence, the finding of this study that anarchic style has negative influence on short as well as long-term achievements of girls and long-term achievement of boys is of significance.

In the levels of thinking, local style is favourable and global style is unfavourable for achievement in science of boys. Scope of thinking influences achievement in science among girls, with external style

favouring short-term achievement and internal style disfavours it. Under leanings, higher conservative thinking is unfavourable for short-term achievement of girls.

In general, the findings of the present study go along with the suggestion by Zhang and Sternberg (2000) on the relation of thinking style and learning approaches. Surface approach positively and significantly correlated with styles of less complexity, negatively and significantly correlated with legislative, judicial, liberal and hierarchical styles; deep approach positively correlated with the above styles and negatively correlated with executive, conservative, local and monarchic styles. Present study found that styles correlate positively with deep approach such as judicial (among boys) and legislative (long-term achievement of girls) styles contribute to achievement in science. It was also found that styles that positively correlate with surface approach such as executive (among boys) and conservative styles (in girls' short-term achievement) have a negative influence on achievement in science. The only aberration to this trend is the finding from this study on the influence of levels of thinking on achievement. Here it was found that among boys local style is favourable and global style is unfavourable for both long-term and short-term achievements in science, whereas what can be expected from their relation to study approach is on the reverse.

Overall, the hypothesis that type I thinking (legislative, judicial, global and liberal styles) are favourable to long-term achievement in science but not short-term achievement; type II thinking (executive, local, monarchic, and conservative styles) might be favourable to short-term achievement in science but not for long-term achievement could be accepted only partially. Legislative (among girls) and judicial (among boys) styles contribute to long-term achievement; executive (boys) style is unfavourable to long-term achievement. However, against what is suggested by the hypothesis, local style is favourable and global style is unfavourable to achievement in science in general among boys, while these styles make no difference in achievement of girls.

### **Educational Implications**

The findings from the study have the following implications for science teachers.

1. Judicial and local thinking styles suit long-term and short-term achievement among boys. Judicial style of thinking being the weakest among the functions of thinking styles of students, the

focus on experiences of comparing, analysing things and making evaluations about quality, worth, effectiveness of existing things and ideas have to be furthered in the curricular activities. This will help to enhance achievement in science especially among boys.

2. Short-term achievement in science in girls is high among those who like to collaborate in groups (External). Group activities and social orientation being the characteristic features of innovative science teaching in the process oriented, activity-centred curriculum practiced in Kerala, those who prefer external thinking style can benefit more from it. Due to the increasing emphasis given by the curriculum to sociability characteristics, those who are generally withdrawn (internal style) are affected. Teachers need to take care not to neglect students who prefer internal style of thinking and to provide such students with experiences that may help them to work individually on tasks.
3. This study as well as the studies conducted previously and reviewed by the investigator suggest that global thinking style disfavours achievement among boys. The students who care on specific details, understanding deep level meaning, reading all parts of a book with care, and putting even minor things for discussion are at advantage. Students' thinking styles being overwhelmingly local and school science being factual, concrete and oriented towards pragmatics of the situations, those students who are global in thinking needs to be attended by taking care to provide overall view of the classroom tasks, discussions and issues in the classroom.
4. Executive style thinking reduces long-term and short-term achievement of boys. Students tends to follow rules and guidelines, prefer problems that are pre-structured or prefabricated, and follow directions and orders verbatim without giving thought to them. Their tendency to evaluate themselves in the same way the system is likely to evaluate them is obvious. By the same coin, legislative style is less among girls as in the Indian context girls are not generally encouraged to decide for them and formulate rules and plans. Hence, science curriculum need to provide opportunities to formulate rules and plans, decide for themselves, imagine possibilities, come up with their own ways of doing things, create ideas and products, and not pre-structured or pre-fabricated. This will enhance achievement in science especially

among girls since legislative style thinking favours long-term goals of science teaching among girls.

5. Among girls, short-term achievement favours external thinking group; but the result is almost the reverse for long-term term achievement but the students are two third (65%) dominantly external. The schools need to mull it over the question of how to provide suitable environment for those who desire to work on tasks that allow one to work as an independent unit.

Local, legislative and judicial thinking styles contribute to high achievement in Science. Teachers must take care to impart teaching such that all students get benefit from their strategies. For conservative students assigning homework or projects that specify steps and procedures given by teacher will be helpful. For liberal students teacher can assign projects and works that need to find out solution based on procedures formed by them. Allow external students to work with group projects, group study and group discussion and provide internal students with assignments that require seatwork, and allot home works or projects that do not need dependence on others for completion. Knowing the characteristics of each style teacher can effectively make learning process flexible according to the need of the students.

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# Stimulating Linguistic, Aesthetic and Objectified Pre-reading Skills of Pre-schoolers

CELINE PEREIRA\* AND ANILKUMARI M.C.\*\*

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## ABSTRACT

*A child has to acquire a lot of skills at the physical, intellectual and emotional levels and these skills can be developed through playful activities. The skills develop not in isolation but as an integral part of the total development of the individual. A multimode programme both in school and non-school environment was implemented for developing basic skills among the pre-schoolers. It was found that the programme was very effective in enhancing majority of the pre-reading skills among the pre-schoolers.*

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*The children are our future  
Teach them well and let them lead the way  
Show them all the beauty they possess inside  
Give them a sense of pride to make it easier  
Let the children's laughter remind us how we used to be...*

## Introduction

Beginning as a microscopic cell, every person takes a fascinating journey designed to lead to adulthood. Like any journey worth taking, the journey of childhood is filled with remarkable events that make the trip both interesting and challenging. This study traces this journey as a multi-disciplinary pre-reading skills of pre-schoolers in all aspects.

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The young minds can be nurtured and moulded in more ways than one. As responsible parents and teachers, it is for us to arm them with the essential skills and knowledge to survive the culture shock this transition involves. Books and the printed word are among the best tools for reading out to a child. But learning does not take place only through ABC charts and textbooks. For effective learning to take place, a child has to acquire a lot of skills at the physical, intellectual and emotional levels. Children acquire and develop a lot of these skills through playful activities.

Skill is an ability of a higher order, which enables the individual to perform something efficiently. Skills are efficient ways of doing something. They are co-ordinated series of responses performed with proficiency. Many skills are really the combination of several skills. Any skill involves two aspects – content of some kinds and a sequence of actions. Skills follow the principles of learning. If developed once, they can be used in situations where they are suitable. Skills are categorised as object motor activities, language motor activities and feeling-motor activities. The category of object motor activities includes the use of tools of measuring and recording devices and the manipulation of materials like wood and objects. Language – motor abilities and communication skills include ‘the movement of speech organs, the movement of eyes in reading and the movement in handwriting, telegraphy, commercial arts and mechanical drawing, Feeling-motor activities (affective abilities/manual-aesthetic co-ordination) involve the attitudes and feelings of the individuals who practice them.

Skill develops not in isolation but as an integral part of the total development of the individual. A skill can be acquired only through continuous practice. Hence, great emphasis should be placed not on factual knowledge, but on practice.

The child moves from a simple level of skill to a higher level and at different stages s/he will integrate such skills with the other skills which are practised and developed separately at an earlier stage. Some children move easily through success, others stumble year after year, requiring special help, remediation, and individual tutoring. The majority, in the great middle bump of the bell-shaped curve of the school population, hover between success and failure, experiencing their share of each.

According to information processing psychologists, cognitive development consists of the acquisition of mental software that is specific to a particular domain. Some of the mental software that

children must acquire for success in school are in the domain of reading and quantitative skill.

The objective of teaching basic skills is to remediate the student's academic deficits. Instructions usually focus on improving abilities in pre-reading skills. Children receive instruction at a level that approximates their achievement or instructional level.

The present study lays special thrust on making pre-reading at the pre-school level useful and relevant for pre-schoolers through a new way. This study starts with pre-reading skills, and moves toward recognition and comprehension. Word recognition is the process of identifying a unique pattern of letters. Comprehension is the process of extracting meaning from a sequence of words. *"Give children a good time and have a great time yourself"*. The essential components of effective programme for developing basic skills in pre-schoolers include Multi Mode Programme (MMP) both in school and non-school environment.

The dimensions of MMP are:

- Parent training
- Social cognitive training
- Pre-school based interventions: like
  - (a) Weekly consultations with teachers
  - (b) Monthly sessions with parents of pre-school children
  - (c) Weekly classroom meetings with children.

In the classroom session, the children are given the intervention programmes which focus on the pre-reading skills, after the assessment of the level of skills in each child. The assessment sheet includes 20 basic/pre-reading skills which are expected to be acquired by the child before s/he is 4½ years old. These are: Colour recognition, Visual discrimination, Visual motor skill, Visual memory, Body image, Gross motor coordination, Identification of body parts, Directional and positional skills, Fine motor skills, Verbal fluency, Verbal direction, Identification of sounds, Personal data and response, Sentence memory, Counting, Alphabet recognition, Numerical recognition, Number comprehension, Say and write own names, and Number sequence.

### **Objectives**

The main objectives of the study included the following:

- (1) To assess the level of basic skills among pre-schoolers;
- (2) To implement MMP among pre-schoolers in school and non school environment;
- (3) To find out the effectiveness of MMP; and
- (4) To find out the attitude of teachers and parents towards MMP and the need for giving intervention.

### **Methodology**

Survey-cum-experimental method was adopted for the present study. The investigators at first thoroughly assessed the level of pre-reading skills of the pre-schoolers. The data were collected from TOC-H Residential Public School situated in the rural area of Ernakulam district in Kerala. The sample consisting of 60 children of age – 4 – 5 were selected by adopting purposive sampling procedures due to the specific nature of the study. Then the assessment followed with MMP were provided to them. Again the instructional learning outcomes were found out. The attitude of 50 parents and 5 teachers of the pre-schoolers were also taken.

### **Tools and Interventions**

Anecdotal records, Assessment sheet, Informal Interview and Intervention programme (IP) were used in the study. The five segments of the IP are:

- (a) Reading and writing;
- (b) Application of mind;
- (c) Intellectual powers;
- (d) Artistic talent; and
- (e) Socialising.

The Table 1 depicts the expected learning outcomes due to IP.

TABLE 1  
Skills Involved and Learning Outcomes

	Joining the dots	Drawing through dots	Matching pairs	Finding out the Differences between pictures	Jigsaw puzzles	Mazing the path	colouring pictures	Finding out the hidden objects	Finding out the odd picture and similar pictures	Read aloud letters	songs	Action songs	Handicrafts	Word game
1.			✓	✓	✓			✓	✓	✓	✓	✓		✓
2.			✓				✓			✓				
3.										✓	✓			
4.				✓										
5.			✓										✓	✓
Reading and Writing														

Contd...



**Analysis and Discussion of the Study**

Simple percentages were found out for the total sample and descriptive statistics was used for analysing the experimental data.

TABLE 2  
**Number and Percentage of Pre-schoolers before and after Administration of the Intervention with regard to Pre-reading Skill**

Skill in the assessment Sheet	Number and percentage of performers	
	Before	After
Color recognition Body image Gross motor coordination Identification of body parts Directional and positional skills Fine motor skills	40 (66.66%)	58 (96.66%)
Counting Alphabet recognition Numerical recognition Number comprehension Say and write own names Number sequence	22 (36.66%)	37 (61.66%)
Visual discrimination Visual motor skill Visual memory Verbal fluency Verbal direction Identification of sounds Personal data and response Sentence memory	15 (25%)	30 (50%)

- I. a) The IP was *very effective* in enhancing colour recognition, Body image, Gross motor coordination, Identification of body parts, Directional and positional skills and Fine motor skills. Among the pre-schoolers, the percentage increased from 66.66% to 96.66%.
- b) Whereas it was *effective* in the case of Counting, Alphabet recognition, Number comprehension, Say and write own names and Number sequence.

In this case percentage increased from 36.66% to 61.66%.

- c) As regards skills like Visual discrimination, Visual motor skill, Visual memory, Verbal fluency, Verbal direction, Identification of sounds, Personal data and response and Sentence memory, the programme was only *mildly effective* (percentage increased from 25% to 50% only).
- II. All the parents and teachers had a favourable attitude towards MMP. They opined that the awareness training helped them a lot to educate their children.
- MMP was an eye opener to them to understand that there are always reasons behind the non-acquisition of the skills by the child.
  - MMP showed that if we treat a child as s/he is, s/he remains as s/he is. But if we treat him as he could be, then s/he becomes what he should be.
  - Parents started to permit the child to decide on the time and type of learning.
  - Parents completely avoided comparing children and abandoned physical punishment and abusive language.
  - Parents started spending more time with their children

### **Conclusion**

The study reveals that the MMP was very effective in developing majority of the pre-reading skills among pre-schoolers.

Thus “stitch in time saves nine”. The intervention at the right time avoids complications in developing pre-reading skills in future time of the pre-schoolers.

*Your child is your past  
S/he has come from you  
S/he is your present  
It is for her/him you strive in this world  
And  
S/he is your future  
Your Gift to the world  
Cherish her/him*

# **Contribution of Scientific Aptitude and Scientific Attitude to develop Environmentally Sensitive Practices**

U. LAKSHMI NARAYANA\* AND ANJULI SUHANE\*\*

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## **ABSTRACT**

*This paper attempts to explore the extent of which scientific attitude and scientific aptitude help in improving environmentally sensitive behaviour. In this paper environmental practices pertaining to conservation of nature, control of noise pollution, water conservation, health and hygiene, energy conservation and limiting use of poly products have been taken into consideration. The sample consisted of 480 students who are studying in IX and X standards. It is found that scientific attitude is influencing environmental practices of children where as scientific aptitude is not. Curiosity and open-mindedness components of scientific attitude do contribute in developing environment sensitive behaviour among secondary school students. Environmental practices that could be developed through scientific attitude are conservation of nature, control of noise pollution and limited use of poly products.*

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## **Introduction**

Developments in science and technology have not only made human living more comfortable but created several problems also to ecological balance and to the environment. Hence, science education should equip children to transform scientific knowledge into optimum utilisation of science without affecting the environment. This could be achieved when inter and intra disciplinary approaches are practiced in science. Progress and development have become synonymous with

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the introduction of new technologies and products, aimed at making life better, safe and more viable. But, there have been instances where apparently useful products and technologies have turned out to be capable of inflicting extremely detritus impact on environment and development in the long run. Many of the problems related to environment are largely due to lack of environmentally friendly application of science and technology. The interaction of humanity with its environment has grown over the last few decades with the exploitation of nature on an increasingly large scale causing detrimental effect on the ecological balance. Man has been the vital cause for this state of environment. Man being a single unit in the vast and complex eco-system is the only organism so totally committed in shaping his environment according to his selfish needs rather than adopting himself to the natural setting of the environment. The problem is that man's propensity to make development decisions is far more advanced than his ability to understand his environment. Environmental problems like pollution, depletion of natural resources, erosion of top soil, deforestation and loss of bio-diversity are all the results of selfish attitude of man along with over and misuse of limited resources by increasing population. Man has created the situation for self-destruction.

Noll (1935) opined that the scientific attitude includes the following habits of thinking, viz. habit of accuracy in all operations, including accuracy in calculation, observation and report; habit of intellectual honesty; habit of open mindedness; habit of suspended judgement; habit of looking for true causes and effect relationship and habit of criticalness, including that of self-criticism. Caldwell and Curits (1943) suggested a list of scientific attitudes. They are curiosities to know about one's environment; the belief that nothing can happen without a cause and those occurrences that seem strange and mysterious can always be explained by natural causes. Sinha and Sinha (1982) arrived at fourteen areas that constituted scientific aptitude. They are experimental bent; clarity of definition; perception of causal relation; ability to reason and solve problems; detection of inconsistencies or intellectual conclusion; ability to reason and solve problems; detection of fallacies or misleading apparent plausibility's; caution and thoroughness; accuracy of interpretation; accuracy of conversation; ability to generalize; ability to deduce conclusion from data provided; ability to differentiate the relevant and irrelevant data; capacity for independent thinking and capacity to detect new relationship. "An environmental behaviour is "a behaviour adopted by an individual consciously attempting to minimise his or her

negative impacts on natural and constructed environments” (Kollmuss & Agyeman, 2002). This type of behaviour, however although desired and researched by environmental educators, is hard to develop because of the difficulty inherent in the behavioural change process. Several models have been proposed to try to identify the various factors of influence and describe the interrelationship among those factors. One of the first suggested models is of Ramsey and Rickson (as cited in Hungerford & Volk, 1990). It was based on the theory that, if people were well informed, they would become more aware of environmental problems and consequently, would be more motivated to act responsibly towards environment. However, the validity of this linear model was not recognised or supported for long (Burgess, Horison & Filuhs 1998; Hungerford & Volk). Hwong, Kim and Jeng (2000) classified the factor affecting environmental behaviours into three categories, cognitive, affective and situational factors. According to Pruneau (2006) cognitive, affective and situational factors influence an individual’s pro environmental behaviour. Cognitive factors correspond to an individual’s degree of awareness and knowledge of the environmental and major ecological concepts, including the individual’s own abilities and knowledge action strategies. Affective factors mostly involve emotions and feelings with environmental issues and ecological phenomena and generally include attitudes and personality traits. Situational factors are linked to an individuals (groups) situation and notably include economic and demographic constraints (e.g. social norms, education level, prior action opportunities, gender).

### **Objectives**

The major purpose of this paper is to explore the contribution of scientific attitude and scientific aptitude in developing environmentally sensitive practice among students of secondary schools.

### **Sample**

The Bhopal district is divided in 2 blocks. Total 455 secondary schools are situated in Bhopal district. Out of 455 secondary schools, 54 are situated in rural areas and 401 are situated in urban areas. In 455 secondary schools, 69 are government schools and 386 are private schools. Total 52,075 students are studying in Classes IX and X of secondary schools of Bhopal district. There are two blocks in Bhopal district, they are Berisia and Phanda and both blocks were selected

for the study. Out of these two blocks, the sample was selected using stratified random sampling technique. Researcher has taken three strata into consideration for selecting sample. They are locality, type of school and sex. The sample consists of total 480 secondary school students drawn from both rural and urban areas and from private and government schools.

### **Tools**

Three tools were used to measure Scientific Attitude, Scientific Aptitude and Environmental Practices.

*Scientific Aptitude Test Battery:* Scientific aptitude test battery developed by Agarwal, K.K.(1986) was used to measure scientific attitude of secondary school students. The test consists of four subtests, viz. reasoning, numerical ability test, science information test, science vocabulary test.

*Scientific Attitude Scale:* Scientific Attitude Scale was administered to secondary school students to know their levels of scientific attitude. This scale constituted six component, namely, Rationality, Curiosity, Open-mindedness, Aversion to superstitions, Objectivity of intellectual beliefs and Suspended judgement.

*Environmental Practices Scale:* In order to measure environmental practices of secondary school students' environmental practices scale has been developed. The present tool 'Environmental Practices Scale' purports to measure the environmental friendly practices of students in their daily life. There are six components in environmental practices scale. They are conservation of nature, control of noise pollution, conservation of water, human health and hygiene, conservation of energy and limiting use of poly products.

### **Results and Discussions**

In order to find out the influence of scientific aptitude and scientific attitude on environmental practices, secondary school students were divided into five categories of very high, high, moderate, low and very low on the basis of their scores on scientific aptitude test battery and scientific attitude scale. The classification was made on the basis of sigma units  $M \pm 1.5$ ,  $M \pm 0.5$ . The sigma interval were 1.5 to ; 0.5 to 0.5 -0.5 to 0.5, -1.5 to -0.5 ; and - to -1.5 for very high; high; moderate; low; and very low categories of scientific attitude respectively. Similar classification was carried out for components of scientific aptitude and scientific attitude. Analysis variance was

carried out to know the influence of scientific aptitude and scientific attitude and their components on environmental practices.

**Scientific Aptitude and Environmental Practices**

On the basis of analysis of variance carried out, no significant effect of scientific aptitude on environmental practices of secondary school children ( $F = 0.86, P > 0.05$ ) was evident. Hence, it can be said that there was no significant difference between students belonging to different categories of scientific aptitude in respect of environmental practices. It may be inferred that scientific aptitude of students does not help to sensitize environment friendly behaviour through their daily practices.

**Components of Scientific Aptitude and Environmental Practices**

Students belonging to different categories of reasoning ( $F=0.44, p>0.05$ ), numerical ability ( $F=1.89, p>0.05$ ), science information ( $F=1.91, p>0.05$ ) and science vocabulary ( $F=2.22, p>0.05$ ) do not differ significantly in respect of their environmental practices. From this it was evident that students' logical thinking, reasoning ability, ability to solve mathematical problems and knowledge in science do not help in improving their environmental friendly practices.

**Scientific Aptitude and Components of Environmental Practices**

The results of analysis of variance indicated that the contribution of scientific aptitude was evident only in limiting the use of poly products ( $F=2.69, p<0.05$ ). The contribution of scientific aptitude was not evident for other components of environmental practices, namely, conservation of nature ( $F=2.02, p>0.05$ ), control of noise pollution ( $F=1.78, p>0.05$ ), water conservation ( $F=1.11, p>0.05$ ), health and hygiene ( $F=1.09, p>0.05$ ) and conservation of energy ( $F=2.03, p>0.05$ ).

TABLE 1  
**Values of 't' between different Categories of Scientific Aptitude in respect of limiting use of Poly Product**

	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
Very High	0.68	0.60	1.25	0.18
High		0.17	2.35*	1.68
Moderate			2.64**	1.62
Low				0.92

\*\*p< 0.01 \* p< 0.05

Students with low scientific aptitude do differ significantly with their counterparts belonging to high and moderate categories in respect of environmental practices in limiting use of poly products. On examining the means it is found that mean of students belonging to low scientific aptitude (AM=5.46) is less than their counterparts belonging to high (AM=5.86) and moderate (AM=5.83) in respect of limiting use of poly products. It may be inferred that students of all categories of scientific aptitude are having higher level of practices in limiting use of poly products. Hence, students with high and moderate scientific aptitude were better in limiting the use of poly products than their counterparts with low scientific aptitude.

**Scientific Attitude and Environmental Practices**

Analysis of variance indicated a significant effect of scientific attitude on their environmental practices (F=3.52, p < 0.01). This indicates that there was a significant difference between students belonging to different categories of scientific attitude in respect of their environmental practices. Variations in students' curiosity, rationality, judgement, open-mindedness and objectivity may likely to explain the variations in their environmental sensitive behaviour. Student's environmental friendly practices in their daily life vary how scientifically they obtain evidences in accepting phenomena and these obtained evidences may be seen in terms of curiosity, rationality, judgement, open-mindedness and objectivity.

TABLE 2  
**Values of 't' between Categories of Scientific Attitude in respect of Environmental Practices**

	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Very Low</i>
Very High	2.71 **	2.66**	3.28**	3.13**
High		0.26	0.83	1.61
Moderate			1.15	1.76
Low				1.44

\*\* p < 0.01

It was evident that students with very high scientific attitude do differ from their counterparts belonging to high, moderate, low and very low categories in respect of environmental practices. Whereas there is no significant difference between high, moderate, low and

very low categories of scientific attitude in respect of environmental practices. Further, it is found that these differences were in favour of students with very high scientific attitude, as its mean (AM=59.55) was higher than the mean values of students belonging to other category, namely, high (AM=55.28), moderate (AM=55.56), low (AM=54.29) and very low (AM=51.54). On examining the means, it is noticed that environmental practices of students have been in a descending trend from very high through moderate to very low categories of scientific attitude. This may be due to the reason that higher level of scientific attitude sensitises students to imbibe environmental friendly practices in their day-to-day life.

### ***Components of Scientific Attitude and Environmental Practices***

A significant difference between students belonging to different categories of curiosity ( $F=2.82$ ,  $p<0.05$ ) and open-mindedness ( $F=2.93$ ,  $p<0.05$ ) was found in respect of their environmental practices. Further, there was no significant difference between students belonging to different categories of rationality ( $F=2.23$ ,  $p>0.05$ ), aversion to superstitions ( $F=1.48$ ,  $p>0.05$ ), objectivity to intellectual beliefs ( $F=1.01$ ,  $p>0.05$ ) and suspended judgement ( $F=1.93$ ,  $p>0.05$ ) in respect of their environmental practices.

Probable explanation to variations between students belonging to different levels of curiosity in respect of their environmental practices might be that students with different levels of characteristics like desire for completeness of knowledge and understanding new situation have different types of environmental friendly practices in the field of control of noise pollution, health and hygiene, conservation of nature, water conservation and energy conservation. This means that students' environmental friendly practices vary how much they are curious in accepting evidences. Variations among students belonging to different level of open-mindedness in respect of their environmental practices might be attributable to their willingness to revise opinions and conclusions and having rejection of rigid approaches have different levels of practices to save our environment. It means that environmental practices of students depend on how much openminded they are to change their opinions.

As regards curiosity, it was found that students with very low curiosity do differ from their counterparts belonging to very high, high, moderate and low categories in respect of environmental practices. Further, it was found that these differences were not in

favour of students with very low curiosity as their mean was less (AM=51.39) compared to their counterparts with very high (AM=56.96), high (AM=56.46), moderate (AM=55.04), and low (AM=55.41) curiosity. From this, it was evident that the students with very low curiosity were having less environmental friendly practices. Further, as regards openmindedness, all the values of “t” were found to be not significant except between very high and low; very high and very low; and moderate and low categories. On examining the means it is

TABLE 3  
**Values of ‘t’ between different Categories of Curiosity in respect of Environmental Practices**

Components	Openmindedness					
	Categories	Very High	High	Moderate	Low	Very Low
Curiosity	Very High		1.90	1.36	2.63**	2.41*
	High	0.25		0.92	1.14	1.31
	Moderate	0.96	1.42		2.09*	1.75
	Low	0.73	0.85	0.30		0.73
	Very Low	2.37*	3.14**	2.28*	2.31*	

\*\* p < 0.01 \*p < 0.05

noticed that means were in descending order from very high (AM=58.37), high (AM=55.14) through moderate (56.10), low (AM=53.88) to very low (AM=52.29) categories of openmindedness in respect of environmental practices. Students with very high level of open-mindedness do possess high level of environmental practices. So it may be inferred that openmindedness of students do help in improving environmental practices. On the whole we can say that curiosity and openmindedness components of scientific attitude do influence environmental practices. Whereas the other components of scientific attitude like rationality, free from superstitions, objectivity to intellectual beliefs and judgement do not influence environmental practices. It means that students have high desire for understanding new things and ideas and willingness to revise opinions and conclusion were better in environmental friendly practices.

**Scientific Attitude and Components of Environmental Practices**

A significant difference between students belonging to different categories of scientific attitude was observed from the analysis of

variance in respect of conservation of nature ( $F=3.60$ ,  $p<0.01$ ), control of noise pollution ( $F=3.75$ ,  $p<0.01$ ) and limiting the use of poly products ( $F=4.18$ ,  $p<0.01$ ). Influence of scientific attitude was not evident in respect of environmental practices, such as, water conservation ( $F=1.12$ ,  $p>0.05$ ), health and hygiene ( $F=1.28$ ,  $p>0.05$ ) and energy conservation ( $F=2.18$ ,  $p>0.05$ ). As values of 'F' were significant for three components of environmental practices (conservation of nature, control of noise pollution and limiting the use of poly products), t-test is carried out to know the significance of difference of means between the categories of scientific attitude.

TABLE 4  
**Values of 't' between different Categories of Scientific Attitude in respect of Conservation of Nature, Control of Pollution and Limiting use of Poly Products**

Components	Control of Noise Pollution Limiting use of Poly Products (values in parentheses)					
	Categories	Very High	High Low	Moderate	Low	Very
Conservation of Nature	Very High	2.88** (0.70)	1 (0.70)	2.90** (1.00)	3.37** (2.30*)	2.51 *
	High	1.40		0.42 (0.00)	0.45 (3.07**)	0.08 (3.57**)
	Moderate	2.83**	1.63		1.08 (2.92**)	0.39 (3.57**)
	Low	3.23**	2.23*	0.51		0.23 (1.99*)
	Very Low	3.07**	2.40*	1.59	1.38	

\*\* $p<0.01$  \* $p < 0.05$

With regard to conservation of nature, it was found that students with very high scientific attitude do differ significantly from their counterparts belonging to moderate, low and very low categories. Further, students with high scientific attitude do differ significantly from their counterparts belonging to low and very low categories. On examining the means, a descending trend was noticed among students belonging to very high (AM=14.29), high (AM=13.66), moderate (AM=13.07), low (AM=12.90) and very low (AM=11.92) categories of scientific attitude.

As regards control of noise pollution, it was found that students with very high scientific attitude do differ from their counterparts belonging to high, moderate, low and very low categories. Further, it was found that students with very high (AM=8.89) scientific attitude exhibited better practices in controlling noise pollution compared to their counterparts belonging to high (AM=7.58), moderate (AM=7.70), low (AM=7.44) and very low (AM=7.54) categories.

As regards limiting the use of poly products, it was found that students with very low scientific attitude do differ significantly from their counterparts belonging to very high, high, moderate and low categories. Further, students with low scientific attitude do differ significantly from their counterparts belonging to high and moderate categories. On examining the means it was found that students with very low (AM=4.92) scientific attitude were not sensitive to minimize the use of poly products compared to their counterparts belonging to very high (AM=5.68), High (AM=5.85), moderate (AM=5.85) and low (AM=5.44) categories.

### **Findings**

It was found that neither scientific aptitude nor its components significantly influence environmental practices of secondary school students. With regard to influence of scientific aptitude on components of environmental practices, scientific aptitude had significant influence on limiting use of poly products. Further, students with higher scientific aptitude were found to be better in minimising the use of poly products when compared to their counterparts belonging to other categories.

There was a significant influence of scientific attitude on environmental practice of students. Values of means of environmental practices are in a descending trend from very high to very low categories of scientific attitude. The environmental practices of students with higher levels of scientific attitude were more environment friendly compared to students with lower levels.

With regard to components of scientific attitude, curiosity and openmindedness were significantly influencing environmental practices of secondary school students. Students with higher levels of curiosity and openmindedness were found to be more sensitive to environment in their practices.

Further, contribution of scientific attitude was evident on three components of environmental practices, namely, conservation of nature, control of noise pollution and limiting use of poly products.

Students with higher levels of scientific attitude were found to be more environmentally sensitive in conservation of nature, controlling noise pollution and in limiting poly product usage.

### **Conclusions**

In these days of enormous ecological imbalance caused due to social and scientific factors, there is a danger for environment. Many efforts are made to protect the environment for the healthy human being and partially succeeded in protecting the environment. Success in environmental protection would be accomplished only when there are environmentally sensitive practices in day-to-day life. There are many efforts to improve environmental awareness but the question is whether this information transforms into environmentally sensitive practices? If so how scientific attitude and scientific aptitude help secondary school students to develop environmentally sensitive practices? This paper examines the contribution of scientific attitude and scientific aptitude in developing environmentally sensitive practice. On the basis of findings of the study following conclusions may be drawn.

- Scientific attitude of secondary school students do facilitate improving environmental practices. Only two components of scientific attitude (curiosity and openmindedness) do help in increasing environmental practices among secondary school students. Environmental practices of secondary school students may be more among these students who have willingness to revise opinions and conclusions and have a desire for completeness of knowledge and new ideas. Students' environmental friendly practices in the field of nature conservation, controlling noise pollution and limiting use of poly products may be more among those secondary students who have better scientific attitude. From the finding of study, it may be concluded that only curiosity, one of the component of scientific attitude do predict environmental practices. Though openmindedness is influencing the environmental practices, it is not acting as a predictor of environmental practices of secondary school students. This indicates that students belonging to different levels of openmindedness (very high to very low) have different levels of environmental practices and this difference is in favour of students with very high level of openmindedness. However, these differences are not contributing to consider openmindedness as a predictor of environmental practices.

- Scientific aptitude of secondary school students does not help in improving environmental practices. All the four components of scientific aptitude also do not help in improving environmental practices. But the practices in limiting use of poly products are more among those students who have better scientific aptitude. All the components of scientific aptitude do not predict environmental practices. From the findings of the study it may be concluded that students' practices in limiting use of poly products have related to their reasoning ability.

### **Implications**

Realising the importance of preparing younger generations to protect environment and maintain ecological balance for harmonious and healthy living free from hazards of natural calamities, school science curriculum from time to time emphasising the need for promoting environmental awareness as well as attempting to develop environment friendly behaviour. Findings of this paper focus on certain pertinent indicators that could help in cherishing the objectives of science curriculum in sensitising children to environmental issues and in turn manifesting these sensitivities to practice. As it was found that scientific attitude (curiosity and openmindedness) seem to have significant influence on environmental practices (conservation of nature, control of noise pollution and limiting use of poly products), this paper ventilates some pertinent implications to school science curriculum.

### ***Establishing Linkage between Science and Environment***

This can be achieved if school science curriculum is feasible to provide adequate opportunities to children in applying science to environment. School curriculum should help children in recognising the consequences, both positive and negative, of science to environment and probable ways of preventing the negative effects. Recent school curriculum documents emphasised the need for cultivation of curiosity and focused on linking science curriculum to environmental issues. National Curriculum Framework (2005) has aptly pointed out that child should be engaged in joyful exploration of the world around and harmonize with it at primary stage.

***Development of Scientific Attitude:*** There should be an inbuilt provision in school science curriculum where children could change their opinions basing on evidences, arrive at judgement basing on

facts, be free from superstitious beliefs, cultivate habits of thinking so on that would help in developing scientific attitude. With a view to make science education true to child, true to life and true to science, NCF (2005) evolved six criteria of validity of a science curriculum, among which environmental validity is one, that places science in the wider context of the learners' environment enabling them to appreciate the issues at the interface of science, technology and society.

***Providing Learning Situations to develop Curiosity and Openmindedness:*** Gone are the days where science is viewed as a routine curricular subject that helps in achieving professional excellence and career growth. Ulterior purpose of learning science is to develop curiosity and openmindedness, two important components of scientific attitude. Science teachers should not leave any opportunity that could activate curiosity and openmindedness while transacting science curriculum. NCF (2005) envisaged that objectives of science curriculum at primary stage as nurturing curiosity of the child about the world (natural environment, artifacts and people), engaging child in exploration for developing cognitive skills through observation, classification, inference. etc.

### **Suggestions**

Following suggestions are made within the limitations of this paper to curriculum developers and implementers. School science curriculum should be designed in such a way that specific classroom and school activities are included to establish a nexus between science and environment. Science curriculum should be flexible and there should be freedom to teachers in organising necessary activities to develop environmentally sensitive behaviour. A teacher manual depicting the strategies and activities that sensitise children to environmental issues need to be developed. School and home should collaborate in developing and sustaining environment friendly practices among children. Besides, providing in-service training to teachers in integrating environmental issues while transacting science curriculum, it is necessary to prepare pre-service teachers also. Hence, environmental education should be included in pre-service teacher education curriculum. There must be some space in the school science curriculum at various stages of schooling for undertaking activities that improve environmental friendly practices. These activities may be organised in collaboration with the community

so that community would also be aware of the importance of protecting environment and preventing ecological imbalances. Science exhibitions at state and district level should focus on environmental education may be conducted. Children are encouraged to prepare projects on this theme and present them in such exhibitions.

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# Personal and Institutional Factors and their Influence on Science Achievement

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## ABSTRACT

*The study explored the relationship between students' personal factors (gender, religion, family background, extra-curricular activities, computer and internet access) and institutional factors (schools having computers, and co-educational schools) with their science achievement. A science achievement test was developed by the investigators. The focus population for this study was 15-year old students from a specific geographical location of western Uttar Pradesh. The results revealed that a number of variables like family background, extra-curricular activities, computer and internet access, schools having computers and co-educational schools were found to be positively correlated with science achievement, but variables like gender, religion and single-sex schools have no correlation with science achievement.*

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## Introduction

In view of modern developments in science and its importance in today's world, science teaching has assumed a significant place in secondary school curriculum. In India, government is concerned about the quality of science education and it has made significant changes to the country's educational system since its independence. To maximise the achievement within a given set-up is therefore, the goal of every educationist, a teacher or educational administrator. One of the goals for school science that underlies the National Science Education Standards (1996) is to educate students who are able to experience the richness and excitement of knowing about and

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understanding the natural world. The science education literature is filled with numerous research activities that suggest that variables such as personal, home, school, teacher, etc. are helpful in increasing the achievement levels and knowledge of students in the area of science.

Different activities, in which students participate, both inside and outside the school itself, are among the multiple situations that can have an effect on science achievement. Extra-scholastic activities have been associated with an improved educational level, more interpersonal competencies, higher aspirations and better attention level (Mahoney, Cairos & Farwer, 2003). Research carried out to examine the relationship between computer use and student achievement, emphasise that there is a positive correlation between these variables. (James & Lamb, 2000; Sivin-Kachala, 1998; Weaver, 2000; Weller, 1996; Wenglinsky, 1998). Type of schools (single-sex or co-educational schools) influence attitude and achievement in science of male and female students in single-sex schools and students in co-educational schools (Dhindsa & Chung, 2003).

### **Empirical Studies**

The differences between boys and girls in relation to science achievement have received a lot of attention in recent years. While some studies indicate that in general boys achieve better (Gipps, 1994; Wang & Staver, 1995; Kingdon, 1999; O' Connor, 2001), either no gender difference (Ventura, 1992; Calsambis, 1995; Mohapatra & Mishra, 2000) or girls outperform boys (Young & Fraser, 1990; Calsambis, 1995; Zeegers & Giles, 1996; Soyibo, 1999; Das & Naval, 2001) has also been demonstrated. Usually the differences are smallest at age of 10 and greatest at age of 17.

Studies have also found that the religion is not a predictor of science achievement (Khatoon, 1996; Neathery, 1997). Muslims performed with as much success on the science test as the non-Muslims. However, Sucharita (1999) reported that the achievement of SC/ST students were lower than that of general students. In a study conducted by Verma (1985), the mean achievement of scheduled caste students was found to be significantly lower than that of tribal students and the students belonging to the other castes.

The influence of the family's educational climate is defined by the amount and style of help that children receive from the family for their educational growth. There is much theoretical and empirical work that suggests that home environment plays an important role

in learning (Walberg, 1991). Schiefelbaum and Simmons (cited by Adell, 2002, p.91) consider family background the most important and most weighty factor in determining the academic performance of the students. Among family factors of greatest influence are social class variables and the educational and family environment. Rodriguez (1986) demonstrated that a positive family climate favours the development of well-adapted, mature, stable and integrated personality, and an unfavourable family climate promotes non-adaptation, immaturity, lack of balance and insecurity. Parent can affect their children's science achievement by creating an environment more conducive to learning within the home. However, Kesamang and Taiwo (2002) in a study reported significant negative relationships between the students' socio-cultural background and their attitudes towards school science on one hand and their achievement in school science on the other hand.

Most research on extra-curricular activities (sports, games, debates, etc.) shows that participation in these kinds of activities is associated to positive outcomes as academic achievement (Holland & Andre, 1987; Yeole, 1990; Marsh, 1992; Silliker & Quirk, 1997; Cooper et al., 1999). Research indicated (Moriana et al., 2006) that group involved in activities outside the school yielded better academic performance, especially those that participated in study related activities and those that participated in mixed activities (both sports and academic).

In today's increasingly technology driven world it would seem that students who have had access to computers in their home or in classrooms would do better on science and mathematics achievement than those who had not (Berger et al., 1994; Shaw, 1998; Papanastasiou, 2003; Papanastasiou & Ferdig, 2003). However, there are still occasions, where computer use in schools associated with lower levels of achievement (Papanastasiou, Zacharia, Zembylas, 2004; & Ravitz et.al 2002).

Most studies reported in the literature have been conducted in co-educational schools, but it is not well understood how science achievement is influenced when male and female students are taught separately in single-sex schools. A limited number of studies show that girls do better in single-sex schools and boys in co-educational settings (Ormerod, 1975; Fraser-Abder, 1990). Young and Fraser (1990) found no significant differences in overall achievement of boys and girls attending co-educational government, catholic and private schools. However, girls in single-sex schools achieved higher than

girls in co-educational schools, and boys in single-sex schools achieved higher than boys in co-educational schools. There were no significant differences between boys and girls attending either single-sex or co-educational schools. Fraser-Abder (1990) found that girls scored significantly higher than boys on the science test.

### **Research Questions**

The research questions for the study include the following:

- (1) Do students' personal factors (gender, religion, family background, extra-curricular activities, access or not access to computer and internet) explain differences in science achievement scores?
- (2) Do institutional factors (schools having/not having computers, single-sex and co-educational schools) explain differences in science achievement scores?

### **Sample**

The sample consisted of 1500 secondary school students (9th standard) selected from 30 schools of specific geographical location of western U.P. (namely: Aligarh and Buland Shahar), in which 813 were boys and 687 were girls. Further, the sample includes 357 Muslims and 1143 non-Muslim students. The average age of the study sample was 15 years.

### **Tools**

*Science Achievement Test:* Data concerning students' achievement in science were gathered by administering to sample, a standardised instrument developed by the investigators. The test consists of 50 items multiple choice type (made up of 25 items in the area of biological sciences and 25 items in the area of physical sciences) each of marks 1. Four alternative answers marked as (A), (B), (C), and (D) with response sheets were provided to the students. Split-half reliability of the test was estimated to be 0.87.

*Information Sheet:* Information sheet was provided to collect basic information about personal aspects of the students (gender, religion, family background, extra-curricular activities, access/ not access to computer and internet) and about the institution (school having/ not having computers, single-sex girls, single-sex boys and co-educational schools). Family background includes parental education,

occupation, size of the family, possession of certain home items and extra-curricular activity group includes participation in sports, games and cultural programmes, etc.

### **Results**

Results did not reveal significant difference in the science achievement of students due to gender and religion (Table 1). Children coming from favorable background, those participated in extra-curricular activities, having access to computer and internet scored significantly higher on science achievement test.

The number of students having access and not having access to computer and internet were 1110 and 390,711 and 789 respectively. This shows only 74% and 52% secondary school students know how to access computer and internet respectively. It is highly surprising that 26% of the students are so ignorant that they have no idea how to access computer. The achievement in science of students having access to computer was significantly better with the one that does not. It was further found (Table 2) that students of the institutions having computer for practical work have significant higher achievement in science than the institutions have not ( $t=13.99$ ,  $P<.001$ ,  $df=1498$ ).

The achievement of boys and girls studying in the single-sex schools and the students in co-educational schools were compared using t-test. The data in Table 3 shows that the achievement in science of boys and girls in single-sex schools indicate that no significant difference between boys and girls exists. Mean achievement scores in science for students of co-educational schools were significantly better than those of boys in the single-sex schools and also girls in the single-sex schools. These results demonstrated that, the science achievement of students in co-educational schools were significantly higher than that of boys as well as of girls student in single-sex schools.

Table 4 shows that the achievement in science of boys and girls in co-educational schools differ significantly showing that girls perform better than the boys which is contrary to the finding in single-sex schools, where boys and girls perform equally good. Further, it was found that boys of co-educational schools have significantly higher achievement in science than the boys of single-sex schools and also girls of co-educational schools have significantly higher achievement in science than the girls of single-sex schools.

TABLE 1  
**Comparison of Mean Achievement Scores on the basis of Gender, Religion, Extra-curricular Activities and Access to Computer and Internet**

<i>Groups</i>		<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>Sig/ Not Sig.</i>
<b>Gender</b>	Male	813	28.08	7.40	0.79	Not Sig
	Female	687	28.39	7.45		
<b>Religion</b>	Muslim	357	28.33	7.66	0.45	Not Sig
	Non-Muslim	1143	28.12	7.35		
<b>Family Back-ground</b>	Favourable	315	34.63	6.39	28.02	P<0.001
	Unfavourable	354	21.64	5.59		
<b>Extra-Curricular Activities</b>	Participation	1179	29.04	7.27	8.34	P<0.001
	No participation	321	25.25	6.97		
<b>Computer Access</b>	Access to computer	1110	29.43	7.53	11.66	P<0.001
	Not access to computer	390	24.50	6.10		
<b>Internet Access</b>	Access to internet	711	30.19	7.37	10.49	P<0.001
	Not access to internet	789	26.32	6.93		

TABLE 2  
**Comparison of Mean Achievement Scores on the basis of Schools having or not having Computers**

<i>School Type</i>	<i>No. of schools</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>Sig./ Not Sig.</i>
Having computers	18	996	29.98	7.28	13.99	P<0.001
Not having Computers	12	504	24.65	6.33		

TABLE 3  
**Comparison of Mean Achievement Scores for Boys and Girls in Single-sex and Co-educational Schools**

School Type	No. of Schools	N	Mean	SD	T		
					B	G	C
Single sex-B (Boys)	5	198	24.88	7.24			
Single sex-G (Girls)	7	285	25.01	6.43	0.21		
Co-education-C (Both)	18	1017	29.73	7.21	8.64*	9.98*	

\* Significant at < 0.001 level

TABLE 4  
**Sex-wise Comparison of Mean Achievement Scores of Co-educational, Single-sex Boys' and Single-sex Girls' Schools**

School Type	N	Mean	SD	t	
				Co-education (Boys)	Co-education (Girls)
Co-education (Boys)	615	29.06	7.17		
Co-education (Girls)	402	30.66	7.20	3.47*	
Single-sex (Boys)	198	24.88	7.24	7.12*	
Single-sex (Girls)	285	25.01	6.43		10.59*

\*Significant at < 0.001 level

### Discussion

Results show that personal factors indices, gender, religion, family background, extra-curricular activities, access/not access to computer and internet and institutional factors indices, schools having/ not having computers, single-sex and co-educational schools, all had significant effects on science achievement scores in expected direction except gender and religion and single-sex school. Finding of this study indicates that there were no significant difference in science achievement between boys and girls. The same is reported

by Patnaik, 1986; Neathery, 1997; Dange and Vijayalakshmi, 2006, but it is contrary to most of previous findings that claimed boys performed better than the girls in science (Tamir, 1988; Shah, 1990) and girls performed better than the boys (Soyibu, 1999). Research by AAUW (1992) reveals that although female students receive equal or sometimes better grades in science courses but they exhibit less interest in science subjects than male students.

Further the result shows that religion was not a predictor of science achievement. Muslim minorities performed with as much success on the science subject as the Hindu majority students. This finding corroborates the findings by earlier researches (Sodhi, 1989; Neathery, 1997) but contrary to the result Indira (1991) reported that Hindu, Muslim and Christian students differed in their academic achievement scores. In another study, Gupta (1983) found that differences in the achievement of Hindu-Muslim students are significant. The academic achievement of non-Muslim children has been found superior in comparison to their Muslim counterparts (Alam, 2001).

In this study family background was found to be most important factor of students' achievement in science. Students from families supportive of learning are likely to have significantly high science achievement score than the families who have not. According to Peng and Wright (1994) the differences in home environments and educational activities accounted for a large part of the difference in achievement between Asian American and other minority students. Young and Fraser (1992) reported that socio-economic level had much stronger correlation with science achievement.

The results presented support the idea that participating in extra-curricular activities brings some benefits for students. The students who participate in extra-curricular activities present significantly better academic achievement in science. There were considerably significant differences in performance in favour of the group involved in academic type extra-curricular activities and that such differences did not appear for those involved only in sports (Morianana et al. 2006). According to Peixoto (2004) students who participate in extra-curricular activities present higher values on some dimensions of self-concept and better academic achievement. Contrary to this result Narang (1987), reported that no academic programme of the school (participation of co-curricular activities) was related to higher achievers. According to the research reviewed here, the participation in extra-curricular activities seems to have positive effects on science

achievement. In this study we analyse the effects of extra-curricular activities in a school system, where this kind of activities exists (related to sports) but without being specially valued.

The results further show that students with computer and internet access have significantly better achievement in science than those who never access to computer or internet. Improved access to technology is a pivotal feature of almost all information technology plans. While there is immense interest in the use of technology in schools and rapid growth in the presence of technology, many students in secondary schools still have limited access to computers. The result shows that 26% of the students who indicated that they never have a computer available for them to use anywhere, neither at home nor in school. According to Mangione (1995) all students must have equal opportunity to learn with and about computers to ensure equity, although few schools have achieved the levels of access necessary to provide students with an equitable experience.

The results show that secondary school students with computers available for use in their schools did significantly better in science achievement than those without computers in their schools. This study is supported by Berger et al., (1994), who found positive correlations between computer use in the school and achievement. But contrary to this Papanastasiou et al., (2003), and Ravitz et al., (2002), reported that computer availability for the student at home and in the library were associated with higher levels of science achievement; however computer availability at school and at another place could not significantly predict science achievement.

The data in Table 3 show that the mean achievement scores in science of boys (single-sex schools) and girls (single-sex schools) were not comparable indicating no gender difference, but contrary to it most of western previous findings, claimed that in uni-sex schools boys performed better than the girls (Calsambis, 1995; Klainin & Fensham, 1987; Soyibo, 1999; Zeegers & Giles, 1996; Young & Fraser, 1990) and in some cases girls performed better than boys in science (Tamir, 1988; Wang & Staver, 1995; Dhindsa & Chung, 2003).

The students of co-educational schools also achieved significantly higher achievement in science than the boys as well as girls in the single-sex schools which is contrary to the findings of Young and Fraser, (1990); Dhindsa and Chung, (2003); Natarajan, (1992) Hariharan et al., (1987). This is most probably due to the high socio-economic status (SES) of the students who are able to study in

co-educational institutions that are generally English medium privately managed schools.

The data in Table 4 show that the mean achievement score in science of boys and girls of co-educational schools were comparable indicate gender difference. Girls of co-educational schools achieve significantly higher in science than their boys counterparts. Further, the mean achievement scores in science for boys as well as girls in co-educational schools were significantly better than those of boys and girls studying in single-sex schools. But contrary to this Emmanuel and Lockheed (1988) reported that girls in single-sex schools do significantly better than their co-educational school girls while boys in co-educational schools do better.

### **Conclusion**

This study found that certain personal variables such as family background, extra-curricular activities, computer and internet access and also certain institutional factors such as schools having computers and co-educational schools have positive influence on the students' science achievement. But the variables like gender, religion and single sex schools have no correlation with the achievement in science.

Although sample was large enough but the generalisability of the findings of the study is limited because test was conducted in specific geographical location of western U.P and only on 9th Standard students. A replication of it with large and more representative sample of students of different classes and subjects from wider region and with more rigorous design is likely to prove quite rewarding in shading more light on difference of mean science achievement in relation to personal and institutional factors.

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# Effectiveness of School Experience Programmes in Building Attitude of Prospective Teachers

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## ABSTRACT

*Pre-service education is a process of transformation of a lay person into a competent and committed professional practitioner. The attitudes that new pupil-teacher brings to the teacher education institution on the basis of experiences as a student in primary and secondary schools (or that in university, as the case may be), have to be modified and re-examined in the process of pre-service teacher education. School experience programme which is an integral part of the professional preparation of prospective teachers provides a wide variety of experiences designed to develop teaching competency and a right attitude towards teaching. The present study examined the impact of school experience programme on the attitude of prospective teachers towards teaching. Teacher Attitude Inventory (TAI) developed and standardised by S.P. Ahluwalia was used to collect data regarding attitude of 120 prospective teachers, pursuing Bachelor of Education (B.Ed) programme under Guru Gobind Singh Indraprastha University, Delhi. The study revealed that the school experience programmes play a vital role in building the attitude of prospective teachers towards teaching. A significant difference in the attitude of prospective teachers before and after school experience programme was observed.*

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## Introduction

A good teacher and the quality of teaching have always been of paramount importance to free men and to a free society. Globalisation

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of education in general has further raised its importance as it has triggered a competition among unequals (the developed and the developing countries). We have to compete with those who have a sound and quality system of education. Unfortunately, our schools in India have failed in engaging the students in a meaningful learning process in classroom as has been indicated by various base line studies conducted by the institutions like the National University of Educational Planning and Administration (NUEPA) and National Council of Educational Research and Training (NCERT). To a large extent, this reflects on the quality of teachers, as teachers are undoubtedly the most important component of our educational system. The case study conducted by Reddy (1995) revealed that teachers are largely responsible for the success of education system. It has been found that among various factors that affect or influence the efficiency of education, the 'teacher' factor alone contributes 68% whereas all other factors like infrastructure, finance, role of leaders, political backing, etc. together contribute 32% only (Panda & Tewari, 1997). The International Commission on Education for the 21<sup>st</sup> century has further laid emphasis on this issue and considered it as one of the multi-pronged strategies for the desired progress in the educational field, as it stated in its report "Improving the quality of education depends on first improving the recruitment, training, social status and conditions of work of teachers. They need the appropriate knowledge and skills, personal characteristics, professional prospects and motivation if they are to meet the expectations placed upon them" (Delors et.al., 1996).

Thus, excellence in education system is directly linked to the commitment, willingness and professional preparedness of the teachers. Teaching as a profession possesses a few distinct features along with other characteristics. It is a body of erudite knowledge, a set of attitudes and a technique which is applied to the service of mankind through an educated group; it is an organised body of intellectual theory constantly expanding by research; it is an intellectual technique which has practical applications; it needs a long period of training and certification (Mangla, 1992).

Attitude is one of the important components of manifestation of professionalism. Teaching profession requires teachers not only with improved knowledge and teaching competence but also with healthy professional attitudes and desirable teacher – like qualities. How a teacher performs his/her duty as a teacher is dependent to a great extent on his/her attitudes, values, and beliefs. Studies have revealed

a positive relation between teachers' attitude towards teaching and their teaching efficiency (Bhalwankar, 1984). A positive favourable attitude makes the work not only easier but also more satisfying and professionally rewarding. A negative unfavourable attitude makes the teaching task harder, more tedious and unpleasant (Ahluwalia, 1978). In addition a teacher's attitude not only affects his/her behaviour in the classroom (Saraswat, 1986) but also influences the behaviour of his/her students and their achievement in subject matter. It has been found that the interest of teachers in literary activities is affected by teachers' attitude towards teaching profession (Saran, 1985). Teachers' attitude towards teaching and teaching profession has been found to be correlated significantly with patience, initiative, carefulness and responsibility (Som, 1984). Hence, it can be said that effective and productive learning on the part of pupils can be achieved by employing teachers with desirable attitudes and by shaping their attitudes in desired direction.

Thus, in this context effective teacher education attains a crucial role. In fact, it becomes a core condition to ensure high proficiency and quality of school education. Improving teacher performance through most effective teacher preparation is an essential ingredient in solving most educational problems. Educationist all over the world have started realising that only securing enough teachers will not do most important is securing the right type of teachers with right type of knowledge, skills, attitudes and competence.

The contention that teachers are born, not made can be seen only in few cases. To prepare effective and efficient teachers with desirable attitude, their professional education is must. Pre-service professional education is a process of transformation of a lay person into a competent and committed professional practitioner. The level to which professionalism is achieved is a matter of great concern. Professionalism of a high degree leads to the development of requisite skills, attitudes and values for imparting successful learning and teaching experience characterised by practicability, relevance and acceptability.

The attitudes that new pupil-teacher brings to the teacher education institution on the basis of his/her experiences as a student in primary and secondary school (or that in university, as the case may be), have to be modified and re-examined in the process of pre-service teacher education. School experience programme which is an integral part of the professional preparation of prospective teachers, proceeds by successful observation, participation and other

equivalent clinical experiences in school environment. It provides multiple opportunities to prospective teachers to participate in many phases of the work of the school system. Teacher educators are expected to provide a role model which acts as an important influencing factor in the transformation of the incumbent into a trained professional. In addition, teachers of practice teaching schools with whom pupil-teachers interact during school experience programme also act as important factor in the process of transformation. School experience programme provides a wide variety of experiences, designed to develop teaching competency and a right attitude towards teaching. It familiarizes prospective teachers with the existing constraints and opportunities present at their future work place, helps in acquiring the skills required for curriculum transaction, provides opportunities to interact with and understand the students' population with which they will be dealing in future and helps in studying the structure and resources of the community around. In short, besides developing various teaching competencies, school experience programme also tries to develop attitude of prospective teachers towards teaching. In the present study an attempt has been made to study the role played by school experience programme in building prospective teachers' attitude towards teaching.

### **Objectives**

Following were the objectives of study:

- (a) To study the inputs provided by the teacher training institutions before and during school experience programme to help prospective teachers in developing positive attitude towards teaching.
- (b) To study the attitude of prospective teachers towards teaching in terms of Teaching Profession, Classroom Teaching, Child-centred Practices, Educational Process, Pupils and Teachers before the commencement of school experience programme.
- (c) To study the impact of school experience programme in changing attitude of prospective teachers towards teaching in terms of Teaching Profession, Classroom Teaching, Child-centred Practices, Educational Process, Pupils, and Teachers.

## **Methodology**

### **Tools**

Teacher Attitude Inventory (TAI) developed and standardised by S.P. Ahluwalia was used to collect data regarding attitude of prospective teachers towards teaching. The inventory consisted of 90 items related with six aspects of teaching namely – Teaching Profession, Classroom Teaching, Child-centred Practices, Educational Process, Pupils, and Teachers. Each aspect had 15 items. Out of 90 items, 56 were in positive declarative form and 34 of them were in negative form. Again 43 items were meant to assess attitude in favourable direction and 46 in unfavourable direction. Thus, the favourable and unfavourable continuum was used to measure the attitude of prospective teachers towards six selected areas. Likert continuum strongly agree, agree, undecided, disagree and strongly disagree was used to get responses of prospective teachers. Prospective teachers responded to each item by putting a tick mark against the serial number of the attitude statement in the answer sheet.

### **Scoring**

Each item was assigned a weight ranging from 4 (strongly agree) to 0 (strongly disagree) for favourable items. In the case of unfavourable items range of weights was reversed that is, from 0 (strongly agree) to 4 (strongly disagree).

### **Sample**

Sample for the present study comprised of 120 prospective teachers, pursuing Bachelor of Education (B.Ed) programme run by Guru Gobind Singh Indraprastha University, Delhi in its affiliated colleges.

### **Procedure**

Out of 17 institutions offering Bachelor of Education (B.Ed) programme under Guru Gobind Singh Indraprastha University, Delhi, one institute (where one of the investigator herself was working as a teacher-educator) was selected on convenience basis and all the students pursuing B.Ed programme in this institution were considered for the study.

First of all the inputs provided by the teacher education institute to the prospective teachers before the commencement of school

experience programme were studied in terms of Teaching Profession, Classroom Teaching, Child-centred Practices, Educational Process, Pupils, and Teachers was measured using teacher attitude inventory (TAI). Then, all these prospective teachers underwent school experience programme for 40 working days in various schools under the supervision of one permanent supervisor, various rotatory supervisors, subject experts, and teachers of the practicing schools. They shared all the responsibilities with the regular teachers of the schools like conducting morning assembly, taking classes, preparing students for various co-curricular activities, conducting evaluations, etc. After the successful completion of School Experience Programme, Teacher Attitude Inventory (TAI) was again administered to prospective teachers to record their attitude towards teaching. Then data was analysed and various statistical techniques were used to study the impact of school experience programme on the attitude of prospective teachers towards teaching.

## **Results and Discussion**

### ***Inputs provided by Teacher Training Institution***

It was found that before and during school experience programme a variety of inputs were provided by the teacher training institutions which include equipping them with knowledge of general aims of education and specific aims of teaching particular subjects at secondary level, competency to state objectives in behavioural terms, understanding of various methods/strategies of teaching, competency to choose appropriate teaching strategy according to the content being taught, developing appropriate teaching aids, making lesson plans, skills of carrying out evaluation of students competency to organise various curricular and co-curricular activities like quizzes, competitions, celebration of various days, etc at school level, preparing achievement test and other tools like checklist, interview schedule, etc for measuring the achievement of the students and studying various aspects of child's life, ability to carry out critical evaluation of their own and fellow pupil-teacher lesson, and skills of preparing school profile and review textbooks that are followed in schools. For this purpose, various workshops, lectures and discussions were carried out by teacher educators of the institute and some invited guests. Also regular support and feedback was provided by the faculty of the school (where SEP is carried out) and training institution at the time of teaching practice. Based on the inputs provided,

prospective teachers prepared various records and reports which include – achievement test report, textbook review, case study, lesson plan file, peer group observation report, reflective journal, co-curricular activity file, physical education file, school profile, and school management report.

### ***Attitude of Prospective Teachers towards Teaching before SEP***

Table-1 shows the category wise response of prospective teachers on attitude inventory.

TABLE 1  
**Attitude of Prospective Teachers towards Teaching before SEP**

<i>Aspect</i>	<i>% Teachers with below Average Attitude</i>	<i>% Teachers with Average Attitude</i>	<i>% Teachers with above Average Attitude</i>
Teaching Profession	0	26.67	73.33
Classroom Teaching	0	76.67	23.33
Child-centred Practices	0	56.67	43.33
Educational Process	0	28.33	71.67
Pupils	0	83.33	16.67
Teachers	0	45	55
Over all	0	41.67	58.33

As per Table-1, not even a single prospective teacher possessed below average attitude towards any of the aspect even before the commencement of school experience programme. This inferred that Guru Gobind Singh university has succeeded in securing persons with favourable attitude towards teaching. The above average attitude of most of the teachers towards 'Teaching Profession' (73.33%) and 'Educational Process' (71.67%) before the commencement of school experience programme supports this point.

### ***Attitude of Prospective Teachers towards Teaching after SEP***

After the completion of 40 days school experience programme attitude inventory was again administered on the 120 prospective teachers to study their attitude towards teaching after school experience programme. Table-2 shows the category wise response of prospective teachers towards each aspect.

TABLE-2  
**Attitude of Prospective Teachers Towards Teaching After SEP**

<i>Aspect</i>	<i>% Teachers with below Average Attitude</i>	<i>% Teachers with Average Attitude</i>	<i>% Teachers with above Average Attitude</i>
Teaching Profession	0	18.33	81.67
Classroom Teaching	0	55	45
Child-centred Practices	0	21.67	78.33
Educational Process	0	6.67	93.33
Pupils	0	53.33	46.67
Teachers	0	26.67	73.33
Over all	0	13.33	86.67

Table-2 shows that percentage of prospective teachers with above average attitude (86.67%) towards teaching is much more than percentage of teachers with average attitude (13.33%).

However, on the other hand, average attitude of slightly larger percentage of prospective teachers towards pupils and classroom teaching may be because these prospective teachers were there in school for a limited period and all their students were well aware of this. Because of this it may be possible that they wouldn't be able to develop that rapport with the students as their regular teacher had, and as a result they would not be able to get support, respect and love of the students as they should have got which might have affected their attitude towards classroom teaching and pupils. It was found that students did not take practicing teachers seriously and used to disturb them during their teaching.

So, this can be inferred that majority of prospective teachers possessed above average attitude towards teaching after the commencement of school experience programme.

### ***Impact of School Experience Programme in changing Attitude of Prospective Teachers towards Teaching***

Attitude of prospective teachers before and after school experience programme was compared. Figure-1 shows the percentage of teachers with above average attitude towards teaching before and after school experience programme.

Figure-1 reveals that above average attitude of prospective teachers has increased in every aspect after school experience programme. In two aspects namely attitude towards teaching profession and educational processes, where attitude score was high even before the commencement of school experience programme, it raised further after the commencement of school experience programme. This may again be because of all the experiences through which these prospective teachers underwent during school experience programme. Working with teachers and students under the normal school environment has enhanced the attitude of prospective teachers. This shows that school experience programme plays a vital role not only in familiarising the prospective teachers with working conditions of schools but also in strengthening their attitude towards teaching.

**Figure-1**

**Above average Attitude of Prospective Teachers before and after SEP**

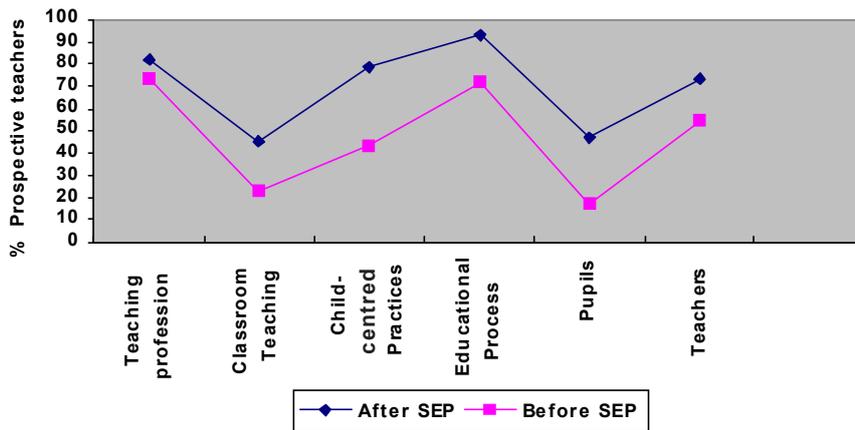


Table-3 shows the t-values for attitude of prospective teachers towards teaching before and after the commencement of school experience programme.

TABLE 3  
t-values of Attitude Before and After SEP

Aspects	Pre-Test		Post-Test		r	$M_1 - M_2$	$SE_D$	t-value
	$M_1$	$SD_1$	$M_2$	$SD_2$				
Teaching Profession	48.03	5.04	50.95	5.22	0.426	2.29	0.71	4.11*
Classroom Teaching	41.98	3.58	45.47	5.13	0.121	3.49	0.75	4.65*
Child-centred Practices	45.1	4.62	49.64	4.21	-0.035	4.54	0.81	5.6*
Educational Process	48.22	4.07	51.64	3.99	0.139	3.42	0.69	4.96*
Pupils	42.71	3.61	45.83	4.8	0.126	3.12	0.72	4.33*
Teachers	45.69	4.31	48.49	5.92	0.092	2.8	0.9	3.11*
Over all	271.7	16.84	292.03	20.75	0.143	20.29	1.27	15.97*

\*significant at 0.01 level of significance

Table-3 reveals that there is a significant difference in the attitude scores of prospective teachers before and after school experience programme as shown by t-values which are significant at 0.01 level. This further supports positive change in the attitude of prospective teachers towards each aspect after commencement of school experience programme. So this can be said that school experience programme which is the most important component of pre-service teacher training plays a significant role in building the attitude of prospective teachers towards teaching. These findings further support the importance of SEP and provides a base for increasing the duration of school experience programme in pre-service teacher education.

### Conclusion

The study revealed that none of the prospective teachers had shown below average attitude and more than 50 per cent prospective teachers had above average attitude towards teaching before commencement of school experience programme. After school experience programme percentage of teachers with above average attitude increased to 80 per cent. t-values reflected a significant difference between the attitude scores of prospective teachers before and after the school experience programme. This shows that the prospective teachers had developed more favourable attitude towards Teaching Profession,

Classroom Teaching, Child-Centred Practices, Educational Process, Pupils, and Teachers after the school experience programme. All these results proved a positive impact of school experience programme in building attitude of prospective teachers towards teaching and thus support the conduct of school experience programme as an integral part of professional preparation of teachers.

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**ERIC Projects Completed**

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(1)

**Pre-Service Secondary Teacher Education  
in the Diverse Education Context**

*A Study of B.Ed. Programme in Karnataka*

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**Introduction:** As a terminal stage of school education, secondary education is required to equip the individuals with competencies and skills so that they can be functionally productive in a knowledge intensive economy and become useful members and citizens of the larger society. It is in this context the present study of B.Ed. programme in Karnataka was undertaken. The study intends to analyse the current teacher education programme to assess its relevance and capability to prepare teachers for the emerging diverse educational context in the present age of globalisation, privatisation, and liberalisation.

**Objectives of the Study:** The present study was conducted with the following objectives: (a) to assess the existing teacher education curriculum in terms of its relevance to the emerging diverse educational contexts; (b) to study whether the existing practice of teacher education curriculum transaction equips the trainees to meet their professional requirements; (c) to analyse the perception of teacher educators and teacher trainees with regard to relevance and adequacy of the existing professional preparation programme of teachers; (d) to evolve profile of teacher educators with a view to assess their competence in changing contexts; (e) to identify the gaps between the on-going process of teacher preparation and the intended objectives; and (f) to analyse the perception of stakeholders with respect to compatibility of the teacher education programme for emerging roles of the teacher.

**Procedure:** The study employed a descriptive survey design (qualitative research design) to study the problem. The data have been largely qualitative in nature and were gathered from both primary and secondary sources.

**Sample:** Data was collected from a stratified sample of six B.Ed. colleges representing different management types and regional locations, 71 teacher educators across the state who responded to macro survey questionnaire and 19 teacher educators who were available for interviews, 177 student teachers from the sample colleges and 26 beginning teachers.

**Research Tools:** A mailed survey questionnaire for conducting macro survey of teacher educators, In-depth Interview schedule for teacher educators, Questionnaire for student teachers, Questionnaire for beginner teachers and Content analysis proforma for students' Observation Records were used as the tools to collect the data.

**Findings:** Results reveal that in terms of the intentions and objectives of teacher education for secondary stage of education, the B.Ed. programme appears to reflect the broader national goals of education as well as some of the emerging concerns in the diverse education context. It was found that the objectives of pedagogic subjects are aimed at developing more skills and application among the student teachers with respect to methods and materials of teaching school curricular subjects. In terms of providing knowledge base, the programme seems to have created adequate space through different professional subjects such as 'Education in Emerging India', 'Fundamentals of Educational Psychology', 'School Management', 'Information and Communication Technology', 'Secondary Education in India', 'Psychology of Learning and Instruction', and 'Education and National Concerns' under its core curricular domains.

In terms of relevance, the current B.Ed. programme reflects all the parameters of diverse education context. In terms of capacity to equip the prospective teachers, the current B.Ed. programme is found to fall short in several areas of professional practice, induction and orientation to teaching. In terms of curricular practice, considering the classroom transaction by the teacher educators, the most commonly observed pattern is the knowledge transmission model, which is pre-dominantly teacher educator and subject centred (over 45.5 per cent). In terms of orienting student teachers to professional roles of teachers during the classroom curricular transaction by teacher educators, there were very few references to the teacher's role for emerging demands in the diverse education context.

The finding reveals that the orientation to B.Ed. which is an initial induction into the teaching profession is generally conducted by all B.Ed. colleges. It was found that the orientation for preparing a lesson plan in the B.Ed. programme is mechanistic and rote in terms of following strict guidelines and the required format rather than promoting a spirit of excellence, individuality and creative thinking. The communication skill practice, although was found to enable the student teachers to practice this skill, yet there was some kind of monotony in the way the skill was practiced. The seminars which have been introduced with the intention of instilling professionalism among the student teachers to display their content mastery and presentation skills seem to have turned into ritualistic and routine activities.

In terms of equipping student teachers with necessary skills and competence, over 60 per cent of the teacher educators are of the view that the present B.Ed. programme partially fulfils this. Having entered the profession of teaching, in order to pursue a career in the same requires certain mindset in terms of motivation, a sense of identity, positive beliefs and values about the teaching profession. It is gratifying to note that more than 70 per cent of the student teachers believe that teachers can be made rather than teachers are born. A large majority of beginner teachers felt that the B.Ed. curriculum did expose them to certain emerging national and global concerns such as universal values, environmental preservation, human rights and rights of children population, etc.

**Conclusion:** In this study, the researcher finds pre-service secondary education at some extent satisfactory. But there are numbers of unraveled issues related to pre-service teachers' education waiting for explanation and some degree of modification.

## (2)

### **Participation and Consequences of Education of Scheduled Caste Children in Rajasthan**

*An Analytical Study*

**Principal Investigator**

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**Introduction:** For centuries, Indian society has suffered from inflexibilities of a rigid caste system. The caste has been the

determinant of class positions resulting in acute inequality in the distribution of wealth and income. Several studies have revealed that the role of education is very crucial as far as the Scheduled Castes and their development is concerned. Against this background, the present study intends to examine the current educational status of SC children along with the infrastructural and other facilities available to them.

**Objectives of the Study:** The present study was conducted with following objectives: (a) to examine the current status of education of SC children through the primary data and to assess the facilities available at school in which they are studying; (b) to know the experiences and perceptions of students, community and those who have discontinued their studies in relation to their socio-economic background and compare this with the experiences of others across socio-economic category; (c) to examine the awareness and the extent of utilization of facilities at various levels by SC students and to find out the reasons for non-utilization of such facilities; and (d) to find out the association between educational and cultural resources available and their utilization.

**Procedure:** The present study was qualitative in nature and the data were collected from the primary unit (the household) of the three districts from the State of Rajasthan.

**Sample:** A total of 1200 households were selected as the primary unit of sample from the three districts of the State of Rajasthan, viz. Bikaner, Jhunjhunu and Sikar; representing both the urban centres (300 households) and villages (900 households).

**Research Tools:** SC household schedule and the schedule for the details of the school aged children were used. SC household schedule consisted of Section A – Perception of school going children; Section B – Schedule for identifying the perception and inspiration of parents; Section C – Perception of dropouts; Section D – Schedule for village education committee (VEC) member; Section E – School Schedule; Section F – Village Schedule; Section G – Perception of school administration (headmasters and principals); Section H – Household Schedule.

**Findings:** The findings reveal that the enrollment of SC community children is proportionately high in primary section. But in middle and high section the enrollment debilitates gradually. In all the three districts SC community's living standard was not up to the mark. It

was found that the main reasons for the backwardness of these communities were poverty, large size of families, lack of educational environment at home, ignorance of illiterate parents, problem of excess liquor consumption, and early Marriage.

Caste discrimination was found at the household level. Even the upper caste people were not interested in the development of SC communities and do not have interest in a welfare plan related to the upliftment of these communities. The household position in all the three districts was by and large average. It was observed that majority of SC population was still living below poverty line. Regarding the condition of villagers in three districts, it was reported that Jhunjhunu was doing better than Sikar and Sikar was better than Bikaner in all the aspects.

The findings reflect that very few people (33% in Jhunjhunu, 8-9% in Sikar and Bikaner) in all villages and urban centres were working in the government jobs. All the villages of three districts had government schools within the periphery of villages itself but none of the village had provision for higher education after secondary school. It was observed that in all the three districts the government schools were short of essential funds for their development and none of the government schools had proper facilities for the children like electricity, furniture, toilets, etc. There were not a uniform fee structures and had no provision of dress for children in all the three districts.

It was found that the children and most of the parents in Jhunjhunu and Sikar districts were satisfied with the teaching facilities in the school but in Bikaner district, the children and parents complained about irregularities and misconducts of the teachers. The shortages of teaching and office staff were reported in all the three districts. The problem of excess consumption of liquor in Jhunjhunu and Sikar districts was found but it was not very serious in Bikaner district. The findings reveal that the parents were encouraging children in studies but still there were dropouts because parents could not find enough resources to help their children to continue their studies. It was reported that most of the government schools give some books to the children when it was the time for final examination. It was observed that children wanted to continue their studies but due to one or other financial constraint they had to drop in between.

The findings delineate that the principal goals of education of each respondent of all the three villages and the urban centres of all

the three districts were to gain economic security followed by higher status in the society. It was found that a large group of children enjoyed going to school but their reasons varied according to each individual child's perceptions. Some enjoyed because they liked school; others because of their friends and some liked going school to play. There were children who did not like going to school simply because they did not find motivated teachers or the school itself, they said, that was full of boredom.

The findings show equal percentage of regular school going children (around 75%) in all the three districts but there was some temporary migration of children due to their parents movement for various purposes. 88% respondents in villages and the urban centre in Jhunjhunu district, 43% in Sikar district and 59% in Bikaner district acknowledged the utility of education in day-to-day life. The status of girl's education in all the three districts was not satisfactory and elders in families were against the education of daughters.

**Conclusion:** The findings of this study delineate the present status and challenges in relation to the participation and consequences of education of SC children under the studied districts. It is true that the conditions of SC children are improving but the improvement is slow and sporadic. A need of more deliberate and comprehensive endeavours to make sure education for all the SC children was acknowledged.

### (3)

## **Effect of Self Regulatory Strategies on Enhancing Teaching Competence among B.Ed. Students**

### **Principal Investigator**

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**Introduction:** The present study intends to study the effect of self regulatory strategies on enhancing teaching competence among B.Ed. student. For doing so, the study comprises both developing teaching competence and self regulatory strategies. Apart from enhancing the general teaching competence, the study attempts to develop self regulatory strategies among the teacher trainees.

**Objectives of the Study:** The present study was conducted with following objectives: (a) to identify the important components, consists and principles of self regulation; (b) to identify the important self regulatory strategies; (c) to identify the specific teaching competencies which are very essential for successful effective teaching; (d) to find out the relationship between self regulatory strategies and specific teaching competencies; (e) to evolve a model to enhance the teaching competencies of B.Ed. teacher trainees; (f) to assess the level of self regulation and application of self regulation strategies of B.Ed. teacher trainees; (g) to implement the model evolved in order to enhance the teaching competence of B.Ed. teacher trainees through the application of self regulation strategies;(h) to assess the application of self regulation strategies among the B.Ed. teacher trainees after interventions; (i) to assess teaching competence after intervention; (j) to find out the relationship between application of self regulation strategies and teaching competency; and (k) to identify the specific self regulatory strategies which enhance specific teaching competency.

**Procedure:** The present study was experimental in nature (pre test-post test experimental design) and the data were collected from teacher trainees of a teacher education college of Salem, Tamilnadu.

**Sample:** A total of 40 teacher trainees (from eight subjects: English, Tamil, Biological Science, History, Economics, Tamil, Mathematics and Commerce) from Kevi College of Teacher Education, Salem, Tamilnadu, were selected through purposive sampling technique.

**Research Tools:** In this study, two tools were subjected to the sample: First, a tool to assess the self regulation of B.Ed. teacher trainees, consisted of seven questions from three major areas(planning, Monitoring and Evaluation); and Second, the Teaching Competency Assessing Tool, to assess the teaching competence of the subjects. The both scales were developed and standardised by the investigator.

**Findings:** Based on the analyses of data, the finding reveals that the B.Ed. teacher trainees improved in all the dimensions namely planning, monitoring and evaluation of self regulatory strategies in the post assessment than the pre assessment. It was found that the teacher competency of the teacher trainees improved significantly in post assessment of teaching competency than the pre assessment. All the components of teaching competency have shown significant improvement.

It has been noticed that the teacher trainees of Physical science scored highest in the evaluation aspect of self regulation, the teacher trainees of History scored highest in the monitoring aspect of self regulation, and the teacher trainees of Mathematics scored highest in the planning aspect of self regulation. It has been also found that the teacher trainees of Tamil scored highest in four dimensions of teaching competency such as mobilisation of resources, planning curriculum, developing leadership quality and motivating pupils. The finding have shown that the teacher trainees of English significantly improved in the four dimensions of teaching competence such as motivating colleagues, evaluation and remedial skills and planning curriculum.

The findings have delineated that the teacher trainees of Mathematics show considerable improvement in the four dimensions of teaching competence such as mobilisation of resources, planning curriculum, identification of pupils' talents and needs and classroom management. It was found that the teacher trainees of Physical science have improved in the four dimensions of teaching competence such as mobilisation of resources, planning curriculum, motivating people and initialisation of curriculum. Teacher trainees of Biological science have significantly improved in the four dimensions of teaching competence such as developing leadership quality, planning curriculum, motivating colleagues and initialisation of curriculum.

The finding also revealed that the teacher training of Commerce have shown considerable enhancement in the three dimensions of teaching competence such as developing leadership quality, motivating colleagues and inter-school relations. Teacher trainees of History show considerable improvement in the three dimensions of teaching competence such as identification of pupil's talents, classroom management and motivating pupils. Teacher trainees of Economics show considerable enhancement in the three dimensions such as mobilisation of resources, identification of pupil's talents and evaluation and remedial skills.

**Conclusion:** After going through the findings it is evident that the self regulatory strategies play a critical role in the preparation of efficient and skilled teachers. Though the sample of the present study is narrowed but the findings of this study broaden the way for further exploration in relation to the effect of self regulatory strategies on the teachers and the students.

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## **Book Reviews**

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Bray, Mark (2009). *Confronting the shadow education system: What government policies for what private tutoring?* Paris: UNESCO International Institute for Educational Planning (pp. 132). € 20 paper copy; electronic copy free of charge from [www.//iiep.unesco.org](http://www.//iiep.unesco.org).

The present book is an authentic and vivid description of the status and implications of the practice of private tuition in the majority of the countries in the world. It derives its input primarily from a 2007 policy forum held at UNESCO's International Institute for Educational Planning in Paris. The practice of private tuition has received increasing attention from policy makers and planners because of its negative social and economic effects. The book shows that there can not be one uniform policy to tackle this issue. Rather, different types of response might be appropriate to different cultures and different points in time, and there is need for continued monitoring and analysis to learn from experience.

The book is divided into five chapters. The first introductory chapter explains why the author calls the practice of private tuition a shadow education system. It notes that supplementary tutoring exists because of the mainstream education system, and that its size and shape varies according to size and shape of the mainstream system. Private tuition has both advantages and limitations. It helps pupils to learn, serves valuable social functions, and helps in generating income for the private tutors. It has, however, major negative implications such as maintenance or exacerbation of social inequalities, and influencing children's life in psychologically or economically undesirable ways. Private tuition can also be a form of corruption that undermines social trust.

The second chapter, "Diagnosis", occupies about half of the space in the book. It presents the scale, intensity and mode of private tuition; its economic, social and educational impact; and three case studies of Korea, Mauritius, and France. Private tuition is evident in both low-income (e.g., Bangladesh, Cambodia and Kenya) and high income (e.g., Canada, Japan, and Hong Kong) countries. The percentage of students receiving private tuition at a range of levels varies from 8% in Canada to 86% in Cyprus with countries such as Bangladesh (31%), Cambodia (31%), Vietnam (38%), India (41%), Egypt (64%),

Japan (65%), Kenya (68%), and China (74%) falling in between. Tutoring is offered through various modes including face-to-face, phone, television, and the Internet. Interestingly, in some countries tutoring is viewed as a 'peace-making' effort between parents and children because the tensions of supervising homework are transferred to the tutor. Various studies report gender, rural/urban, and ethnic differences in the beneficiaries of this practice. Though private tutoring supports the mainstream, its current commercial nature, in addition to other psychological effects on the students, presents a threat to the mainstream.

The third chapter elaborates the types of responses which might be considered by the policy makers. There cannot be a worldwide uniform response to this practice; rather, it needs to be addressed in a context-sensitive manner. Any such exercise should take into account the cultural and economic factors as well as the importance given to the examinations, transition rates, and confidence of the parents in the mainstream education system.

Monitoring and Evaluation have been discussed in the fourth chapter. Governments need to create national and local feedback loops, and remain in touch with the practices followed at the international level.

The book is an excellent treatise on the practice of private tuition and a must-read for people interested in knowing the nature and shape of this phenomenon across frontiers and cultures. It presents an in-depth analysis of various dimensions of private tuition in a clear manner. It contains citations of recent studies which will motivate people to undertake further studies on this topic.

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Baru, Rama V. (Ed.) (2008) *School Health Services in India: The Social and Economic Contexts*. Sage Publications, New Delhi (pp. 210, Price Rs. 550/-)

This volume on school health in India is partly the result of Rama V. Baru's involvement with the *National Curriculum Framework – 2005* exercise of NCERT (National Council of Educational Research and Training). This gave her an ample scope to gain an insight into the real working of health related issues in schools. When she chaired the National Focus Group on the Health and Physical Education,

she fuelled the interests of the members of the group to deliberate on perspectives, curriculum and pedagogy so that it could be more meaningful to children, teachers and parents. Hence, it is the fruit of joint venture undertaken by researchers on social, educational and medical issues holding prestigious positions at different levels.

The volume brings together the various aspects of school health in a comprehensive manner. It outlines the importance of health as right of children and the role of school in addressing their health requirements. It tends to assess the health status in terms of nutritional levels, causes of mortality and social-economic groups. It explains the complex relationship between inequality, poverty and ill-health, and its consequences for enrolment, retention and completion of school. It gives an insight into the different programmes and the role of multiple institutions which deliver these programmes including the Mid-day Meal Scheme, school health services programmes, and health and physical education programmes. It also appraises us of the implementation, management and responsiveness which vary from state to state and also from area to area depending on its status whether rural or urban. It also highlights constraints in implementing these programmes. It evaluates and provides some alternatives to the future of school health in India.

The book brings together articles on various components of school health in India. It contains seven chapters. Chapter 1 “The Introduction” and Chapter 6 “School Health Services in India- An Overview” are contributed by Rama V. Baru, Associate Professor at the Centre of Social Medicine and Community Health at the Jawaharlal Nehru University, New Delhi. The first one introduces us to the three components of school health – Mid-day Meal (MDM) Scheme, School Health Services and School Health Education and the role played by socio-economic factors. It traces, in brief, the evolution of school health programmes in developed countries addressing nutritional and physical fitness aspects on account of poor nutritional status among lower-middle and working class children. It also appraises us how in developing countries like India the importance of school health has now been recognised and various programmes have been chalked out in this regard. Chapter 6 provides an overview of School Health Services Development in India. It reviews its working in different parts of the country. It also throws light on the constraints in the implementation of the programme. She has dealt with all these issues in a most lucid and elegant style.

Chapter 2 “Through The Life Cycle of Children: Factors that facilitate/impede Successful Primary School Completion” is written jointly by three persons, viz. Vimala Ramachandran, Kameshwari

Jandhyala, and Aarti Saihjee. Vimala Ramachandran, founder of the Educational Resource Unit, has an extensive experience in qualitative research, programme development and process documentation. Kameshwari Jandhyala, the former Director of Mahila Samakhya, Andhra Pradesh, has special interest in qualitative research. Aarti Saihjee, a Project Officer in UNICEF, has taught International Development at the University level. The article highlights the nexus between poverty, ill-health and their consequences for schooling. The MDM Scheme gains its significance in addressing hunger in classrooms though its implementation in most parts of India.

Chapter 3 “The Future of Mid-day Meals” is contributed by, Jean Dreze and Aparajita Goyal. Jean Dreze, visiting professor at the university of Allahabad, has written widely on development issues with special reference to India. Aparajita Goyal is currently a Ph. D. candidate in economics at the University of Maryland. Their article highlights that MDM can enhance child nutrition, promote social equity and contribute to educational advancement. But the programme is not effectively implemented in poor states which need it more. It has its impact on enrolment and retention of children. MDM Scheme has an important role in resocialisation as it breaks down the barriers of class, caste and gender.

Chapter 4 “Mid-day Meals in Primary Schools – *Achievements and Challenges*” by Reetika Khara, a research associate at the Centre for Health and Well being, Princeton University, deals with the history and management of the MDM Scheme, finance for the scheme and the scheme’s impact on enrolment, retention and attendance of children. It also brings out the nutritional and health impact, socialisation and educational benefits.

Chapter 5 “Towards More Benefits form Delhi’s Midday Meal Scheme” is written by Meera Samson, Claire Noronba and Anuradha De, the researchers on social issues. The article highlights various issues related to MDM Scheme like genesis of current Mid-day Meal Scheme in India, MDM Scheme in Delhi, Methodology and Sample, implementing the scheme as directed by M.C.D., observations from the Schools, perceptions of parents and children, etc.

Chapter 7 “Innovations in Health Education Curriculum in Schools: Towards an ‘Art of the Possible’” is jointly written by Anu Gupta, who works on community Health, Mohan Deshpande – a medical practitioner, R. Bala subramaniam – the Founder President of Swami Vivekananda Youth Movement, and Anil, C. – a medical doctor with a specialisation in Hospital and Health Systems Management. It deals with Health Education, Teacher preparedness, pedagogy, etc.

Book Reviews

All these articles give a comprehensive view on school health services in India in the social and economic contexts of the class and caste – ridden and gender – biased society. They also highlight the attitude of states towards health programmes – MDM Scheme and their impact on enrolment, retention and attendance of children. It is a treatise of immense value in the field of school health services, written with a pragmatic approach to address the issues affecting a large mass of children's school completion. It will give us an innovative direction in tackling all allied educational problems in the years to come.

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Agarwal, Pawan (2009). *Indian Higher Education: Envisioning the Future*, Sage Publications. New Delhi (pp.488, Hardbound; Price: 895)

The book under reference comprises a comprehensive review of the complexity of the academic system and analysis of problems facing Indian higher education. Organised in nine chapters with stimulating foreword by Professor Philip G. Altbach the book lends an opportunity to initiate a dialogue about Indian higher education under the changed realities.

At present, higher education has secured a crucial position in the government of India's education policies (nine-fold increase in outlay for higher education in the eleventh five year plan, 2007-2012) due to the India's outward orientation in the background of liberalisation, privatisation and globalisation. It is astonishing and shocking that India has no major higher education research centre. The quality of India's higher education system is inferior to the countries with which it is competing globally. Not a single Indian university has been placed near the top in any of the international rankings. But India has several competitive advantages and one of them is the widespread use of English. Against preceding contexts the present volume promises to fulfill a conspicuous gap in the existing body of knowledge about Indian higher education, particularly development over the past couple of years.

In the first chapter, entitled "Size, Structure and Growth", the size, structure and growth of higher education in India, both in terms of enrolment and institutions have been elaborated. In terms of absolute enrolment (about 12.8 million students), India is the third largest education system in the world, but in terms of gross enrolment ratio, it is small—just around 11 per cent. There are more than 20,000 higher

education institutions (universities and colleges) in India more than the rest of the world taken together. The higher education system in India is highly fragmented, organised sub-optimally and skewed (enrolment pattern) in favour of arts and humanities. The author has talked about two distinct phases of growth of Indian higher education: first, until 1980, growth was mainly in colleges affiliated to public universities and second, after 1980, growth was primarily in private professional colleges. In recent years, with private and new providers and new forms of delivery, higher education system is witnessing a lot of activity. Various perceptions and complexities of Indian higher education system have been noticed. The empirical mapping of size, structure and growth of higher education has been justified also.

In the second chapter, the issues of access and equity have been addressed that are central to higher education in most of countries around the world. It examines the expanding enrolment and its consequences and limitations on access when higher education is entirely provided by the public sector. It has been alluded that over sixty years, it is the unplanned proliferation of universities and colleges, rather than proactive, intelligent interventions that have expanded access to higher education. It has been observed that the issue of access is related to insufficient public funding. It was found that though with increased enrolment various disparities (for example, gender disparity, inter-caste disparity, inter-state variation, etc.) are less stark now, yet these persist. Inclusive growth is dominating the developmental agenda of government of India but over the past decade we have witnessed interpersonal, inter-state and rural-urban inequalities. It suggests the idea of equity in access of higher education in the context of the changes in the Indian society.

In the third chapter, entitled, "Private Higher Education", the growing and vibrant private sector in higher education, its growth and prospects has been delineated. It has been viewed that the future of Indian higher education would largely depend upon the growing private sector due to the quantum jump demand for higher education and at the same time the inappropriate numbers of public institutions. Some issues have been raised about private sectors, for example, fears of low quality, the inequitable access, another mean of exploitation, etc. but the government regulations can be resolved these issues in a proper manner. It is true that private higher education has come to stay and is destined to grow. So there is a need to handle this sector carefully in keeping mind the interests of students as well as maintaining the efficiency of higher education.

Fourth chapter, entitled, "Financing and Management", deals with the issues relate to financing and management of higher education

in India. It has analysed the funding of higher education (from both public and private resources) and examined overall funding patterns and trends. The issue of institutional funding, student financing (student aid and loans) and offered suggestions on sustainable funding arrangements, with a particular focus on student financial aid has been elaborated. It perceives an organic link between financing and management of higher education and discusses issues relating to institutional management in the context of new public management philosophy.

The chapter five pertains the discussion about the contribution of higher education in the development of workforce, to meet domestic as well as the global demand for qualified manpower. It views higher education as a major mean to gain access to higher status and better paid jobs but majority of the workforce is engaged in low productivity and low wage jobs. Now the scene is changing and some jobs are being created at the high end. The mounting skill shortages have drawn attention towards the unhealthy status of higher education, recently. Such shortages occur side by side with rising graduate unemployment and underemployment. The adverse conditions of the vocational education and training sector and their consequences have been investigated also. There are perceived skill shortages due to differences between work skills and academic skills.

In the chapter six, entitled, "Research and Higher Education", the author has envisioned the Indian research performance in relation to global stage and assessed the crucial contribution of academic research in the nourishment of innovation. The story of research enterprise in India is a story of hopes and despair. The picture of basic science in India is one of declining productivity but there is a general optimism about India's potential in the new knowledge-based economy. Research funding and foreign patent activity have been found insufficient as well as inappropriate. Growing global impact of research from India in recent years has been noticed, though there is concern about fewer and poor quality Ph.Ds graduating from Indian universities. The author has talked about further actions on several fronts, for example, encouragement of private funding of research by evolving a system of incentives, introduction of research assessment exercise, setting up a research portal regarding the issue of research coordination and maximum use of existing research infrastructure and experimental facilities. The encouragement of research partnerships has been advocated also.

In the chapter seven, entitled, "Regulatory Framework", the issues of regulatory environment for higher education as occurs in present India has been discussed. The role of state as a regulatory body for

higher education has functioned well when it was funded primarily publicly. Right now the role of state is under the process of change due to the various providers of higher education. Three probable roles of the state as an advocacy body, steering body, and the regulatory body have been observed. It has been suggested that there is a need to develop a roadmap for streamlining regulation of the higher education sector through decentralisation of central regulation and development of institutional mechanisms for effective market coordination. It has been viewed that the role of UGC needs to be reworked as suggested by the National Knowledge Commission. There is also a need to terminate unnecessary regulations for the smooth and healthier functioning of the Indian higher education.

In the chapter eight, entitled, "Quality management", the author has analysed the progress made on accreditation in India and alluded the inappropriateness of existing accreditation system. It is evident that the present accreditation serves little purpose. In India, accreditation is voluntary and cyclical and is both for institutions and programmes. It is organised at national level. It has been viewed that for a large system like that of India, multiple accrediting bodies with sufficient capacity to undertake cyclical accreditation are needed.

The final chapter nine, entitled, "Perspectives", investigates the conclusions reached in the context of changing socio-economic and political realities and growing optimism. It discusses the issues of purpose, diversity and competition and assesses the status and prospects of Indian higher education. It also observes the changing nature of policy support and the imperatives for systematic governance in the changed scenario.

The importance of higher education is growing gradually due to its role in the preparation of skilled human resource. Skilled human resource is the very basis of any progressive country, as we know. At present, the higher education in India is passing through a transition phase in order to compete with other countries and witnessing several opportunities and challenges. The present volume provides a detailed account of Indian higher education. It is successful in developing a deeper sense of Indian higher education in the mind of the researchers and students working in this area. The analytical framework and data provided in this volume could certainly stimulate the thinking mind.

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Form IV (See Rule 8)  
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I, Peyyetti Rajakumar, hereby declare that the particulars given above are true to the best of my knowledge and belief.

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