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राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
**NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING**

## About the Journal

The *Journal of Indian Education* is a reviewed periodical published in May, August, November and February by the National Council of Educational Research and Training, New Delhi.

The NCERT encourages original and critical thinking in education. The JIE provides a forum for teachers, teacher educators, educational administrators and researchers through presentation of novel ideas, critical appraisals of contemporary educational problems and views and experiences on improved educational practices. Its aims include thought-provoking articles, challenging discussions, analysis, challenges of educational issues, book reviews and other related features.

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

The views expressed by individual authors are their own. They do not necessarily reflect the views of the NCERT or the views of the Editors.

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## CONTENTS

# EDITOR'S NOTE

The National Curriculum Framework (NCF) 2005, by emphasising the concerns of the pupil and the teacher, offered ample opportunity to arbitrate in the area of teacher preparation. The realisation of needs of the teacher articulated through different concerns like connecting knowledge to life outside the school, understanding about construction of knowledge, helping and facilitating learner in the knowledge construction, creating a fear-free environment, addressing diversity and inclusion, equity and quality are of paramount importance as far as teacher preparation is concerned. The articles and research papers in the current issue of the *Journal of Indian Education (JIE)* discuss some of these concerns and endows with some practical solutions for the improvement of our education system.

Koijam Sobita Devi analyses the theory of constructivist psychologists Jean Piaget and Lev Vygotsky with reference to their viewpoints on constructivist learning process. The paper highlights the importance of engaging the child's mind by constructing powerful and useful concepts through cognitive and social interaction. The paper also discusses the different strategies, its implications and methods for facilitating constructive learning.

The quality of learning requires the right type of pedagogy. A collaborative learning process, as advocated by the constructivist psychologists is an innovative pedagogy, which teachers essentially practice in classroom. Bharati Prashant Falari narrates her experience as a Teacher Educator while teaching history to her student teachers through collaborative pedagogy. She explains specific examples that help the learner to relate the historical knowledge very effectively.

Multigrade teaching is still a reality in many schools of our country. Sandhya Sangai through her paper related with multigrade teaching explores the various challenges as well as some effective pedagogical strategies for addressing those challenges.

School picnics, field trips and excursions are considered an important pedagogical strategy in a constructivist classroom. It will necessarily provide the students an opportunity to connect academic knowledge with outside world. An empirical survey by Shreenabh Agrawal emphasises on the use of visual aid in creating awareness about sustainable tourism. The finding highlights that visual aid as a pedagogical tool was effective in creating awareness about sustainable tourism among students, teachers and parents.

One of the important factors contributing to the quality of education is the teacher. The National Curriculum Framework for Teacher Education (NCFTE, 2009) has made it clear through its recommendations of preparing humane teacher. Bhupendra Singh and Patanjali Mishra through a critical review of NCFTE, 2009 highlight its contribution and the practical possibilities for

preparing humane and professional teachers. They suggest that in order to capture the spirit of preparing humane teacher, every Teacher Education institution needs to develop a Teacher Education plan.

Madrasa education has an important role in educating the Muslim minorities in India. An empirical study by Lakshmi Pandey assesses the quality of facilities available in madrasas of Bihar. The study highlights that most of these madrasas lack infrastructure such as building, classrooms, furniture, etc. The study also reveals that most of the teachers are poorly trained or untrained.

Jayanta Kumar Behera investigates the status of primary education of tribal girls in Madhya Pradesh in the context of the Right to Education Act, 2009. The study provides an insight in to the problems and challenges faced by the tribal girls. It reveals that tribal education is still a matter of great concern in Madhya Pradesh and highlights the need to provide more attention on tribal education in general and girl's education in particular.

Deepika Bansal discusses conventional perspectives of females about science and how feminists identified science as both a source and a locus of other kinds of gender inequalities. The article critically evaluates the role feminists play in exploring different disciplines of science. The study by Prachi Sinha and M.C. Paul explores the relationship between education and skill training provided to women through case analysis of two NGOs. The study highlights the role played by the NGOs in the social and economic empowerment of illiterate women through skill training.

Mathematics has been considered as a difficult subject by students across the country. Vyomesh Pant explores the reason for difficulty faced by the learner in understanding the concept of fraction. The paper also suggests some practical ways through which the teacher can help the students to conceptualise the concepts easily. The empirical study by Arup Kundu focuses on self-efficacy of students in mathematics and how it affects their performance positively.

Lakshmanasamy reports the result of an estimation study about the intergenerational effects of parental education on child education. The study reveals that there is a high degree of intergenerational persistence but it lacks a low degree of educational mobility in our society.

We expect that our readers would be able to relate their personal experiences with the issues and concerns discussed by the authors of these articles and research papers presented in the current issue. We invite our readers from different levels of school education and teacher education to contribute to the journal by sharing their knowledge in the form of articles, action research reports, theoretical papers, book reviews, etc. Your valuable suggestions and comments for improvement of the quality of the journal are welcome.

*Academic Editor*

# Constructivist Approach to Learning based on the Concepts of Jean Piaget and Lev Vygotsky
## An Analytical Overview

Koijam Sobita Devi*

| Abstract |

*The goal of learning is not to store piles of information but to engage children's minds by constructing powerful and useful concepts. The behaviorist approach to learning focuses only on the behaviour that can be externally observed without considering the influence of the unconscious mind. The constructivist approach to learning can facilitate individuals by providing meaningful and relevant information, by giving opportunities to discover or apply ideas themselves and by teaching them to be aware of and consciously use their own strategies for learning. Here, the learners must be capable of discovering basic skills and knowledge to solve complex problems or transform complex information into convenient and suitable information. Jean Piaget viewed children as discovering or constructing virtually all knowledge about their world based on their cognitive levels. According to Vygotsky, the socio-cultural context also profoundly affects children's learning. This paper discusses the different strategies and methods for facilitating constructive learning with broad emphasis on the views of Jean Piaget and Lev Vygotsky.*

**Keywords**: Learning, Cooperative, Discovery, Scaffolding, Cognitive Development

## INTRODUCTION

In the job to instruct student teachers, the constructivist approach to learning is introduced to minimise deficits and utilise the strengths of the student teachers through which

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they in turn can enhance the learning opportunities of their students. There are no boundaries in learning and teaching—teachers, students, and learning cannot be limited to the confines of the classroom. Constructivist learning is a student-driven process in which students develop or construct their understanding of information. The learners incorporate their own experiences and perspectives as well as those of others to develop their own understanding of concepts rather than only receiving information from the instructor (Anthony, 1996). Knowledge is not seen as fixed and existing independently outside of the learner but rather learning is a process of accommodation or adaptation based on new experiences or ideas (Jenlick and Kinnucan-Welsch, 1999). The constructivist pedagogies represent a synthesis of cognitive and social perspectives where knowledge is seen as personally constructed and socially mediated. The act of teaching is co-constructing knowledge with students, acting as conceptual change agent, mentoring apprentices through the zone of proximal development and supporting a community of learners (Windschitl, 2002). Learners can learn by integrating information from the external world with their pre-existing schemas of knowledge to develop their own understanding of concepts (Collay, Gangon and Schmuk, 2006). The constructivist approach allows space for the learner's curiosity by providing flexible time to experiment,

think and reflect about what they are doing and learning (Grennon-Brooks and Brooks, 1999). In the process, the teacher is the mediator, who guides the learning process by asking questions, making suggestions and explaining concepts, instead of explicitly forcing to memorise the correct answer to the learner.

Behaviourism and constructivism are two learning theories that have stemmed from two philosophical schools of thought that have influenced educators' view of learning. Behaviourism refers to a psychological approach which emphasises scientific and objective methods of investigation concerning observable stimulus-response behaviours (McLeod, 2017). Watson (1878–1958), Pavlov (1849–1936), Thorndike (1874–1949) and Skinner (1904–1990), the major proponents of behaviourism believed that all behaviours were the result of interaction with the environment and only observable, measurable and outward behaviours were worthy of scientific inquiry (Bush, 2006). Their direction of research in learning was focused on behavioural changes manipulated by conditioning of the external environment

> Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select — doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations and the race of his ancestors (Watson, 1924).

Behaviourist teaching methods tend to rely on the so-called "skill and drill" exercises to provide the consistent repetition necessary for effective reinforcement of response patterns. Positive reinforcements such as verbal praise, good grades and prizes are common (Morrison, Ross and Kemp, 2004). In contrast, constructivism views learning as a search for meaning and describes elements that help predict what students understand at different stages of development (Rummel, 2008). Whereas a behaviourist is mainly concerned with the learning contents and the effect of conditioning on learning, a constructivist would be more interested in understanding the learners attempt to construct meaning (Bush, 2006). Behaviourism can clearly define behaviour and measure behavioural changes from a scientific angle. Important factors that influence behaviour, like emotions, expectations, higher-level motivation, etc., are not discussed; rather it focuses only on the behaviour that can be externally observed. Therefore, this learning theory faces criticism from the psychodynamic approach of Sigmund Freud as it does not take into account the influence of the unconscious mind on behaviour. Humanistic psychology also rejects the nomothetic approach to behaviourism as humanism views humans as being unique that cannot be compared with animals. In due course, researchers sought ways to identify the cognitive processes in learning (Fisher, 2008). This led to the development of cognitive science, which "includes the study of thinking, perception, emotion, creativity, language, consciousness and learning" (Harman, 2008). Many psychologists have worked on constructivism, postulating an answer to the question 'how people know what they know?' John Dewey (1938) was credited for beginning the constructivist movement. The essence of constructivist theory is the idea that learners must individually discover and transform complex information if they are to make it their own. The constructivist revolution draws heavily on the works of Jean Piaget (1896–1980) and Lev Vygotsky (1896–1934) on cognitive development, that is how thinking and knowledge develop with age. The present discussion is concerned with the critical analysis of constructivism in the views of Piaget and Vygotsky.

## CONSTRUCTIVISM IN THE VIEWS OF PIAGET AND VYGOTSKY

Jean Piaget explained the learning process as adaptation (building of schemes, that is, organised ways of creating information on how things work through direct interaction with the environment), assimilation (introduction of new information into the existing schemes) and accommodation (transforming existing schemes or creating new ones). The learner is inclined to adapt to his new environment and restore the disequilibrium between the existing

schemes and what is encountered in the environment. Continuous interactions among existing schemes, assimilation, accommodation and equilibration create a strongly interconnected cognitive system for new learning. Piaget divided the psychological development of the young learner into four sequential stages. During the sensorimotor stage (birth to the age of 2), sensory experiences and motor activities dominate. Advances in mental representations but limitations in thinking mainly intuitive in nature occur during the preoperational stage (from age 2 to age 7). At the concrete operational stage (from age 7 to 11), the intelligence of the child is logical and more organised with the ability to decentre and reverse thinking and dependent on concrete references. The formal operational stage (after 11 years of age) is the stage when abstract thinking starts and the learner engages in hypothetic-deductive reasoning.

Piaget's theory provides a solid framework for understanding children's way(s) of doing and thinking and their capabilities at different levels of their development. Children have their own views of the world that are extremely coherent and robust. Their ways of doing and thinking are mostly well suited to their current needs and possibilities. The views are continually evolving with the expansion of knowledge from within, and through self-organisation, thus requiring a better theory to abandon a believe system or a working theory. Piaget believes that a constructivist classroom must provide a variety of activities to challenge students to accept individual differences, increase their readiness to learn, discover new ideas, and construct their own knowledge (Ackermann, 2001).

Lev Vygotsky, known for his socio-cultural theory of constructivism, believes that children develop cognitively through the process of socialisation and education. Vygotsky agreed with Piaget that children are active, constructive beings but unlike Piaget who emphasised children's independent efforts to make sense of their world, Vygotsky viewed cognitive development as a socially mediated process dependent on the assistance that children received from adults and more expert peers in tackling new challenges (Berk, 2007). The perceptual attention and memory capacities of learners are provided by their culture. For learning to occur, the child first makes contact with the social environment at an interpersonal level and then internalises this experience to think and solve problems. The earlier notions and new experiences influence the child, who then constructs new ideas through self-regulation.

Children learn best the concepts that are in their zone of proximal development. Children are working within their zone of proximal development when they are engaged in tasks that they could not do alone

but can do with the assistance of peers or adults. When children are working together, each child is likely to have a peer performing on a given task at a slightly higher cognitive level exactly within the child's zone of proximal development. In the views of Vygotsky, cognitive development is limited to a certain range at a particular age. With the help of social interaction, such as assistance from a mentor, learners can comprehend concepts and schemes that they cannot know on their own.

In scaffolding or mediated learning, the teacher is the cultural agent who guides instruction so that students will master and internalise the skills that permit higher cognitive functioning (Vygotsky, 1978). The ability to internalise cultural tools relates to the learner's age or stage of cognitive development and once acquired, the internal mediators allow greater self-mediated learning (Slavin, 2009). In practical terms, scaffolding might include giving students a great deal of support at the early stage of learning and gradually turning responsibility over to them to operate on their own (Rossenshine and Meister, 1994). Vygotsky's emphasis on scaffolding or mediated learning is important in the modern constructivist approach. Students should be given complex, difficult, realistic tasks and then be given enough help to achieve these tasks. This is the underlying principle for the classroom projects, simulations, explorations in the community,

writing for real audiences, and other authentic tasks (Byerly, 2001).

Piaget's "cognitive constructivism" views that humans are unable to automatically understand and use information that they have been given, because they need to "construct" their own knowledge through prior personal experiences to enable them to create mental images (Chambliss, 1996). Therefore, the primary role of the teacher is to motivate the children to create their own knowledge through their personal experiences (Rummel, 2008). Vygotsky's "social constructivism" is similar to Piaget's assumptions about how children learn but places more importance on the social context of learning. In Piaget's theory, the teacher played a limited role whereas in Vygotsky's theory, the teacher played an important role as a facilitator in learning.

## CONSTRUCTIVISM IN TEACHER EDUCATION

Due to differing views, educators have the daunting task to design instruction and develop a curriculum that will promote student learning in a diverse society. In Teacher Education programmes, student teachers' learning can be the result of experiences gained in schools and/or new inputs acquired from the Teacher Education courses which are often associated with practical works both in the classrooms and the field. The constructivist perspective is appropriate in Teacher Education because it is not oriented

towards absolute truth but intended for understanding of appropriate teachings. Pedagogy classes provide an understanding to student teachers on how students learn and the student teachers construct useful strategies within their own teachings. This constructivist perspective of Teacher Education has reversed the earlier view of teachers as merely exhibiting prescribed behaviours in the classroom. Teachers can be viewed as critical thinkers who use their unique background experiences to construct their own understanding during their professional preparation (Noel, 1993). Constructivism has been relevant to the teaching of various disciplines, such as, mathematics (NCTM, 1991), science (Lakatos, 1970), reading, comprehension (Spivey, 1989), arts (Simpson, 1996), etc. The constructivist wave has been entering the scene of the Indian educational discourse during the last decade. Before, the term 'constructivism' appeared only in journals and Teacher Education and Education Technology textbooks. The National Curriculum Framework for Teacher Education (NCFTE, 2010) requires teachers amongst others to view learners as active participants in their own learning and not as mere recipients of knowledge; to encourage their capacity to construct knowledge; and to ensure that learning shifts away from rote methods. Learning is to be viewed as a search for meaning out of personal experiences, and knowledge generation as a continuously evolving

process of reflective learning. The framework envisages that Teacher Education must engage with theory along with field experiences to help trainees to view knowledge not as external to the learner but as something that is actively constructed during learning. In the National Curriculum Framework (NCF 2005), learning is understood mainly as the construction of knowledge. Several education technology companies such as Educomp, Mexus Education, TATA, etc., have entered the Indian market and deployed their systems in numerous private schools. Constructivism has now become a widely adopted slogan applied in various ways and in several contexts. The philosophy or belief that learners create their own knowledge based on interactions with their environment including people, views learning as an interpretive, recursive and building process by active learners interrelating with the physical and social world (Draper, 2002). Constructivism requires the teacher to assume the role of a guide who relinquishes his authority figure to allow the students to be actively engaged and take some responsibility for their own learning (White-Clark, DiCarlo and Gilchriest, 2008). The teacher concentrates on showing students relevance and meaningfulness in what they are learning and to pose realistically complex and personally meaningful problems to the students.

In the backdrop of the views of Piaget and Vygotsky, some of

the constructivist approaches to education are discussed below.

## Cooperative Learning

Constructivist approaches to teaching typically make extensive use of cooperative learning where students work together in small groups to help each other learn. The emphasis on the social nature of learning and the use of groups of peers to model appropriate ways of thinking and exposing each other's misconceptions are key elements of Piaget's and Vygotsky's conceptions of cognitive change (Pontecorvo, 1993).

## Discovery Learning

It is an important component of the modern constructivist approaches that has a long history in education innovation. In discovery learning (Bergstrom and O'Brien, 2001), students are encouraged to learn largely on their own through active involvement with concepts and principles, and teachers encourage students to have experiences and conduct experiments that permit them to discover principles for themselves. Summer camps and innovative science programs (Singer et al., 2000) are based on principles of discovery learning. Discovery learning arouses students' curiosity, motivating them to continue to work until they find answers. Students also learn independent problem-solving and critical-thinking skills,

because they must analyse and manipulate information.

## Self-regulated Learning

In self-regulated learning, the learners are metacognitively, motivationally and behaviourally active in their own learning (Zimmerman, 1989). Self-regulated learners use specific self-directive processes that transform their pre-existing mental abilities into academic skills or task related behaviour in diverse areas (Zimmerman, 2002; Zimmerman, 2013). The motivation for self-regulation of the learners mainly arises from their underlying beliefs including perceived efficacy and also from their intrinsic interests. Self-regulated learning involves the use of specific processes that are effective learning strategies for each learning task (Zimmerman, 2002; Slavin, 2009). The learners look for ways to simplify complex problems, decide when and how to go for deep understanding, etc. (Greeno and Goldman, 1998; Zimmerman and Kitsantas, 1999; Slavin, 2009).

## Active Engagement

Physical and mental manipulation of materials and ideas enable students to gain experiences where they can think about and reproduce and consequently develop a relationship with the information and concepts involved. The instructor is required to design learning activities that provide opportunities for experimentation and discovery, and guides the learning

process through questions and feedback (Johnson et al., 2005a). In B.Ed. courses, for example, student teachers are asked to prepare teaching aids for teaching demonstration. A student teacher was required to prepare a chart of the digestive system of human body.   During the preparation of the teaching aid, various situations arise, like fixing the size of the chart, borders, fonts, line weight, line spacing, related organs, size, proportion and colour of the organs, process involved, etc. As the activity proceeds, the student teachers discuss ideas among themselves, hear from students of biology background, consult books, web pages, etc. By actively engaging in the process of making a chart, the student teacher develops one's own enhanced understanding of the digestive system, the importance and functions of the digestive system. The instructor mediates the learning process by asking questions, making suggestions, and explaining basic concepts of instruction through chart, and the learning is driven by the student teacher's needs and interests.

## Intentionality

Although exclusive focus on performance goals can cause anxiety and stress for learners and inhibit their ability to retain knowledge after task completion, limited performance goals can be helpful in building confidence in learners because they can see productive outcomes and accomplishments result from their learning (Grabowski and Song, 2006). Learning environments designed with specific learning goals help learners understand why the information they are working with is important and relevant (Grabinger, 2001). Goals can also be performance-based, in which the learner seeks public recognition for a result. In the B.Ed. programme, one aspect is the co-curricular activity with performance-oriented goals. In one of the sub-activity, the student teachers are to present a one-act play on social and educational issues. While the supervisor explains the concept of the issue, it is for the student teachers to bring out the play with educational implications in a way to be appreciated by the audience. Instructors working with these students support learning goals by stressing the importance of taking time to understand the concept and not rushing through the process. The performance goal encourages them to slow down and think about how they want other people to see their efforts. It also encourages the learners to take pride in their work and complement each other.

## Complexity

Physical growth is enhanced by physical exercise whereas cognitive growth is enhanced by complex thinking. Adults must strike a balance between a child's existing cognitive development and the level of thinking that a child is capable of when assisted by a more informed person.

Oversimplifying may not help curious children who ask about everything from where babies come and why the sky is blue to why there is war and why people die. The child's age, our own knowledge, social circumstances, and experiences influence our responses to such inquiries. Learners need to be exposed to and engaged in such complicated discussions in order to develop higher order thinking skills. Exposing a child to ideas and tasks that are more complicated than those that the child is already familiar with helps that child develop more elaborate cognitive processes (Wertsch, 1988). As children understand complex ideas and meet complicated challenges, they build confidence in their ability to perform such tasks and are better prepared to later build more complex structures of knowledge (Collay et al., 2006).

## Collaboration

Social interactions can expand our thinking and expose us to new ideas. In collaborative learning environments, individuals must balance their dependency on others with their own accountability to the group in order to reach shared objectives (Johnson et al., 2005b). As individuals work to communicate, resolve disagreements, and achieve goals, they are forced to examine and modify their own thinking, behaviours, and relationships with others (Costa, 2000). Collaboration can also develop individuals' self-esteem because they are needed for the group. When group members share responsibly and support one another, individuals within that group can develop an emotional sense of self-worth and usefulness because they are needed to advance the shared group goal (Biehler and Snowman, 2003). The successful completion of a joint effort also brings individuals within that collaboration closer together through the shared achievement of reaching the mutual goal.

## Conversation

Conversational learning helps learners develop and expand their concepts of knowledge and information by exposing them to new information and alternatives. In addition to exposing learners to new information and alternative perspectives, the exchange of ideas and personal sharing that occurs in conversation can also help people recognise their similarities, develop bonds, and learn from one another as models of behaviour and thinking; as people talk and share their thoughts with one another, a trust and understanding can be built that can open those involved to new perspectives (Baker, Kolb and Jensen, 2002). Additionally, when people articulate their ideas and explain their thinking to others, they think through their reasoning and re-examine their ideas (Biehler and Snowman, 2003). During the community contact programme for the B.Ed. course, the student teachers are divided into groups and each group is allotted a topic

for the contact programme. Student teachers with different backgrounds, experiences and qualifications have an opportunity to share their ideas among themselves for finalisation of the methodology of presentation. Their views are in turn shared with the community having families of different socio-economic status. Such conversation facilitates student teachers to generate better ideas of the topic and at the same time, recognise and understand the importance of the topic in practical applications.

## Reflection

Conversation provides opportunities for learners to reflect on their thinking and analyse the process they used to reach opinions and ideas; as individuals attempt to explain their ideas to someone else, answer questions and respond to feedback, they think through their reasoning and re-examine their ideas (Biehler and Snowman, 2003). Such re-evaluation may help people reaffirm their ideas to their own mind or may cause them to reconsider some of their positions, but in either case, reflection allows learners to follow their own thought processes (Lochhead, 2000). As people learn to follow their thought processes, they learn to recognise inadequacies in their understanding of information and can thereby ask questions and seek information to gain clarity. Such thinking about thinking, or metacognition, teaches learners that thoughts do not just magically happen, but that thoughts can be directed and guided by the thinker (Swartz, 2000). Reflection also helps learners build knowledge constructs, because as they reflect on their thinking and thinking processes, they relate their own personal experiences and associations to the information and make that knowledge their own (Martin, 2000). This personal identification and the act of reflecting on thinking helps the learner to retain information and increase his ability to transfer that knowledge to other contexts (Johnson and Johnson, 2000). In a project work for extraction of caffeine from tea, the student was required to determine the melting point of the caffeine extract. The caffeine extract was put inside a flask and was to be melted by placing the flask on boiling water. In the process, the temperature of the water when the caffeine started to melt was to be recorded as the melting point of caffeine. The child was feeling frustrated as the caffeine never started to melt that whole day. The instructor only reminded the basics, that is the temperature of liquids will not rise above their boiling points. The child succeeded in melting the caffeine extract and recording the melting point by replacing water with a liquid having higher boiling point. Drawing the child's attention to his own thinking and working process not only helps one discover one's own errors, but also initiates the habit of thinking to avoid repeated errors in the future.

## IMPACT ON CURRICULUM DEVELOPMENT AND INSTRUCTIONAL DESIGN

The curricula developed with due consideration of the constructivist learning model actively engage the students in their learning process. Learning occurs due to an internal cognitive activity where learners construct knowledge from classroom experience. The teacher's role is to facilitate and negotiate meaning, rather than to dictate an interpretation (Driscoll, 2005). Curriculum specialists and lesson plan builders can use the zone of proximal development as a guiding reference. The constructivism oriented instructional framework developed by Kumar (2006) suggested a repertoire of heuristic instructional strategies that facilitated students' independent construction of scientific knowledge. Learners select and process information through constructing hypotheses, decision making, and giving meaning and organisation to experiences. Constructivists frame all instructional goals in experiential terms, specifying the kinds of learner problem addressed; the kinds of control learner's exercise over the learning environment; the activities in which they engage and the ways those activities could be shaped by leaders or instructors; and the ways in which learners reflect on the results of their activity together (Weegar and Pacis, 2012).

In a constructivist classroom, teachers and peers support and contribute to learning through the concepts of scaffolding, cognitive apprenticeship, tutoring, and cooperative learning and learning communities (Brown, 1994; Rogoff, 1998). The teachers create situations that review the assumptions of traditional teaching and learning. Constructivists always re-evaluate assumptions about knowledge and attitude towards 'the expert'; do not have any problem by ambiguity but are enticed by complexity; and venture on the never-ending quest for truth and learning through the process of construction in which the knower participates (Belenky, Clinchy, Goldberger, and Tarule, 1986). Reflecting on teaching practice enables the teacher to move on from the traditional teaching to a constructivist and transactional one which is the purpose of constructivism (Mezirow, 1990).

According to the social constructivist approach, instructors are facilitators (Bauersfeld, 1995). Whereas a teacher gives a didactic lecture that covers the subject matter, a facilitator helps the learner to get to his or her own understanding of the content. The learner plays a passive role while the instructor just teaches; however, the learner plays an active role while the instructor facilitates the learning process and helps learners to learn. A teacher tells, a facilitator asks; a teacher lectures from the front, a facilitator supports from the back; a teacher gives answers according to a predetermined curriculum, a facilitator provides guidelines and

creates appropriate environment for the learner to arrive at his or her own answer and conclusions; a teacher gives monologue, a facilitator is in continuous and interactive dialogue with the learners (Rhodes and Bellamy, 1999).

With the growing popularity of online learning vis-à-vis constructivism, software packages focus on interactive problem-based environment where the student is empowered to take charge of his or her own learning. Hypermedia and multimedia online instructional approaches can be constructivists in nature by emphasising problem solving to the learners. The creation of these rich learning environments may include fully integrated courses complete with texts, reference sources, multimedia, social networking, etc. (Shield, 2000). Problem-based learning (PBL) is one method which allows students to apply their knowledge to real world applications through online learning (Camp and Doolittle, 1999). Students work in cooperative groups to explore possible answers, develop a product, and present findings to the selected audience (Carbonell, 2004). Threaded discussions and problem - based learning project activities online enable the learners to think critically and provide discovery learning.

## CONCLUSION

Both Piaget and Vygotsky appreciated constructivist learning. Knowledge is not merely a commodity to be transmitted, encoded, retained, and re-applied, but a personal experience to be constructed. Constructivist learning environments promote the learner to gather, filter, analyse, and reflect on the information provided for their own understanding. Piaget's theory has been criticised for relying exclusively on the sequential stages and underestimating children's abilities and progress but Piaget's influence on concepts of cognitive constructivism and developmentally appropriate instruction are important in educational reforms.

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# Wandering in the Realm of History
## Experimenting with Pedagogy

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## Abstract

*Teaching history to the D.El.Ed trainees is both, a challenge and an opportunity. The huge burden of 'accumulated facts' (that is, what we transform history into) could be reduced considerably by introducing innovative ideas and initiating a culture of collaborative learning. The relationship between the past, present and future can be effectively transacted through vivid activities related to the social milieu and personal experience of the learners.*

*This article explores the journey of the author (a Teacher Educator in history and civics) and her teacher-trainees into the pedagogy of the subject, and the possibilities of creative and collaborative learning as introduced by DIET, Goa.*

## INTRODUCTION

The vast, mysterious ocean of the past beckons, allures, invites us. On the shores of this vast ocean, we gather facts, weave a lot of fiction around it and get actively engaged in understanding our pasts. It is in the light of our past that we can understand our present and carve the path for the future.

It was the Centre for Cultural Resources and Training (CCRT), New Delhi which provided a plethora of rich and vivid experience, connecting history with culture. The wonderful lectures, slides of our heritage sites, regional songs, visits to historical sites in Delhi, live performance of theatre artists and classical dancers, and many other such activities

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transformed my perception of the subject.

The huge educational kit gifted by them to each participant was truly a treasure trove of the past. This kit consisted of attractive pictures and slides with useful information about the architectural marvels of India, classical dance forms, musical instruments, miniature paintings, folk theatres of India, national symbols and a lot more.

It made me realise that history is not merely an accumulated heap of facts, facts and more facts; but a lively, colorful, engaging 'affair' with the past and the present. History is not merely about kings and queens, but also ordinary people, such as artisans, weavers, farmers, scribes, poets, scientists… all those who have built this world in which we live today.

This understanding freed us from the shackles of treating the subject area as a mere 'political arena' and helped develop a comprehensive viewpoint about the nature of the subject and the role of a Teacher Educator.

## INCLUSION OF CREATIVE PEDAGOGY IN TEACHING HISTORY AND CIVICS: GLIMPSES OF EXPERIENCES

The subject content of the textbooks of social sciences published by the National Council of Educational Research and Training (NCERT) (June 2006) has many significant pedagogical strategies woven into the content, which provides scope for the trainees to discuss, debate, interact and share their viewpoints. Many interesting narratives and case studies have been used by the authors. But, the problem is that it is not connected to the local history. An insight into the subject content and an attitude to go 'beyond the text' is needed in order to make the subject relevant and interesting.

In this context, a brief overview of the activities conducted in the District Institute of Education and Training (DIET), Goa, is thus provided.

## 'Amchem Mankulem Goem' (Our tiny Goa): Revisiting the Past

One of the key activities taken up in order to infuse local history and engage teacher-trainees actively was an exhibition titled 'Amchem Mankulem Goem', showcasing the heritage and culture of Goa. Every home is a site which cherishes and preserves things of the past. Each trainee brought articles, generally from their ancestral homes and wrote a few lines about its type, material used, and utility. The trainees and the teaching faculty were excited and pleasantly surprised to see that we have history in our homes which we need to discover and appreciate and be aware of. The antiquities exhibited surpassed our expectations. The long forgotten instruments of measure (locally called *annathi, ginnathi, kudav, payl, padd,* etc.) were displayed. The 21st century teacher-trainees seemed unaware of its presence in their homes or its utility.

Large sized copper and brass vessels, liquor storage glass wares, musical instruments; several articles used by the tribes of Goa adorned the exhibition hall. This activity brought to the fore memories of the bygone era and the need to preserve it. In a way, it was a celebration of the rich cultural diversity of the land and its people.

Perhaps, we could use the term "constructivist pedagogy" for this kind of a learning endeavour, wherein the learners become the makers of meaning. This is possible only when the learning is 'connected' to the world of learners. According to 'Constructivist Pedagogy' proposed in the National Curriculum Framework 2005, the learner is the creator of content, the maker of meaning, and not merely a passive receiver of the 'given' knowledge.

### *Taare Zameen Par*: Celebrating 100 Years of Cinema

It was in the year 2013, that the Indian Film Industry had hit a century on the screen of time. The History Club of our institute used this opportunity to display an array of exhibits related to the theme Indian Cinema. From screening the first feature film of the Silent era, *Raja Harishchandra,* by Dadasaheb Phalke, to listing the major blockbusters till 2013, the exhibition hall was filled with the history of cinema.

Cinema too documents the past in many ways. This realisation was needed because we take films for granted. Many films and film clips on social themes of untouchability (*Achhut Kanya, Sujata*), gender oppression, poverty, and class struggle could be used by teachers of social science as an effective device for creating social awareness.

Indeed, films could be used as a catalyst to change the rigid mindset of people. However, the choice of films to be screened and discussed should be done carefully because many films perpetuate the age-old stereotypes and biases. Documentary films on themes such as India's freedom struggle*,* Shyam Benegal's series based on Discovery of India have the potential to change one's approach to teaching about our glorious past.

Developing a legitimate pride in the achievements of our country is possible through judicious selection of the theme, articles, pictures, relevant materials for the exhibition. Correlation of history with other subjects such as art, literature, geography, political science can also be done effectively.

Cinema based on the theme of freedom fighters, partition of India, or personalities like Ramanujan (a mathematician), Milkha Singh (an athlete), Mary Com (a wrestler), Hansa Wadkar (film *Bhoomika*, a biopic of the actor), several films on Gandhiji (*The Making of Mahatma, Gandhi My Father, Gandhi, Lage Raho Munnabhai,* etc.), Bhagat Singh, Subhashchandra Bose could be used as a significant source of learning

history. Partition based films such as *Garam Hava, Tamas, Pinjar, Khamosh Pani* are relevant in the present times too, for they reveal the anatomy of communal violence and its tragic consequences.

## Digital Storytelling (DST)

An assignment on preparing photo slides, a short video with narration using voice-over, background music, on a theme selected by the trainees, helped create stories about the local history of temples, feast, folk theatre, *jatra* (a village fair) and many other exciting topics. The ethnic diversity of Goa was well captured by the 'selfie-obsessed' new millennial generation. The wide spectrum of themes included the feast of 'Sao Jao' (St. John), 'Chikalkalo' (mud festival celebrated in Goa during monsoons), 'Bonderanche fest' (the feast celebrated on the island of Divar, wherein people march with colourful flags). The history of forts, temples, chapels, martyrs' memorial were digitally documented and presented. Though amateurish, it was the first attempt at using this mode of DST for learning about local history, which mainly focused on cultural history. This experience of learning about the local history became relevant and interesting for our teacher-trainees, as it involved total engagement with the topics they had chosen, which were rooted in their cultural history.

Similarly, short videos could be prepared to capture oral history, wherein senior citizens, freedom fighters, the elders in our family could be interviewed. Their valuable experiences and views about the Portuguese regime and the post-liberation period could be understood and appreciated.

The District Institute of Education and Training, Alto Porvorim is the only DIET for the entire state of Goa. The trainees travel from the extreme ends of north and south Goa to reach Porvorim, which is more or less located in the central Goa. Therefore, our trainees could represent a wide spectrum of themes related to local histories.

## Visit to Museums

Visit to the Goa State Museum, a storehouse of artefacts, well-displayed in its galleries, is one of the prime activities taken up by the History Club of DIET. The sculptures of gods and goddesses carved during the reign of the early rulers of Goa, the photographs of rock art of the prehistoric times, the Portuguese influence on Goan history and heritage, the life-sized statues of the saints who propagated Christianity in Goa, the furniture of the colonial period, the sketches depicting the horror of the inquisition period, the pictures depicting the transformation of the city of Panaji into the capital of Goa during the Portuguese rule, coins, manuscripts, inscriptions, miniature paintings and many other antiquities helped in understanding and appreciating our unique identity

as 'Goans'. The first printing press in India was started in Goa. The first printing machine is displayed in the printing press gallery.

Indian Customs and Central Excise Museum, situated in the heart of the capital city of Panaji is one of its kind in the entire country. Right from the punch-marked coins of the Kushana period, to the depiction of The Silk Route during the reign of Kanishka, the Salt Satyagraha of Gandhiji, the photographs of finance ministers of India since Independence, adorn the galleries of this museum. Several priceless historical antiquities have been smuggled out of India. Therefore, the role of the custom and excise officers in intercepting the smugglers of not only antiquities, but also of narcotics, gold, arms, tusks of elephants, etc., was appreciated by all.

The visit to museums made our trainees reflect on whether there is a need to create a little museum corner in their classrooms. It was suggested that this be taken up as a group activity and the displays could be changed every month. Collection of stamps, coins, stones, utensils, pictures, drawings, illustrations, models, clay-models could be displayed artistically. Such learning activities could be a part of group assignments.

## History and Heritage Trail

Goa has been portrayed as the land of sun, sand and sea. In the author's experience, it has been found that many important historical facts and heritage aspects are not known to the teacher-trainees. An annual activity of 'history and heritage trail' taken up under the guidance of noted historians and environmentalists of Goa provided a very enriching and memorable experience to our future teachers.

For more than a decade, various historical sites have been visited. Bhimbetka Caves of Madhya Pradesh have been discussed in the NCERT textbook of Class VI. It is a World Heritage site, known for its evidence of prehistoric human beings and the cave paintings created by them around 10,000 years ago. In one of the heritage trails conducted in Goa, the trainees could see the prehistoric rock art at Pansaimol, Sanguem taluka. These carvings made on the laterite stones have interesting figures of birds and animals. The trainees realised the importance of preserving these sites.

To cite another significant example, it becomes a direct learning experience when we walk the trade routes which connected Goa with its neighbouring states of Maharashtra and Karnataka. History becomes real, palpable and interesting. The Jain temple at Kudne, or the Harvalem caves in Bicholim taluka which show the presence of Buddhism in Goa, the worship of Sapta Matrukas (seven mothers) reveal the presence of Shakti cult, and the 'linga, indicating the presence of Shaivism in Goa.

Rivers are the lifeline of a civilisation. In Goa, out of the eleven rivers, river Mahadeyi and river Kushavati have not only created a rich biodiversity but also vivid cultural diversity. The Western Ghats in Goa are home to many species. Therefore, the organisers of heritage trails should consciously select resourceful persons, who are well versed with the history, geography and culture of Goa. Such personalities make a profound impact on the student teachers.

As a follow-up, the Teacher Educator and trainees can decide a variety of activities such as slide presentation, preparing sketches, writing poems, articles, essays, reports, etc., according to the aptitude and interest of the trainees.

## REPRESENTATION OF WOMEN

The contribution of women should be adequately included in the subject content of all the disciplines across the board. What we learn and how we learn about our past will determine our perception of the present. Therefore, every teacher should analyse the textual content from the gender point of view, for gender equality and gender justice are pre-requisites for creating a democratic society.

Gender stereotypes are deep-rooted in our society, perpetuated by socialisation practices. For instance, one comes across a question stated in the lesson plans by the trainees on the topics related to family or village panchayat: 'who is the head of your family?' or 'who cooks food in your family?' the expected response from the school children is 'father' and 'mother' respectively, very often our expressions, whether visual or verbal, strengthen our stereotypes. This is also true with respect to the textbooks.

Prior to the introduction of the NCERT textbooks in 2006, history and civics textbooks used in Goa had merely a couple of names of women personalities included as 'tokenism'. In the chapters related to the freedom struggle of India, only three women freedom fighters, namely, Rani Laxmibai, Sarojini Naidu, and Annie Besant were mentioned briefly. Comparatively the representation of women in the textbooks titled '*Socio-Political Life I, II and III*', respectively is much more gender sensitive as the currently used NCERT textbooks showcase real issues faced by girls and women of our country.

A purposeful, deliberate and a consistent effort is needed to include women in every sphere of history; be it social, political or cultural. An analytical or critical perspective is necessary to understand the textual content by Teacher Educators and trainees. This will enable them to play a proactive role in changing the age-old gender perceptions. In D.El.Ed institutes, more than 90 per cent of trainees are girls. To empower them, we need to create opportunities for inclusion of women personalities in the content, and use activities, such as wallpapers, videos, pamphlets, talks, poetry, songs, dramatisation, newspaper articles, discussions, etc.

## CONCLUSION

If we adopt an activity-based approach to learning the subject, allow ourselves to wonder about the nature of the subject of history, go beyond the textual content, contextualise the learning experiences, develop a gender sensitive approach, nurture the creative potential of our teacher trainees and use local history to create a bond with the past, such endeavours will definitely go a long way in changing the perspective of our future teachers. A wide range of ideas, viz., constructivism, critical pedagogy, child-centric education, activity-based learning are complementary and correlated.

The future of our country is being shaped in our classrooms and the teachers who will educate and empower this 'future' are being educated and trained in the teachers' training colleges. A paradigm shift is needed from being 'trained' to being 'educated' and this requires a paradigm shift in the pedagogies used in the DIETs and other teachers' training colleges.

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# Multigrade Teaching
## Challenges and Opportunities

SANDHYA SANGAI*

| Abstract |

*We often come across some primary school, especially in rural and remotely located areas, staffed with one or two teachers. In sparsely populated habitations, due to thin size of enrollemnt, the number of teachers allotted for the schools is less than the number of grades. This requires action on the part of the available teachers to combine several grades. Primary schools with multigrade teaching are acknowledged for their constraints in several research studies. However, pedagogical concerns, skills and methods required for multigrade teaching situations have different rationale from common situations of monograde teaching. This paper discusses some strategies for organising teaching-learning in a multigrade context, how to covert multigrade challenges into opportunities and how the teachers should be oriented to teach multigrade classrooms.*

## INTRODUCTION

Multigrade teaching is a widely prevailing teaching-learning situation in both the developing as well as the developed countries. Sometimes, such a situation is appreciated as it gives ample opportunities for self-learning, self-assessment, peer learning and good socialisation. This spirit of constructive vision can be better seen in multigrade classrooms where children struggle to learn in their own ways. In a multigrade setting, generally the number of teachers is fewer than the number of classes. Such a situation is observed more in the areas which are either difficult to access or the schools having low enrolment and hence, less number of teachers. Sometimes, multigrade teaching could also arise as a situation in a school having

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enough teachers. It happens when some teachers are engaged with other school related assignments besides teaching. In such situations remaining teachers are expected to take care of teaching all the classes in the school.

A common argument raised against it is that in multigrade, teaching, students, learning suffers as they do not get enough attention and time from the teachers. However, in the garb of this argument, pedagogical arguments have been neglected. There is no dearth of researchers and practitioners who argue that multigrade classrooms should promote child-centered teaching and learning, flexible teaching, a secure classroom environment, freedom of teachers to implement innovative pedagogy and an understanding for individual learning pace. Multigrade teaching becomes challenging as there are children of different ages having varying needs. What has been observed across researches is that there are different types of research findings based on the practices used in multigrade teaching. Handling multigrade classrooms is a skilful assignment for the teachers in context.

## Organising Teaching and Learning in a Multigrade Setting

Multigrade contexts vary within the country as well as across countries. In some countries like Nepal, a single teacher teaches more than one grade together, maybe in the same classroom or different classrooms. In Malaysia also, a teacher accommodates two or more levels in one classroom for the purpose of teaching. In Pakistan, more than three levels are joined together and taught by a single teacher (Birch and Lally, 1995). In India too, the multigrade teaching situation is witnessed by almost all teachers especially in government run primary schools. Even in schools which are otherwise monograde, the teachers are faced with multigrade situations for various reasons. There are three main teaching-learning strategies that can be adopted in a multigrade classroom situation.

• Students' group formation and subject organising
• Peer tutoring
• Differentiation

## Students' Group Formation and Subject Organising

Organising students in groups created on the basis of various criteria and then engaging them in teaching-learning as per the decided curriculum is a generally followed practice in multigrade set-ups. The sub-categories for this category are based on the definition of multigrade practices proposed by researchers and practitioners. The specific strategies for curriculum transaction under this main category could be as follows.

### Parallel curriculum

In this type of a teaching situation, students share the same themes or subjects but study the syllabus of their respective grade. Each grade is taught turn by turn by the teacher. Suppose there are three Classes—III, IV and V in one classroom and the subject of environmental studies is being taught. If the teacher has adopted the parallel curriculum approach, the teacher will take up a particular theme, say for example, plants. The teacher will discuss the general concepts and other things about the plant which would be relevant and comprehensible to the students of all the three grades. However, the syllabus and textbooks or teaching-learning material would be different for all the classes. Take for example, in Class III, under the theme 'plants', children are supposed to observe different types of plants, including trees and bushes. They should also be allowed to notice different parts of the plants and diversity in different parts such as shapes of leaves, surface of bark, etc. In Class IV, the children are expected to observe the changes taking place in the growth of plants and other processes like photosynthesis. In Class V, children are expected to know about the process of germination, how the plants grow, needs of the plants, etc. Caring for plants and sensitivity towards them is a common concern across classes.

In a multigrade classroom, if the teacher is adopting the parallel curriculum approach, the beginning point may be concern, care and importance of plants. Thereafter, the teacher can discuss the observations of children from their daily life experiences, and gradually, the discussion level may get relatively complex to help Class V children know as per their syllabus. Thus students of a particular class would be required to cover the syllabus relevant to them and teachers will take each class turn by turn for specific inputs.

### Curriculum rotation

In this situation, the whole class studies the curriculum of one grade in one year, and the curriculum of the other grade is taught the next year. Thus, children of all the classes are taught together. Taking the same example as given above, there are three types of syllabi for Classes III, IV and V. The syllabus for each class will be taken up turn by turn each year. For example, in first year, Class III syllabus may be covered, next year Class IV syllabus and then in the following year, Class V syllabus is taken up. However, this strategy is not appreciated by practitioners as the learning pace and capacity of children is not same across the grades. For example, for Class V child, syllabus of Class III is pitched at a relatively lower level of difficulty while for Class III child syllabus of Class V would be of higher difficulty level.

### Spiral curriculum and curriculum alignment

In this kind of a practice, similar topics are identified in different grade curricula. Students share the same themes. The basic concepts are taught in the lower grade and the same are deepened and expanded in the upper grades. Again, taking the same example of teaching of EVS in Classes III, IV and V, the teacher would identify which themes and topics are common across the curricula of the three classes. Food, family, plants are the themes which are generally common across Classes III to V. Such topics can be taught to the whole class and then depending upon the syllabi and curricular expectations at different class levels, these topics can be discussed in specific detail in class-wise groups. The teacher may make groups class-wise. Whole class teaching and group teaching can be taken up as per the decision of the teacher.

### Subjects staggering

In such kind of a strategy, all grade students study different subjects and each grade is taught by turn. The situation is just like making students of different classes sit together and read their own subjects and syllabus. The teacher takes turns for direct teaching or getting involved with classes individually. Taking the same example, Classes III, IV and V sit in one classroom and children are engaged in their own learning without getting involved with the subject or theme being taught to other two classes. It may happen that children of Class III are studying mathematics, Class IV students are studying language and Class V children are engaged with environmental studies simultaneously.

### Whole class teaching

In this situation, all the classes are taught same subjects at the same time using the same material. Though children belong to different grades, yet there is no differentiation in the teaching, and the same material is supplied to all the children for learning. In such a classroom, the teacher focuses only on the basic competencies and skills which would be helpful to all the children across classes. Generally, this method is used for teaching subjects like music, yoga, sports and art.

In all the practices given above, student grouping emerges as the key point in organising teaching-learning in multigrade classrooms. The grouping of students as per classes will not be required in the case of whole class teaching as all the classes are combined and teaching is done simultaneously using the same material. In other cases, the teacher decides on grouping arrangements. If the number of students is quite low, the children may be grouped according to grades. In case the number of students is more and the learning pace also varies, the teacher may go for a grouping, based on ability. The group arrangement may

keep on changing, depending upon the skills and interest of the teacher.

## Peer Tutoring

The second main strategy practised in a multigrade situation is peer tutoring. Peer tutoring can be spontaneous or guided. When children help each other without any prompt or stimulation by the teacher, it is called spontaneous peer tutoring. However, when it emerges as a reaction to the teacher's guidance, it is called guided peer tutoring. Peer tutoring is considered to be beneficial for both sides, the students of higher grades as well as students of lower grades. Peer tutoring may be within the same grade or it could be across different grades. Spontaneous peer tutoring requires a specific environment that can be developed through reduction in control of learning situation by the teacher or by creating situations such as cross age grouping. Teachers, as per research studies, use guided peer tutoring as a teaching strategy. Some teachers take the help of students who complete their task early to help other students who may be facing difficulty in completing their work. Some teachers like to encourage students of higher grade to teach students in a lower grade. The opportunities to develop and utilise peer grouping and tutoring could be many depending upon the visualisation of the teacher.

## Differentiation

The practice of differentiation in teaching is also used by teachers dealing with a multigrade situation. The differentiation could be internal or external. In internal differentiation, the difficulties in the development and background of students are generally taken into account; while in external differentiation, students are grouped on the basis of their achievement level. Differentiation is also created on the basis of the needs of different learners in the classes. The groups created on the basis of differentiation are handled using different practices; for example, giving different assignments, providing remedial teaching and using personal work plan for children, etc.

## Converting Multigrade Situation to an Opportunity for Better Learning

Necessity may not be considered as the only reason for adopting multigrade teaching. In many situations, it has been observed that vertical grouping has the potential for better learning than horizontal grouping. Research conducted on multigrade teaching suggests that learners in such settings perform equally well or even better as they have opportunities to interact and learn from their peers in higher grades. Also, in a multigrade situation, the teacher's time is distributed among the learners of all grades. Such a shortage of the teacher's availabile time provides opportunity to the learners to take up self assessment and enhance their learning and achievements. The junior students of multigrade

classrooms get chances to learn from the senior students and likewise, the senior students have opportunities to review, revise, and strengthen the concepts which have already been taught to them. Reciprocal teaching, thus, is a good instructional method which encourages students to help from each other and learn. It also supports good emotional development of young children in primary classes.

## TEACHER PREPARATION IN A MULTIGRADE CONTEXT

Despite the intensity of the issue, the stakeholders have not shown enough concern to prepare and update their teachers to handle challenges of multigrade teaching nor have they oriented them on managing the classroom adopting several implementation techniques as per their situation. This situation calls for the need to research the practices followed in different states and countries to share with teachers a variety of tools and the pedagogy to be undertaken to make multigrade classrooms effective.

Most of the education systems opt for multigrade teaching as the only option, and in such cases, the quality of teaching-learning becomes very poor. A teacher trained in single class teaching is given the responsibility of teaching in multigrade settings without providing any kind of specific training for handling more than one class simultaneously. However, the effectiveness of multigrade instructions depends upon the capability and skills of the teacher in planning and implementing teaching-learning strategies. Teachers need to work on maximising students' 'time on learning tasks'. Obviously the challenge becomes greater for the multigrade teacher than the monograde teacher. Miller (1991) suggests that the multigrade teachers must be well organised and they must put in much preparation time. There is much to learn from these teachers about the classroom management and instructional organisation. Birch and Lally (1995) expressed that multigrade teachers need to know the contents of various subjects across different grades they are supposed to handle. Since all the concepts across the grades cannot be integrated, the teachers have to face challenges on a regular basis.

In a research study conducted in Pakistan, Nawab and Baig (2011) found that the teachers of multigrade setting were trained in teaching single grades. Hence, they were not familiar with the concept of multigrade teaching. However, a drastic change was observed in the trainee teachers while they were engaged in workshops on teaching-learning in multigrade contexts. They were found to be actively engaged in developing the concept grid and demonstrating the concept. Their understanding was also visible from the reflections they were writing on a daily basis. However, proper implementation of training inputs in classrooms also remains a concern as evidenced by a number

of research studies. In the same study, the research team expressed satisfaction as they observed many changes that had undergone in the teaching-learning methodologies; the most important among them was development of concept grid.

## CONCLUSION

The discussion above reveals that multigrade teaching can be a challenge, but at the same time, it has a potential to get converted into an interesting opportunity, benefitting both the children and the teachers. In many places, multigrade classrooms are not treated as the last resort to manage classes in a particular school. To have a child-centric approach, sometimes vertical grouping yields better results than horizontal grouping as it provides more learning opportunities through social interaction of children in different grade groups. However, in order to streamline teaching-learning processes in a multigrade context, the government education departments need to step in. The initiatives of government in developing specialised training courses for a multigrade setting and providing regular support to teachers in such a context would definitely improve the situation. Otherwise, multigrade schools will continue working in their old style, implying that due to shortage of teachers and space, students would not get proper attention and learning environment.

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# Impact of Visual Aid in Creating Awareness about Sustainable Tourism in School Students

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## Abstract

*Picnics, trips and excursions are a common practice in almost all schools of Nagpur. Thus, picnics of school students become a very important tourist segment of our country which can be systematically trained for sustainable tourism and guided during travel by the teacher leader. There is a need to create awareness about sustainable tourism in schools. The present research focuses on using visual aid as a pedagogical tool to enhance awareness about sustainable tourism in school students. For this, it was necessary to find the motivation of schools in their choice of travel destinations and to check the level of importance given to sustainable tourism while deciding the destination. The next objective was to understand the level of awareness regarding sustainable tourism in teachers, parents and students. The research was aimed at educating the parents, teachers and students such that their perspective of school tourism changes by way of a visual aid created by the researcher in the form of a video. In this research project, a pre-post impact analysis of a video created by the researcher explaining sustainable tourism was tested on parents, teachers and students from various schools in Nagpur. A survey of 150 participants including school teachers, parents and students was conducted in two phases, once before the experiment and the second after the experiment. The experiment constituted the video screening. The observations of both phases were recorded. Statistical analysis of the data was carried out by applying A Class student writing a paper with this extensive research and it was found that visual aid had a significant effect on enhancing the awareness level of sustainable tourism.*

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## INTRODUCTION

Picnics or excursions are a common practice in almost all schools carried out at least once a year. Generally, each school has 13 classes (pre-primary, primary, middle and high school) with minimum two sections for each class. Each section has a minimum of 40 students, making a total of minimum 1,000 students per school. If Nagpur alone is considered with a minimum of 1,000 (1/3 of total number) schools (Table 1) there will be a minimum of one lakh students who go for picnics every year. If the entire country is brought under focus, the number will indeed be very huge.

**Table 1**
**Number of Schools (2017)**

| Pre-primary Schools | 1,029 |
|---|---|
| Higher Primary Schools | 1,739 |
| Secondary Schools | 177 |

*Source: http://nagpur.gov.in/htmldocs/glance.htm*

Thus, school students going for picnics become a very important tourist segment of our country. If this segment is concentrated upon and turned towards sustainable tourism, the future of tourism in India will be very bright. The schools will then become the torchbearers of sustainable tourism. However, there is a need to create awareness about sustainable tourism in schools. The present research focuses on using visual aid as a pedagogical tool to enhance awareness about sustainable tourism in school students.

## REVIEW OF LITERATURE

According to Ritchie and Coughlan (2004) school excursion tourism is a relatively underresearched and poorly understood segment of the tourism industry. They studied the travel motivations of the schools and found that sustainable tourism was not one of the motives. In a study conducted by Dale (2013) on school tourists, factors such as safety, cost effective accommodation, relevance to studies, access to destination, historic and cultural attractions, learning in a new environment, recreational opportunities, changing school routine and attractions with scientific merit were considered to make tourist destination decisions. Sustainable tourism was not considered a factor for travel decisions. Similar research studies conducted by around 200 researchers were compiled by Wilson and Richards (2004) as 'A Bibliography of Research and Publications' which dealt with student tourism, none of which considered sustainable tourism as a prime factor.

## STATEMENT OF NECESSITY

It is necessary to make students aware about sustainable tourism so that the entire nation becomes educated. It is therefore necessary to make sustainable tourism a motive to plan school picnics and excursions. There is a need to create awareness about sustainable tourism in schools as it is a very large segment of the tourism industry which can be systematically

trained for sustainable tourism. Thus, a simple and effective way needs to be added to the pedagogy to aid in the process of enhancing sustainable tourism in school students.

## OBJECTIVES OF THE RESEARCH

1. To understand the impact of visual aid in enhancing awareness about sustainable tourism in school students
2. To understand the motivation of schools in their choice of travel destinations for students (picnics and excursions) and to check the level of importance given to sustainable tourism while deciding the destination
3. To understand the level of awareness regarding sustainable tourism in parents, teachers and students
4. To educate the three stakeholders (parents, teachers and students) of school tourism such that their perspective of school picnics shifts towards sustainable tourism

## HYPOTHESIS

The video designed by the researcher will aid in enhancing awareness about sustainable tourism in school students.

## METHODOLOGY

The research was conducted in three phases. The same sample was retained for all three phases of the research. The sample was collected using random sampling method. Three schools from Nagpur were selected randomly for the study. A total of 50 students, parents and teachers were selected randomly from these three schools for data collection.

## PHASE I: PRE-EXPERIMENT PHASE

A survey of 150 participants from three schools of Nagpur including 50 school teachers, parents and students each was conducted after explaining to them the purpose of the research. Parent-teachers' meeting day or open forum day was chosen to collect the data as all the three stakeholders— teachers, parents and students are available in the same place at the same time. Permission was sought from the school authorities to conduct research. An open-ended questionnaire consisting of only one question was given to the parents and students. They were asked to list five most important aspects of sustainable tourism. A separate questionnaire with the following three questions was given to the teachers. The questions were basically designed to find out the motivation of schools behind planning the excursion for students. The reasons for their choice of a particular travel destination were collected through the questionnaire. The importance given to sustainable tourism as a reason was assessed. The questions included in the questionnaire for teachers are as follows.

1. Do you take your students for a picnic or excursion?
2. What is your criteria for selection of the tourist destination?

3. Do you know what is sustainable tourism? List five most important aspects of sustainable tourism.

## PHASE II: DESIGN OF EXPERIMENT

A video was developed using VideoPad Video Editor which is a video editing application developed by NCH software. The photos were either clicked or downloaded from Google related to each of the aforementioned ways to make tourism sustainable. The photos were then merged in a video format with the voice-over given by the author. The video was then sent for validation to three experts from the area of tourism marketing. The duration of the video was limited to one minute 55 seconds so that the interest of the audience could be maintained. It was shared on social media via YouTube, WhatsApp, Facebook, Pinterest, Google Plus, e-mail, etc. It was also showcased in schools during the data collection phase.

The video covered the following important aspects of tourism.

### Definition of Sustainable Tourism

It is a concept of visiting a place as a tourist and trying to create only a positive impact on the environment, society and economy.(Jonanna Read, April 25, 2018)

### *Ways to make tourism sustainable*

- No littering
- Being considerate about the environment one is visiting
- Avoiding excessive waste creation (zero waste)
- Reducing energy consumption
- Conserving water
- Educating oneself before going to a tourist place
- Not purchasing or eating endangered species or products
- Supporting local economy by buying local handicrafts
- Eating local, seasonal food to decrease the carbon footprint
- Using public transport for tourism

## PHASE III: POST EXPERIMENT PHASE

After taking permission from the school authorities, the video was shown to the parents, teachers and students on the same day when the pre-experiment phase was conducted. The video was screened in the school auditorium on a projector screen. After the video designed by the researcher was shown to the parents, teachers and the students, they were again asked to list five important aspects of sustainable tourism in an exactly similar manner as in the pre-experiment phase.

### OBSERVATIONS

### Pre-experiment Phase

*Parents:* Out of the 50 parents surveyed, only 11 could enlist at least one aspect of sustainable tourism and rest of the parents could not enlist anything related to sustainable tourism. They were categorised as 'aware' and the remaining 39 were categorised as 'unaware'.

**Students:** Out of the 50 students surveyed, 26 could list at least one aspect of sustainable tourism whereas rest of the students could not enlist anything related to sustainable tourism. They were categorised as 'aware' and the remaining 24 were categorised as 'unaware'.

**Teachers:** In response to the first question, it was found that all the three schools take their students for picnics or excursions.

In response to the second question, it was found that schools select the tourist destination based on the following criteria.

1. Nearness to the school (distance)
2. Easy availability of transport
3. Safety of students

Age wise—entertainment for primary school students, culture/heritage sites, for middle school students, and education for high school students.

In response to the third question, it was found that though all the 50 school teachers responded to the question in the affirmative, only 31 could enlist at least one aspect of sustainable tourism. They were categorised as 'aware' and the remaining 19 were categorised as 'unaware'.

**Post Experiment Phase**

**Parents:** Out of the 50 parents surveyed, 37 enlisted at least one aspect related to sustainable tourism correctly. They were categorised as 'aware' and the remaining 13 were categorised as 'unaware'. Parents promised to educate themselves and their children and aid in the cause of making tourism sustainable.

**Students:** Out of the 50 students surveyed, 42 could enlist at least one aspect related to sustainable tourism. They were categorised as 'aware' and the remaining 8 were categorised as 'unaware'. The students promised to follow all rules to make tourism sustainable.

**Teachers:** 48 teachers could enlist at least one aspect of sustainable tourism. They were categorised as 'aware' and the remaining two were categorised as 'unaware'. The teachers also promised to design their future travel by keeping sustainable tourism as their primary motivation. They also promised that the students of their school would in future be provided extra sessions to educate them about sustainable tourism.

## DATA ANALYSIS

The data collected through the questionnaire in Phase I and Phase II was analysed using McNemar Test (Tables 2 and 3). A pretest and post test analysis was conducted by way of this statistical technique.

On application of the McNemar test, assuming α=0.05, it was found that there is a significant impact of the video on enhancing the education level of the parents, teachers and students alike. The p-values for all the

**Table 2**
**Descriptive Statistics**

| Sample | Experiment | Sample Size (N) | Mean | Std. Deviation |
|---|---|---|---|---|
| Parents | before | 50 | 1.78 | 0.418 |
| Students | before | 50 | 1.48 | 0.505 |
| Teachers | before | 50 | 1.38 | 0.490 |
| Parents | after | 50 | 1.26 | 0.443 |
| Students | after | 50 | 1.16 | 0.370 |
| Teachers | after | 50 | 1.04 | 0.198 |

**Table 3**
**McNemar Test**

| | Parents | Students | Teachers |
|---|---|---|---|
| **N** | 50 | 50 | 50 |
| **Chi-square (a)** | 24.038 | - | - |
| **Significance (p)** | 0.000 | 0.000(b) | 0.000(b) |

participants were found to be 0.000 ($p<\alpha$). The mean awareness level before the experiment was towards 2 (where 2 means unaware) whereas after the experiment the mean awareness level shifted towards 1 (where 1 means aware). Based on these results, it was found that the video (visual aid) played a significant role in enhancing the awareness of parents, teachers and students alike. The technique can be effectively used in schools to enhance awareness about sustainable tourism in school students.

## FINDINGS

1. The awareness level of parents, teachers and students regarding sustainable tourism was less, prior to the showcasing of the video and it increased substantially after the visual aid was used.

2. The impact of the video was clearly visible in the pretest and post test analysis done using McNemar test.

## CONCLUSION

Visual aid can create a visible impact on enhancing awareness about sustainable tourism in school students.

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# The Pursuit of Preparing a Professional and Humane Teacher
## What Lies behind the National Curriculum Framework for Teacher Education 2009

Bhupendra Singh*

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| Abstract |

*Every teacher is charged to deliver the curriculum to their students. But a humane teacher makes sure to teach the curriculum in a meaningful way to one's students so that they can share its implications beyond the classroom walls. Kilpatrick envisaged the curriculum as "a series of experiences in which, by guided induction, the child makes his own formulations. Then they are his to use" (quoted in Pinar et al., 2008, p. 116). The Teacher Education curriculum is a plan that is related to develop a competent and humane teacher by empowering one to face the challenges before education and society. Therefore, an assured way of making a curriculum more attractive, inspiring and applicable is to implement it through humane education materials and promote the ideas of learners. This research article focuses on the aim of the National Curriculum Framework for Teacher Education (NCFTE) 2009 behind preparing a professional and humane teacher.*

## INTRODUCTION

Humane education not only instils the desire and capacity to live with compassion, integrity, and wisdom but also provides the knowledge and tools to put our values into action in meaningful, far-reaching ways (Mims & Waddell, 2015, p. 189).

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Ban Ki-Moon, former UN Secretary-General, once stated that "education gives us a profound understanding that we are tied together as citizens of the global community and that our challenges are interconnected" (UNESCO, 2015, p. 14). The phrase, humane education is often associated with humane societies and organisations that advocate for the appropriate treatment of children and animals. Humane education focuses on issues related to animals, environment, and people (Weil, 2012). Globalisation can be conceptualised as flows of ideas, cultures, technology, finance, and media across the world, which influence people's outlooks about self and others (Ali, 2009, p. 239). In her interview, Zoe Weil (2012) recapped the four essential elements of humane education to prepare global citizens — providing accurate information about the pressing issues of our time so that people have the knowledge which they need to address global challenges; fostering the 3Cs of curiosity, creativity, and critical thinking so that people have the skills they need to address challenges; instilling the 3 Rs of reverence, respect and responsibility, so that  people have the will to address challenges; providing positive choices and the tools for problem-solving, so that people can solve challenges. Finally, we can say that humane education is the education of imparting best qualities of human being into the civilians of the world.

Many international educators believe that young people in the 21st century should be prepared to be global citizens. A popular rationale is that young people need to be prepared for the flat world… Current and future generations of young people will enter and lead a world where competition and its benefits are based on knowledge and skill (Ruby, 2014, p. 54). The National Curriculum Framework for Teacher Education (NCFTE 2009) elaborates preparing global citizens to bring about change in our education, knowledge, and values to meet with the global society for developing all citizens from intellectual, physical, emotional, social, moral and spiritual dimensions (p. 32). The values of the current societies are demanding promoting education for peace as training of life (p. 33), not as training of professionals. Ideas of philosophical thinkers should be implemented in curriculums for "philosophical and sociological probing into the ideas of knowledge, morality and values" (p. 33) of citizens. So, the engagement of educators, teachers, trainees and institutions with local community be encouraged by molding and reforming the curriculum to the study of "self and identity, human relationship, adult-child gaps, assumptions, beliefs and attitudes" (p. 33) to "explore the meaning of ethics and values, observe and understand feelings of fear and trust and their influences in personal and social attitudes towards

the competition and co-operation" (p. 33). A curriculum based on the the constructivist philosophy should be practicalised in the internship of trainee teachers or educators for understanding the issues of equity, democracy and social justice (p. 33) in which workshops in drama, art, music, and craft (p. 34) should be applied to analyse the observations in life through experiential training. The NCFTE 2009 also recommends that the programmes of training must focus on the high priority of language competence and communication skills (p. 34) for developing an intellectual understanding of language.

During the complete teaching process, a teacher has a purpose of creating, maintaining and enhancing the relationship with one's students for teaching the curriculum, adjusting in the classroom and preventing the opposed possibilities. Thus, a teacher acts as a humane catalyst in teaching-learning situations for enabling the learner to discover one's talent and to realise one's potentialities. An accountable teacher prepares a responsible and active citizen by character building and developing human values in the learner. Professionalism can be viewed as the result of the collective achievement of a corps of professionals who strive together towards the same end (Frelin, 2013, p. 9). Professionalism is made up from the word 'profess', meant to be received formally into a religious community such as a monk who takes monastic vows in a religious

order (Merriam-Webster, 2018). It implied a public avowal to follow a path of high moral ideals (Belanger & Pupulin, 2004, p. 2). Before 1500 AD, the word professionalism was used 'only in a religious sense' (Mainzer & Mainzer, 2015, p. 710). "Professional" included those who were qualified to pursue a vocation or calling... they required professed knowledge, shared values,and wisdom, and a fiduciary relationship with others (Belanger & Pupulin, 2004, p. 2). Now 'professionalism' is used to define an individual's conduct at work (McKay, 2017) or the competence or skill expected of a professional (Oxford University Press, n.d.). As regards the teaching of theory, we may note that the knowledge component in Teacher Education is derived from the broader area of the discipline of education as well as foundation disciplines of philosophy, sociology, history, political science, and psychology. So, conceptual inputs in Teacher Education need to be articulated in such a manner that they can describe and explain educational phenomena, tasks, efforts, processes, concepts, events and so on (National Council for Teacher Education, 2009, p. 53).

## PROFESSIONALISM IN TEACHER EDUCATION

Across various disciplines of Teacher Education, it is clear that "educators are expected to develop the characteristics of a professional and model professionalism every day" (Kramer, 2003, p. 22). It is essential

for teachers to recognise their role in this chain of command. An aspect of being a professional is the ability to be a follower as well as a leader. It is especially crucial for the pre-service teacher who is not an employee of the school. At the same time, educators should be prepared to take a stand for what is right. Teachers are encouraged through the practices of research, reflection and sharing with others to help bring about needed changes (Hurst and Reding, 2000, p. 36). Professionalism in Teacher Education can be applied by developing a professional attitude through training for openness to happily accept feedback from classrooms and instructors; courteousness to colleagues, staff, peers, students, etc.; conscientiousness for every work related to social welfare; reliability in commitments and appointments; care and compassion for the needy; developing professional ethics through training of confidentiality, respect, fairness, honesty, trustworthiness and integrity in one's work; providing training of non-teaching duties, administrative tasks, community services and skill development; developing attitude towards professional human relation through training for building positive relationships, appreciating diversity, situation control, adjustment, teasing and bullying; developing attitude towards professional knowledge by providing knowledge of laws, regulations, policies, requirements and procedures for good judgement,

planning, managing and regulating the resources.

## RELATIONSHIP BETWEEN THE HUMANE TEACHER EDUCATOR AND PROFESSIONALISM

We have been taught that all religions teach principles of non-violence, peace, and kindness, which are controlled by ethical treatment. It means every religion wants peace and harmony to its followers. It wants that every person should welcome the opinion of others and be able to tolerate their behaviour. Thus, exposure of experiences in activities, individual reflection, application of humane education principles, internationalisation of new knowledge are the main aims of the educational approaches to help students to be able to use their capacities by knowing the self. John Dewey (1958) proposed that these values can be applied to the beliefs and behaviour patterns of students. But, there would be a need for innovating programmes of Teacher Educators with the change in context (p. 102). Teacher professionalism and humanism are fragile. However, in sustainable environments, professionalism can continue to prosper. Professionalism and humanism are ontologically dependent on each other. Both professionalism and humanism influence the ability and will of teachers or Teacher Educators to act responsibly. Therefore, the contemporary realities have made some teachers regard ethical and

broader social commitments and responsibilities as primarily residing with others, partly determining that they have neither the time nor the autonomy to be responsible for them (Frelin, 2013, p.12).

## The Need for Preparing a Humane Teacher

Maslow wrote that a musician must make music, an artist must paint, a poet must write, to be ultimately at peace (Schultz & Schultz, 2013, p. 249). The theory of Hierarchy of Needs of Abraham Maslow indicates that we are seeking to move towards a self-actualised state. Since the needs of the global society and the contexts of education are changing day by day, therefore, the demands for modifying curricula for the welfare of a global society and a globalised education system motivate countries to prepare humane teachers. Some foundational demands are discussed in the NCFTE 2009 for the need to prepare a humane teacher to teach values which are inducted into the constitution of countries. The responsibility of a teacher for the all round development of children with the application of knowledge should be fixed so that they can perform their role as a reponsible guardian. The teachers and Teacher Educators should be capable of comprehensive and continuous evaluation of the knowledge of children for increasing understanding and ability to use knowledge. The NCFTE 2009 focuses on knowledge of gender equality with an understanding of sex to provide a practical environment for learning to children. It suggests independent understanding to prepare the teacher as a facilitator to construct knowledge, curricula, textbooks and teaching-learning material. It recommends stopping the proliferation of non-qualified and untrained teachers by understanding the vital role of a humane teacher for knowledge of peace to save humanity.

## The Vision for Preparing a Professional and Humane Teacher

In 1948–1949, the University Education Commission in its report raised a concern that people in this country have been slow to recognise education as a profession for which intensive preparation is necessary, as it is in any other profession, (GoI, 1962, p. 183) with the recommendations that the course of Teacher Education should be replanned according to the future perspectives. It should be suitable for school education with regard to practical training. It also recommended that adequate number of schools be used for actual practice. After a decade, in 1964–1966, the Education Commission in its report perceived that the destiny of India is now being shaped in its classrooms. With the same faith, the National Policy on Education 1986, dominantly emphasised that "the status of the teacher reflects the socio-cultural ethos of the society." Therefore, the role of the teacher as

a transmitter, inspirer, and promoter of real and eternal knowledge should be envisioned with priority to make them a humane teacher. Mainly, the National Curriculum Framework 2005 and Right to Education Act (RTE Act) 2009, have both provided an original vision for preparing the NCFTE 2009. It is envisioned in the NCFTE 2009 that development of ideas for global competence (p. 19) and continuous learning society (p. 19); understanding the need of the contemporary perspective; integrative and eclectic paradigm change in inclusive education; improvement in capacities and capabilities of teachers; understanding the learning to give, are needed for preparing a liberal, humanistic and social teacher by making them professional and humane teachers.

## PREPARING TEACHERS AS GOOD HUMAN BEINGS

The famous lines of Ralph Waldo Emerson—what lies behind us and what lies in front of us are but tiny matters as compared to what lies within us (quoted in Chittister, 2003, p. 77) give a solid clue for promoting humanism by preparing the teacher as a good human who has compassion and benevolence. For preparing the teacher as a good human being, initiatives are discussed in the NCFTE 2009 which inspire the Teacher Educator for sociological and anthropological insight (p.19). It insists that the training of Teacher Educators should be in a

multi-cultured and diverse environment by engaging them with farm, workplace, home, community, and media, through community services to train the teachers for extracting out the knowledge of their students. Internship programmes should be implemented strictly with norms designed by the National Council for Teacher Education that support different teaching and learning methods to face diverse learning styles like an oversized classroom, multi-language, ethnic and social diversity, and individual differences during the intership. Teacher Educators should be prepared for reflective teaching, constructive teaching, projective teaching, activity-based teaching and experiential teaching, where their pedagogical knowledge should be able to train Teacher Educators for judgement in moments of uncertainty and fluidity (p. 20). It emphasises to prepare teachers who can care for the children, increase the happiness of children, understand the responsibilities of the children and society, be able to make a firm commitment to justice and be able to have a strong feeling for social reconstruction. Training of Teacher Educators should be in regularly running schools which are selected for daily practice teaching insted of a dummy environment, so that they can be able to prepare striving teachers, to reach the aims of education, and turn them into finer and sensible humans by correcting

the errors and for establishing peace of mind of the self and their learner.

## CONTINUING PROFESSIONAL DEVELOPMENT OF TEACHING ETHICS FOR BEING HUMANE

Teaching ethics refer primarily to a set of principles, rules, values and ideals of teachers and educators. It is, therefore, a type of professional ethics, which is developed for the specific professional community of teachers and other educators (Curko *et al.*, 2015, p. 9). The purpose and role of ethics has always been the preservation of the human being as a person, human dignity, and the conditions for leading a good life (Curko *et al.*, 2015, p. 5). In the Vedic era, the Indian education was fundamentally intended for personal growth of an individual. Some declared Indian Vedic Ethos, are discussed by Banerjee (2005, p. 135) which provide immense power to manage self-ethics to an individual human. A teacher should be trained with the aim of *ātmanomokshārthaṃjagathitāya-cha* (Rambachan, 2013) which means one's salvation through the welfare of others. A teacher must realise *ātmanāvindyatevīryaṃ* (Berman & Sabharwal, 2013, p. 104). When a person believes in self-strength and knowledge, only then one can be able to recognise one's inner abilities. Thus, an enlightened teacher can teach with his full strength without making any discrimination. The NCFTE 2009 emphasises that at

the heart of Teacher Education is the question— what value does Teacher Education add to the prospective teacher's ability to face challenges of facilitating the development of critical and creative students, and subsequently adults? (National Council for Teacher Education, 2009, p. 7) In the answer to this question, it is worded in the NCFTE 2009 that teacher should be trained thus type to enable their students to explore the meaning of ethics and values, observe and understand feelings of fear and trust and their influences in personal and social attitude (p. 33), which indicates *yādriśhībhāvanāyasya siddhī bhavatitādriśhi* (Berman & Sabharwal, 2013, p. 104) that is, as we think, so we succeed, so we become. A teacher should be trained for *parasparambhava yantahshreyahparaṃbhavap śyathah* (Berman & Sabharwal, 2013, p. 104) by understanding mutual cooperation, respect and fellow feeling to know and follow the *teshamsukhamtesham śhanti śhaswatī* (Berman & Sabharwal, 2013, p. 105) which indicates that infinite happiness and infinite peace come to those who see the divine in all beings. Therefore, the framework of training of teachers should be dedicated to the compendium of *yogahkarmashukaushalam Samatvam yoga uchyate* (Berman & Sabharwal, 2013, p. 104) which makes clear that he who works with calm and even mind, achieves the most with the pedagogy of regarding of

the learner by making sense of same consciousness which is contained in *paraspardevobhavaḥ* (Berman & Sabharwal, 2013, p. 105).

## PREPARING TEACHER EDUCATORS TO TRAIN PROFESSIONAL TEACHER

The NCFTE 2009 has guided Teacher Education institutions for remembering the context, concerns and vision of Teacher Education. It has also contributed to reinforcing the qualitative improvement by focusing on perspectives for equitable, sustainable development, gender perspectives, the role and participation of society in education, the use of ICT (Information and Communication Technology in schooling as well as teacher training courses. The NCFTE 2009 suggests that for the professional teacher, "the school internship is visualised by situating the practice of teaching in the broader context of vision and role of teacher and sustained engagement with learners and schools (p. iv)." Therefore, the focus on process-based Teacher Education has been attempted as models for practising teachers to adopt/ adapt (National Council for Teacher Education, 2009, p. iv). After the Independence, due to more and more focus on Universalisation of Elementary Education (UEE), by the 86th amendment in the Indian Constitution, Free and Compulsory Education was transferred from Article 45 to Article 21(A) of the Fundamental Rights. Then, the RTE

Act 2009 came into force from April 1 2010. Therefore, the pressure of globalisation (National Council for Teacher Education, 2009, p. 4) with increasing competition (NCFTE, 2009, p. 4) and need to train the poorly equipped teacher (National Council for Teacher Education, 2009, p. 1) gave a strong reason to prepare the professional teacher for the growing Indian society. In the NCFTE 2009, it has been noted that a Teacher Educator should be trained for preparing the teachers who can—contribute as resource person; be able in formulating educational policies (p. 64); be able to do research on the effectiveness of their training programmes within the government system (p. 64); be able to work towards training of teachers for universalisation and inclusion (p. 65). The NCFTE 2009 focuses on the role of agencies engaged in preparing and development of teachers and Teachers Educators. It suggests that these agencies must be determined, planned, implemented, monitored (p. 64) approaches of professional development by enabling the Teacher Educators for commitment to constitutional values and for preparing teachers for overcoming discrimination in the classroom (p. 65); to implement, achieve specific target and use of curriculum and technology in classes, and to enhance their role in education system; to work as medium of transferring experiences of community to learners through teachers. Therefore, it is needed in

empowering Teacher Educators for personality development of teachers by—preventing their training from frameless quick-fix strategies and activities (p. 67); promoting them as a globally mobile researcher (Fahey & Kenway, 2010, p. 52) to get skilled in current and valuable trends of Teacher Education. It is observed in the NCF Position Paper on Teacher Education that existing training programmes of Teacher Educators such as the M.Ed. have become woefully inadequate in facilitating a deeper discourse in education and an opportunity for interdisciplinary enquiry. These offer little scope for professional development of Teacher Educators (National Council for Teacher Education, 2009, p. 79). It is becoming clear that apart from addressing the immediate needs of preparing teachers, postgraduate courses of education need to contribute towards building the discipline and the knowledge base of education especially within the Indian context (National Council for Teacher Education, 2009, p. 80). Therefore, in addition to revamping the existing M.Ed. programme, a fresh discourse has to be initiated in Teacher Education to arrive at tangible understandings of the implications of aspects such as creating multilateral entry points for the study of educational studies as a pursuit in higher education; broad-basing the profile of Teacher Educators by infusion of persons who have knowledge of disciplines generic to Teacher Education so that the discipline of education grows into specialization requiring persons to be well-versed in cognate disciplines outside education; working out possibilities to pursue educational study at the post-graduate level through the route to Teacher Education involving bridge courses, wherever required and considered necessary (National Council for Teacher Education, 2009, p. 80).

## PREPARING TEACHER EDUCATORS TO TRAIN A HUMANE TEACHER

It is worded in the NCFTE 2009 that a significant area of weakness in the existing teacher preparation programmes is the quality and experience of those who have the responsibility of training young entrants to the profession of teaching (p. iv). The National Council for Teacher Education (NCTE) is trying to modify the Curriculum Frameworks respectively from 1978 when it was a non-statutory body. The NCTE has prepared various versions of Curriculum Frameworks respectively as its revised version in 1988, Curriculum Framework for Quality Teacher Education (CFQTE) in 1998, Draft for Discussion of NCFTE in 2006 in collaboration with the National Council of Educational Research and Training (NCERT) and Draft for Discussion of NCFTE in 2009 to maintain Teacher Education according to the global community, which has been the primary demand of the education system in India

forever to prepare an innovative teacher, active teacher, social teacher, peace supporter or humane teacher. Being human, it is expected of a Teacher Educator not to view knowledge as an external reality embedded in textbooks but as it should be self-constructed by insight in the shared context of teaching-learning and personal experience. It is also expected to change the perception of the child as a receiver of knowledge and encourage its capacity to construct knowledge and view learning as a search for meaning out of personal experiences, and knowledge generation as a continuously evolving process of reflective learning (National Council for Teacher Education, 2009, p. 77).

## INDIANISATION OF TEACHER EDUCATION

It is apparent, therefore, that the philosopher of education will have to go into ethics to deal with the valuations and into the theory of knowledge to get more explicit about the distinction between concepts such as 'knowledge', 'belief' and 'understanding'. Educating people is not done only by instant promises (Edel, 1998, p. 39). They take time and, some different processes of learning and teaching are involved in it. In India, education was started with entering of the child in ashramas where lifelong education was divided into four ashramas as *brahmacharya, grihastha, vanprasth,* and *sanyas.* In this system, the most knowledgeable and qualified person, was called *upadhyay,* who worked as a Teacher Educator to train those teachers, who were known as *pithicharya* or *pittulacharya* to educate princes and soldiers. But the selection of the *upadhyay* was wholly dependent on the discretion of *acharya* (Principal of the ashram).

In an ideal learning process, a teacher is supposed to be a father figure and role model. In the *Vedic* era, every teacher was a specific person due to one's inner vision than through outer experience. But in India, what has been commonplace since the *Vedic* period till today? That is the legitimacy of knowledge, and respect for the teacher. From the University Education Commission (1948–1949) to NCFTE 2009 did glorify the teacher's characteristics but kept the Indian knowledge tradition aside and adopted western changes. In our Gurukul System, the basic aim of education was to know the self. After that the learner was free to select any type of curriculum—rhetorical, logical or arithmetic, etc. The evaluation system was also very tough, based on self-evaluation. Therefore, for Indianisation of Teacher Education, there is a need for implementation of theories of 'human-making before knowledge', which are described in the *Vedas, Upanishads, Ramayana, Mahabharata* and other Indian epics for preparing Teacher Educators. It is rightly said in the Report of the Chavan Committee or Ethics Committee that "Truth (*satya*), righteous conduct

(*dharma*), peace (*shanti*), love (*prema*), and non-violence (*ahimsa*) are the core universal values which can be identified as the foundation stone on which the value-based education programme can be built-up... They also are correspondingly co-related with the five major objectives of education, namely, knowledge, skills, balance, vision, and identity" (GoI, 1999). The NCFTE 2009 suggests for the Indianisation of Teacher Education that the education of the Teacher Educator should be in the mother tongue to train the teacher for multi-language, multi-dimensional (p. 84) and multitude (p. 91) classrooms with the man-making process. Meditation and yoga (p. 17) should be compulsory for the Teacher Educators to train the teacher to get relaxed from his burden (p. 66) and to provide burden less education (p. 7). Indianisation of Teacher Education has been demanding that fundamental concepts of *Vedas*, *Brahmans*, *Upanishads* and other old works of literature of India and their implications should be included in syllabii of Teacher Educator programmes; education of Teacher Educators should be to train the teacher for training of brain by hands (p. 21) and perform hands-on activities (p. 56) in classroom; education of Teacher Educators should be for lifelong learning, character building, commitment with honesty and respect to each other (p. 13; p. 67); co-curricular activities such as indoor games, outdoor games (p. 14), drawing, music, play, dance, etc., must be included for complete skillful training of Teacher Educators; subjective knowledge of Indian values with constitutional values should be incorporated in the curriculum of Teacher Education to train teachers for preparing peace favoured global citizens; education of Teacher Educators should be for inclusion to train the teacher for promoting values of peace, democratic way of life, equality, justice, liberty, fraternity, secularism and zeal for social reconstruction (p. 23); education of Teacher Educators should be for rights with remembering of duties to train the teacher for human and social welfare.

## Evaluation of a Humane Teacher

Explanations of how and on what criteria, teachers are assessed may be difficult to articulate. When this occurs, it is almost impossible to give constructive feedback and maintain teacher support for the programme (Chamberlin *et al.*, 2002 as quoted in Santiago & Benavides, 2009, p. 20). Meaningful teacher evaluation involves an accurate appraisal of the effectiveness of teaching, its strengths and areas for development with the essential to celebrate, recognise and reward the work of teachers (Santiago & Benavides, 2009, p. 3). But a key challenge is to understand the complex range of features associated with teacher evaluation (Santiago & Benavides, 2009, p. 3). Therefore, every

conceptual framework for Teacher Education should be enfolded with six aspects, first, who is assessed (it refers to a teacher); second, by whom is one assessed (it refers to skills to perform the assessment of a teacher); third, what aspects to be assessed (it refers to responsibilities and activities); fourth, how evaluation is performed (it refers to technology and approaches for evaluation); fifth, what is the purpose of assessment of a teacher (it refers to ensuring the result of evaluation) and sixth, who will be the evaluator (it refers to the stakeholders as parents, students, teachers, school leaders, unions of teachers, administrators and policy makers). Glazerman *et al.* (2010) concluded that value-added data has an important role to play in teacher evaluation systems, but that there is much to be learned about how best to use value-added information in human resource decisions (p.1). There are many procedures, tools and technologies available to evaluate the teacher as a professional individual. But the instruments which are used in the context of teacher evaluation as humane are survey, attitude scales, attitude transfer scales, situational tests of humane professionals in various situations during class caring, pedagogy teaching and other professional practices for collecting the views of students, parents and teachers for humane treatment of students, trainees and teachers. Peers can be good evaluators as anonymous feedback provides an unbiased result about the behaviour, and the reliability of several evaluators' combined ratings is higher than the reliability of a single evaluator's ratings (Rosenthal & Rosnow, 1991). They also normally have the experience of being professional as well as humane if they complete a dedicated teacher training programme. Guaranteeing to understand the evaluation procedures and to benefit from evaluation results has also been vitally important part of teacher education programmes (Santiago & Benavides, 2009, p. 18). Therefore, training modules should be prepared thus type, so that it can be expected to recognise to the best use of the feedback received. The NCFTE 2009 has focused on some of the key aspects of transacting a process-based curriculum to develop reflective (p. 51) evaluators by training of understanding the social, cultural and political contexts in which learners grow and develop; engaging with learners in real life situations along with theoretical enquiry; conceptual knowledge generation based on experience, observations and theoretical engagement by critical inquiry in shared context; engaging them with deeper discussions and reflection for identifying and articulating issues for self-study and critical inquiry; encouraging to work in teams undertaking classroom and learners' observations, interactions and projects across diverse courses.

## CONCLUSION

The real power of a learned society resides in its critical thinkers who can innovate. This thoughtful society has a multitude of sociological, economic, political and environmental challenges related to the needs of its individuals. As with so many things in the current life, we know what makes for humaneness in Teacher Education. In Teacher Education, there is a need for greater individualisation of instruction (Tylor *et al.*, 1971, p. 699). The new concerns of school curriculum and the expected transactional modalities have been emphasised in designing the National Curriculum Framework for Teacher Education for all stages of school education. Issues related to inclusive education, perspectives for equitable and sustainable development, gender perspectives, role of community knowledge in education and ICT in schooling as well as e-learning become the centre-stage in the Framework (National Council for Teacher Education, 2009, p. iii). Many of the ideas have been expressed in the NCFTE 2009 as considerable agreement to meet with the global curriculum. It suggests that selection of Teacher Educators must be careful to make it a humane programme; personality and professional features must be pre-decided as criteria for the training of Teacher Educators; welfare of the self and community must be taken into account with priority; training programmes for Teacher Educators must be connected with school education programmes through teachers; priority should be given to the social and community services in training of Teacher Educators; Teacher Educators should be trained to decide their role on their own. They should be trained to use ICT (Information and Communication Technology) through hands-on practice within humanistic model; the syllabii of the Teacher Educators' training programmes should be planned for preparing a global learning community with mutual respect, welfare and goodwill. Thus, the Indian knowledge tradition should be implemented in Teacher Education at every level. It is also a considerable suggestion that during their academic careers at the university level, the learners must have the opportunities to explore their potential for teaching through real experiences with colleagues, between or within peer groups. If anyone shows a lack of talent for this type of work, they should be counselled for the plan, procedure and skill development. Students, who are entering Teacher Education programmes should be mentally healthy, open-minded and genuinely interested in becoming teachers. For the pre-service Teacher Education programmes, a model syllabus should be prepared and for achieving universalisation of Elementary Education, the Right to Education Act 2009 should be implemented with force for structural changes in the Teacher Education. The point

of significance here is that while formulating knowledge components for Teacher Education, conscious efforts need to be made to represent explanations from the perspective of education as well as other social science disciplines. Attempts must be made to shift from the usual theory to practice model to understanding theory in order to develop tools and frameworks of thinking and to theories about field realities (National Council for Teacher Education, 2009, pp. 53–54). Overall, the humane education provides (i) responsibility to understand feelings of the other and change in the feelings of self; (ii) ability of Connection to connect with the others; (iii) understanding the nature and behaviour of others and (iv) experience to learn from situations and use opportunities.

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# Madrasa Education System in Bihar

LAKSHMI PANDEY*

## Abstract

*Madrasas have become a symbol of Muslim identity in India. They are an indispensable component of the minority community, tasked with imparting the knowledge of Islam to the younger generation. This paper aims to assess the infrastructure facilities available in madrasas accounting for teaching-learning processes in Bihar. A Multistage Sampling Design (MSD) with different stratifying parameters was adopted for the selection of sample units at different levels. The present study was administered on a sample of 220 students and 22 principals from 22 madrasas in a district of Bihar. In order to map out the objectives of the study, two data capture formats (DCF) namely—Madrasa Management Schedule and Student Schedule were prepared and used for the study. The results show a lack of contemporary educational resources, such as proper school building, classrooms, furniture and blackboard, in some of the madrasas. Moreover, the quality of teachers was found to be unsatisfactory; they had never received proper training either from a government organisation or the Waqf Board. It is, hence, safe to conclude that the madrasas are not at par with government schools.*

## INTRODUCTION

This paper intends to evaluate infrastructural provisions available in madrasas accounting for teaching learning processes in Bihar. Madrasas are indigenous schools which form an integral part of the Muslim cultural tradition and play an important role in the enculturation process of their child. These schools are primarily designed to teach Urdu, Persian and Arabic literature, and Islamic theology. They are expected to cover the curriculum of modern education approved by the State Madrasa Board. The presumption is that students enrolled in madrasas would continue

their education after getting the inputs of modern education. Studies (NCAER, 2005, Sachar Committee Report, 2006 and Desai et al. 2010) confirm that, "Muslims in India have a poor human development status. Widespred illeteracy. low income, irregular employment implying thereby a high incidence of poverty prevailed among them."

Madrasa, an Arabic term for a school or college, is no longer a strange word in today's world. The word which derives its origin from *al dars ('darasa')* that is, to teach or to learn, is synonymous with the traditional seats of Islamic learning today. Presently, there are four types of Islamic educational institutions prevailing all over India—*maktab,* madrasa, *jamia and darul qur'an* which are institutions corresponding to schools, high schools, colleges and universities respectively. These four type of Islamic educational institutions are all wrongly understood to mean the madrasa alone. However, our subject of discussion here is the second type of 'madrasa' which is funded and run by Muslims. Madrasas in India are mainly of three kinds—some madrasas are recognised and aided by the state government, like in Bihar, West Bengal, Assam and Jharkhand. Though small, these madrasas draw salaries and collect grants from their respective state governments. Thus, the curricula of these madrasas are by and large similar to those of state-sponsored schools or colleges,

in addition to Islamic subjects. Their degrees are recognised by the state so that students having degrees from such madrasas can enter the 'mainstream' education. Then, there are the affiliated (unaided) madrasas, which do not receive financial support from the state but are affiliated to the State Madrasa Board which allows their students to appear in exams conducted by the Board. Apart from the aided and unaided madrasas, there are those madrasas which neither receive any financial aid nor want to be recognised by the Board, known as 'azad madrasas'.

A myth prevails in the society that a large number of Muslim children are enrolled in madrasas. Indeed, at the initial stage they join *maktabs* for religious education. This is not a formal channel through which Muslim children come into the purview of the schooling system. Moreover, madrasas have a long and distinguished history in India. They have existed since the early days of Islam in the subcontinent. While the history of major institutions such as Deoband, Nadwat al-Ulema and others are available, there are no reliable statistics for madrasa students and teachers in the past to measure their extent, geographic location and influence. For more recent times, there are some statistics. The Hamdard Education Society (2003) in New Delhi conducted a survey of 576 madrasas between 1989 to 1991. It reveals an expansion of madrasas from 1,06,678 in 1989 to

1,47,011 two years later. The Sachar Committee Report (2006) has quoted the NCAER survey (2004–2005) reports and NCERT (2005) reports. The NCAER claims, that "only about 4 per cent of all enrolled Muslim children in the school-going age group are enrolled in the madrasas. Consequently, this comes to about 3 per cent of all Muslim children of school-going age group at the national level. The NCAER data is supported by estimates made from school level NCERT (provisional) data; which indicates a somewhat lower level of 2.3 per cent Muslim children aged 7–9 years who study in madrasas. It is noteworthy that the proportions are higher in rural areas and amongst males." According to the Indian Human Development data of 2016, the enrolment figure in madrasas is only about one per cent (.98 per cent) of the overall population. This calculates to about 4.5 per cent of the Muslim children.

## MUSLIM EDUCATION IN BIHAR

As per the population Enumeration Data 2011, the state of Bihar has a sizeable Muslim population of 175.5 lakh or 16.86 per cent of the total population. Around 86.55 per cent of the Muslims in this state live in rural areas. The literacy rate of Muslims of Bihar is well below the national average at 44.94 per cent. A further breakdown of this figure shows wide disparity between rural and urban areas. The Muslim male literacy rate in Bihar is 51.05 per cent, while it is only 38.46 per cent for females (Bihar Religion Census, 2011). Moreover, regional variations

do exist. Muslims in some parts of Bihar are more literate as compared to other parts. The Muslims are not a homogenous community in terms of their socio-economic characteristics; a majority of them suffer from the common problem of low income, widespread illiteracy and many other socio-economic and psychological disadvantages. Moreover, the type of educational institution in which children study is also an important marker of the educational status. This is because the quality and cost of education varies in different types of schools. There are some interesting statistics available about the type of the educational institution and presently school- and college-going students in the state of Bihar. Fifty-one per cent students opt for a government institution in rural areas and 54 per cent in urban areas, two per cent students opt for an expensive private institution in rural areas and 7.6 per cent in urban areas, 15.7 per cent go to an ordinary private institution in rural areas and 24.6 per cent in urban areas. Only 4.1 per cent students study in minority schools in rural areas and 3.2 per cent in urban areas. Nearly, 24.1 per cent of rural students and 9 per cent of urban students go to a madrasa (Kamaluddin, 2016).

In Bihar, about 1,145 recognised and 36 unrecognised madrasas accommodate 3.67 lakh students covering Faquania level (equivalent to Class X under the Bihar State Education Board), which constitutes 7 per cent

of the total Muslim population and 2 per cent of the total population of the 5–14 age group in the state (U-DISE, 2014–2015). The Government of Bihar (GoB) has set up a Board of Madrasa Education that frames the syllabus of madrasas affiliated with them, consisting of both traditional Islamic as well as modern subjects. Modernising madrasas by the government has been a very contentious issue with many differing viewpoints amongst the community. While there is a general acceptance of an urgent need for the modernisation of madrasas, the modernisation schemes of the government have not really provided much relief to the community as far as quality education is concerned.

All madrasas are covered under the Sarva Shiksha Abhiyan (SSA). Since the inception of the Sarva Shiksha Abhiyan (SSA) in Bihar, some sincere efforts have been made to upgrade the status of madrasas, with a presumption that this would help facilitate the teaching-learning process of madrasas. Consequently, a plethora of teaching aids have been provided to madrasas for enriching institutional climate and classroom ecology. This study intended to map the infrastructure facilities available in madrasas for teaching-learning process (TLP).

## OBJECTIVES OF THE STUDY

1. To measure infrastructure inputs available for the teaching-learning process
2. To assess the qualifications of madrasa teachers

## METHODOLOGY

### Sample

A Multistage Sample Design (MSD) was employed to cover units at different levels. At the first stage, a total number of 22 madrasas from six blocks were selected for the study on the basis of U-DISE (2014–2015) report. At the second stage, 220 students were randomly selected with the replacement technique. Finally, 22 principals participated in the study.

### Tools Used

The tools were developed after a pilot study and the items were selected after pre-testing.

### *Madrasa Management Schedule*

It was a multidimensional schedule covering various aspects of facilities available in madrasas such as infrastructure, TLM, ancillary facilities, qualification of principals and teachers, number of female teachers, student enrolment and teaching methods.

### *Student Schedule*

It contained questions pertaining to the teaching-learning process of madrasas and the resources available in madrasas. It also covers the experience of pupils in madrasas through questions about the class work and home work given to them by teachers and whether it is checked or not.

**Table 1**
**Distribution of Madrasa by Type and Management**

| Types of Madrasas | Recognised (Aided) | Affiliated (Unaided) | Total Number | Sampled Madrasas (%) |
|---|---|---|---|---|
| Boys' | – | 01 | 01 | 5 |
| Girls' | – | 02 | 02 | 9 |
| Co-educational | 12 | 07 | 19 | 86 |
| Total | 12 | 10 | 22 | 100 |
| Percentage | 54.55 | 45.45 | 100 | – |

## RESULTS

### Types of Madrasas

Table 1 shows that of the madrasas surveyed, 86 per cent had co-education, 9 per cent were exclusively for girls and the rest 5 per cent were for boys'. Of the madrasas surveyed, approximately 54.55 per cent were recognised by the state government and they receive grant-in-aid from the government. The rest were not getting grant-in aid but were affiliated to the state government.

### Infrastructure Facilities in Madrasas

Altogether, 14 relevant variables for various infrastructural facilities available in both types of madrasas — aided and unaided were considered for assessment (Figure 1).
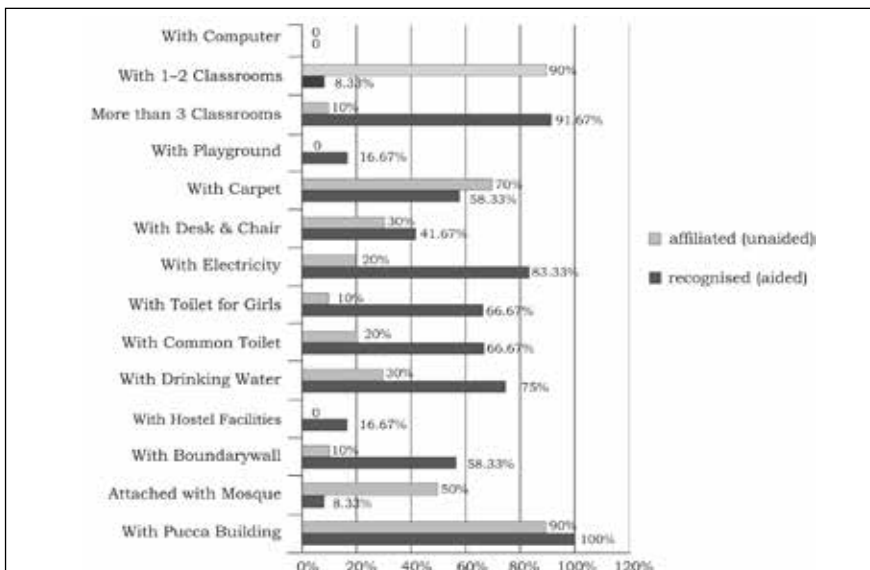


*Figure 1. Infrastructure Facilities Available in Madrasas*

Though all recognised madrasas had *pucca* school building, but they were running in dilapidated conditions. There existed about 8 per cent of the government aided madrasas running under the premises of a mosque. Furthermore, safe drinking water is essential for the maintenance of good health. About 75 per cent of aided madrasas were providing drinking water facilities either from taps or the hand pump. In addition, with regard to the availability of common toilets in madrasas, more than 66 per cent of madrasas (aided) had separate toilet facilities for girls. Ordinarily, separate toilet for girls in upper primary schools can reduce dropouts, absenteeism and ensure hygiene amongst adolescent girls. Further, 83 per cent of the sampled aided madrasas had electric connection, about 17 per cent had a playground and none of the sampled madrasas had a computer. This result further indicated that only eight per cent of the sampled aided madrasas had less than three classrooms whereas about 90 per cent unaided madrasas had less than three classrooms. Nearly 58 per cent aided madrasas had not provided desks and benches for students. Therefore, students as well as teachers in classes sit on mat on the floor of the madrasas and study.

**Teaching Aid**

Table 2 presents teaching aids available in madrasas. The results reflected a gloomy picture of both aided and unaided madrasas. In case of the aided madrasas, about 17 per cent had distributed textbooks among students. The same was not available to the unaided madrasas. By the same token, about 17 per cent of the aided had their own library madrasas. In terms of inputs of modern education like computer lab, ICT lab, LCD projector, science kit and mathematics kit, etc., madrasas remained deserted. The most common form of Teaching Learning Materials (TLMs) such as charts, posters, maps were not found in any madrasa. Even the Scheme for Providing Quality Education in Madrasa (SPQEM) was not implemented in Bihar. Further, there existed no scheme of health checkup and had no sports materials for students. Only Mid-day Meal were given to students of aided Madrasas. Urdu (L1) was the medium of instruction in all Madrasas followed by Arabic (L2) and Persian (L3). Surprisingly, Hindi, followed by English was the least preferred medium of instruction.

**Table 2**
**Availability of Teaching Aid in Madrasas (per cent)**

| TLM | Recognised (aided) | Affiliated (unaided) |
|---|---|---|
| Textbooks | 16.67 | NA |
| Blackboards | 83.33 | 10 |
| Charts/Posters | NA | NA |

| | | |
|---|---|---|
| Computer Lab | NA | NA |
| Library | 16.67 | NA |
| LCD Projector | NA | NA |
| Math Kit | NA | NA |
| Science Kit | NA | NA |

*Note: NA— not available*

## Educational and Professional Qualification of Teachers

Table 3 displays a pattern of teachers available in madrasas. About 64.5 per cent teachers of aided madrasas and 68.34 per cent teachers of unaided madrasas had qualification acquired from a madrasa system which did not cater to the needs of the students, widening the gap between demand and supply. The result further supported that about less than 10 per cent madrasas had a science teacher. There was no English teacher in both the aided and the unaided madrasas. Similarly, about 5 per cent madrasas had teachers of social science.

Professional competence was a desirable input for teaching-learning process. Table 4 demonstrates professional qualification of madrasa teachers. By analysis, it was apparent that about 87 per cent teachers did not receive any professional training, nor had they received any in-service training. About 5 per cent teachers of aided madrasas had professional qualification.

### Table 3
### Distribution of Teachers by Qualifications in Madrasas

| Qualification—Description | Recognised (aided) | | Affiliated (unaided) | |
|---|---|---|---|---|
| | *No* | *Percentage* | *No* | *Percentage* |
| Hafiz (Quran) | 8 | 12.90 | 12 | 20 |
| Fazil only (postgraduate) | 13 | 20.96 | 4 | 6.67 |
| Alim only (graduate) | 10 | 16.13 | 13 | 21.67 |
| Maulvi (Hig. Secondary) | 9 | 14.52 | 12 | 20 |
| Inter/Higher Secondary | 7 | 11.29 | 7 | 11.67 |
| Matric/Secondary) | 8 | 12.90 | 7 | 11.67 |
| Graduate (Science) | 04 | 6.45 | 5 | 8.33 |

| Graduate (English) | – | – | – | – |
|---|---|---|---|---|
| Graduate (Social Science) | 3 | 4.84 | – | – |
| Total | 62 | 100 | 60 | 100 |

*Note: The total of first four is the percentage of teachers from madrasa background of aided madrasas and 68.34 per cent teachers of unaided madrasas.*

**Table 4**
**Distribution of Teachers by Type and Number of Training**
**Programmes Attended in Madrasas**

| Professional Qualification | Recognised (aided) | | Affiliated (unaided) | |
|---|---|---|---|---|
| | *No* | *Percentage* | *No* | *Percentage* |
| B.Ed or equivalent | 02 | 3.23 | – | – |
| BTT/Diploma in School Teaching | 3 | 4.84 | – | – |
| In Service training | – | – | – | – |
| No training | 54 | 87.09 | 60 | 100 |
| Others | 3 | 4.84 | – | – |
| Total | 62 | 100 | 60 | 100 |

## Female Teacher and Pupil-Teacher Ratio (PTR)

Because of some constraints, only 11 per cent female teachers were working in the aided madrasas. There existed only one female Principal out of 22 madrasas (Table 5). Most of the sampled madrasas were co-educational, but the data primarily indicates that madrasas were headed by males even in girl's madrasas also. This is a major problem of madrasas and one of the main reasons of high dropout rate of girl students.

Table 5 enfolds description of pupil-teacher ratio (PTR) and student-classroom ratio (SCR). The PTR in madrasas was noted at 42 which was a little bit more than the recommended PTR of 35, showing the demand for more teachers. Further, the classroom looked, to some extent, overcrowded. As against the standard norm of 40, the madrasas in Bihar had 47 students. However, boys: girls' ratio (1:1.09) was not very skewed. As against the boys (1,854), more girls (2,014) were enrolled in madrasas. While comparing the teacher strength, of teacher  it was found that both the aided and the unaided madrasas had an equal number of teachers (average 5.17 and 6 teachers per madrasas respectively). There existed unequal distribution of classrooms between the aided and the unaided madrasas. In an unaided madrasa, only 19 classrooms were available to the students as compared to 65 classrooms for aided madrasas.

**Table 5**
**PTR and SCR in Madrasas**

| Indicators | Recognised (aided—12) | Affiliated (unaided—10) | Total |
|---|---|---|---|
| Total enrolment in Wastania Level (1–8) | 2,562 | 1,369 | 3,931 |
| BG Ratio | 1:1.23 | 1:0.94 | 1:1.09 |
| Total Teacher | 62 | 60 | 122 |
| Total Female Teacher | 07 (11%) | 04 (7%) | 11 (9%) |
| Total Classrooms | 65 | 19 | 84 |
| PTR | 1:42 | 1:23 | 1:36 |
| SCR | 1:40 | 1:72 | 1:47 |

## SUMMING UP

The study attempted to measure whether infrastructure inputs available for the teaching-learning process were adequate. To measure this objective, 22 madrasas were selected for the study. One common presumption was that if infrastructure inputs were sufficient to the madrasas, there would be a healthy teaching-learning process. The study noted insufficient resources in the madrasas. The aided madrasas had, to some extent, educational resources while the unaided madrasas were deprived of even basic inputs, resulting in two different patterns of educational resources. If educational resources were assessed on the parameter of the RTE Act 2009, all madrasas, irrespective of being aided or unaided, come under the category of non-complied schools. If the scenario was gloomy, how could one expect to ensure the quality education for madrasas? Under such circumstances, madrasas could not be modernised. The lofty goal of SPQEM becomes a distant dream.

The findings of the study show a lack of contemporary educational resources, such as a proper school building, classrooms, furniture and blackboard, in some of the madrasas. The condition and especially, the availability of physical facilities can have an effect on the teaching-learning process. Another revealing fact observed was that they receive aid from the government alone only for the teachers' salaries. They hardly get any other of the finances which are essential for the teaching-learning process and for the quality improvement of madrasa education. Therefore, because of lack of these facilities (playground, furniture, library, toilets, etc.) and in the absence of quality improvement funds, madrasas are struggling

hard to compete with other schools. Moreover, there existed a constraint of resources for the modernisation of madrasas. Almost all madrasas could not avail themselves of SPQEM because they were not aware of the Centrally Sponsored madrasa modernisation Schemes. Even the Government of Bihar (GoB) could not initiate any drive to gather a substantive plan of SPQEM from madrasas.

Classroom inputs are as essential as material inputs in achieving quality education. The most critical input in the classroom is the teacher. In most of the madrasas, there was a general lack of modern, subject-specific teacher (English, science, Maths and social science). Further, the study disclosed the fact that about 87 per cent of teachers in madrasas were untrained and unaware of the teaching methods. They frankly admitted that there was no provision of pre-service or in-service training of teachers in madrasas. A similar finding was noted in the previous studies (Ali, 2015; Pandey, 2017 and Syed, 2001). With such negligible attention given to capacity building of the teachers, one can imagine the quality of teaching that they are able to provide to students. Additionally, madrasas could not make functional linkages to the State Council of Educational Research and Training (SCERTs), District Institutes of Educational Training (DIETs), or Block Resource Centres (BRCs). As a result, the teachers were

deprived of getting adequate inputs of the teaching-learning processes. In addition to the aforesaid ones, they did not have any inputs of teacher training. Moreover, many important inputs in this category were not adequately provided. They employed fewer teachers than required and on the other hand, the teachers were paid less than those teaching in government schools. The number of female teachers in administrative and teaching positions was very less, even in girls' madrasas too. Further, these institutions did not have adequate and functioning laboratories for science teaching and other facilities. Findings also revealed that there was a gap between what exists in madrasas and what is needed in terms of quality improvement of teaching in modern perspectives. There were still unmet needs in the madrasa education system that negatively impact Muslim education.

There existed variation in the learning space. Even the previous study supported the assumption that adequate learning space and quality of school facilities seems to have an indirect effect on learning, an effect that is hard to measure (Shukla, 1994; Saxena, 1996; Singh, 2006; Goyal, 2007 and Srinivasan, 2010). Some conflicting findings on a relationship between learning space and pupils achievement were noted irrespective of socio-economic background (Bhunia, 2012; Lahon, 2015). In a few studies, there existed no relationship between the learning

space and achievement. However, a good number of studies lend support to the notion that adequate infrastructural facilities available in the madrasas contributed to ensuring quality learning. Govinda and Varghese (1993) found that students in schools with very good facilities scored high as compared to those in schools with no buildings and poor facilities. Other researchers have found that students in schools with adequate classroom facility scored higher than those in schools which were lacking them (Shukla et. al, 1994; Aikara, 1997; Singh, 1996; and Bashir, 1995). Studies also showed that schools where children had textbooks scored two to three times higher than children who had no textbooks (Govinda and Varghese, 1993; Saxena, Singh and Gupta, 1996). Teacher quality was another variable that has significant impact on pupils' overall achievement scores. It was found that Teacher Education or qualification was one of the important determinants of students' achievement in both advantaged and disadvantaged regions (Govinda and Varghese, 1993; Saxena, Singh and Gupta, 1996).

There exists a dearth of studies on madrasas, capturing a linear pattern of infrastructural facilities in relation to the quality of learning. Madrasas were not at par with the government schools. Even the aided madrasas had poor infrastructural facilities. The unaided madrasas were running under deplorable conditions. These two different scenarios adversely affect the quality of learning. The findings suggested additional infrastructural facilities in both aided and unaided madrasas. More attention needs to be paid where infrastructure facilities are least visible. In addition, teachers of madrasas are required to be trained for ensuring quality teaching. At the same time, more female teachers should be included in the madrasas.

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# Problem Statement and Prospects of Tribal Girls' Education
## A Study of Madhya Pradesh

Jayanta Kumar Behera*

### Abstract

*"Education is the most powerful weapon to change the world." (Nelson Mandela) The development of a nation depends upon its ability to create skilled human resource through the promotion of quality education among its citizens. It is with this objective that the educational programmes had been initiated to promote education in unserved habitation envisaging special interventions for children belonging to these tribal areas. But, not much success could be achieved, due to some major problems. However, the government has continued its efforts and diverts more grants for the uplift of the tribals' education in various tribal areas. The present paper shows that inspite of the persistent efforts, the tribal communities lag behind the general population in education. It must be admitted that tribal girls' education still has low achievement levels and falls way behind the expected levels. The present paper aims to investigate the actual condition of the tribal girls' education in the district and the different obstacles in the path of the girls' education. The paper also tries to explore the measures taken by the government to improve the present situation and attitudes of the family members towards their girls' education in tribal areas of Dindori district, Madhya Pradesh. The inputs and interaction from the tribal girls, parents, and teachers of the schools in the study areas are brought out in this description. Tribal education is still a matter of great concern in Madhya Pradesh. Therefore, there is a need to pay more attention to tribal education in general and girls' education in particular, as only this can motivate them to better their future life.*

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## INTRODUCTION

Education imparts knowledge. The knowledge of self identity and the human environment will infuse a sense of confidence, courage, vision and ability among the weaker sections of the society to know and overcome their problems associated with exploitation and deprivation, and avail socio-economic and political opportunities extended to them (Pradhan, 2011). Education is considered the basic need for human development as it can enhance the capability of an individual to improve one's quality of life. In the pre-independent India, the British government had no direct programme for the education of tribals in general and girl children in particular. The dawn of independence ushered in a new era in the field of women's education in general, and tribal women, in particular, in the country. With the adoption of the Constitution, the promotion of education of Scheduled Tribes (STs) has become a special responsibility of the central as well as of the state governments. The Indian Constitution assigns a special status to the Scheduled Tribes (STs). Traditionally referred to as Adivasis, banvasis, tribes, or tribals, realising that the STs are one of the most deprived and marginalised groups with respect to education, a host of programmes and measures were initiated ever since Independence. Elementary education is a priority area in the tribal sub-plans from the Fifth Five Year Plan. Education of the ST children is considered important, not only because of the constitutional obligation but also as a crucial input for the total development of tribal communities.

As a result, achieving universalisation of elementary education has gained considerable attention from policymakers and implementers. Education has become a fundamental right, free and compulsory for children aged between 6–14 years, mandated by the 86th constitutional amendment, the Right to Education Act 2009 and Article 21A, which has become operational from 1 April 2010. It puts the onus of sending children to school on parents rather than the state. Apart from this, the governments have proclaimed that "the education of girls should receive emphasis not only on grounds of social justice, but also it accelerates social transformation". Accordingly, there has been a phenomenal expansion of our educational system in terms of institutional facilities and other infrastructure for the tribal women. Under Article 46 of the Constitution, the government is committed to promote, with special care, the educational as well as economic interest of the weaker sections of the people in general and of the scheduled tribes and scheduled castes in particular (Pattajoshi, 2010, pp. 53–56). Various government programmes have led to progress, although the country has not achieved 100 per cent literacy. The levels of literacy are high among the upper

strata of the society, but illiteracy remains a serious issue for the Scheduled Castes, Scheduled Tribes, Other Backward Castes and Muslim minority groups. In short, meaningful access to education varies widely by geographical location, caste, class, gender and poverty (R. Govinda and M. Bandyopadhyay 2008).

The girls from the ST communities face serious development neglect, particularly evident in the status of primary education across India among different tribal groups. Today, with the enforcement of the right to education universal primary education is a national agenda. For the scheduled tribe population in India, the literacy rate increased from 8.53 per cent in 1961 to 58.96 per cent in 2011 for STs, while the corresponding increase of the total population was from 28.30 per cent in 1961 to 72.99 per cent in 2011. Literacy rate increased by 11.86 percentage points from 2001 to 2011 for STs and 8.15 percentage points for total population during the same period. Literacy rate has however, all along been lower both for male and female STs as compared to SCs and the total population. Male-female gap in literacy rate decreased from 24.41 percentage points in 2001 to 19.18 percentage points in 2011 for STs and for the total population; it declined from 21.59 percentage points in 2001 to 16.25 percentage points in 2011. Among states, Mizoram (91.5 per cent) and Lakshadweep (91.7 per cent) have the highest literacy

rate for STs, while the lowest literacy rate was observed in Andhra Pradesh (49.2 per cent) and Madhya Pradesh (50.6 per cent). Accordingly, the tribal female literacy rate also varies across states and Union territories such as from 37.3 per cent (lowest) in Rajasthan to 89.5 per cent (highest) in Mizoram (Pradhan, 2011). Except Mizoram, Lakshadweep, Nagaland, Sikkim, Tripura, Andaman and Nicobar Islands, Manipur, Meghalaya, Daman and Diu, Goa, Assam and Kerala, all other states and UTs have the women literacy rate below the national level of 64.64 per cent (Registrar General of India, Census, 2011). The drop-out rates for tribal girls are higher than those for boys in tribal population. The drop-out rate for tribals at the secondary level is as high as 87 per cent and for the girls it is almost 90 per cent. Consequently, there is a negligible per cent (0.06 per cent) of tribal women in institutions of higher education. However, various factors are responsible for the slow progress of the educational development of tribal women.

Lack of meaningful access to education is a major concern in Madhya Pradesh, which has generally been regarded as an educationally 'backward' state. The state has witnessed considerable expansion of educational facilities and unprecedented increase in enrolment of students over the last few decades. The present paper makes an attempt to analyse the problems in the field of tribal girls' education and suggests

measures for the development of education among the tribals in Dindori district of Madhya Pradesh in India. On the basis of an empirical study conducted in the tribal areas of Dindori district, some of the observations are presented. Education is an important parameter for any inclusive growth in an economy. The policies have to focus on inclusive rather than divisive growth strategies. Education also prevails in illiterate societies, where it is imparted orally and by mass behaviour. A member of the primitive society learns to earn one's livelihood, to do good work, to obey the spiritual beings and also superstitions, etc., from the elders of the society and is bound by its laws and regulations. This is their education. Hence, education can play the role of a "catalyst" in bringing sea change in the social, political, and economic fields. One of the important reasons for the failure of development activities in the society by various developmental agendas is the prevalence of acute illiteracy and ignorance, combined with superstitions among the rural masses (Malyadri, 1990, pp. 3–7).

## REVIEW OF RELATED STUDIES

Before the development of survey tools, seek out the existing educational service statistics to avoid duplicating efforts or collecting data unnecessarily. A thorough literature review can tell us what is already known and suggest areas that need further exploration. Jha (1987) did an evaluation study on tribal women's education which included all the staff of campus—principal, faculty, hostel superintendent, ex-students and present students of Tribal Research Institute, Bhopal, with the intention to evaluate the role played by the campus in the education of tribal women. He found the following major obstacles responsible for the slow growth rate of tribal women's education. It has no building even after six years of establishment. Also, there was no proper facility for practical training for different subjects, nor proper attention given to physical education, sports, cultural activities and hygiene. Ethiraj (1993) studied rural parents' opinion on girls', education to find out whether there exists any significant difference between the sub samples of rural parents in respect of their opinion towards girls' education. The study revealed that there was significant difference between fathers and mothers. Men had a more favourable attitude. There was a significant difference between literate and illiterate parents. Sharma (1994) studied the educational attitude of tribal students towards education in comparison to non tribals. The major findings were the following— there exists a significant difference in the attitude of tribal and non tribal students. Caste and religious factors made a significant difference in the attitude of students hailing from different categories.

Sujatha (1994) undertook a micro level study to find out the underlying

causes of absenteeism, stagnation and waste among the Yanadi tribe in Andhra Pradesh. She found that absenteeism was more among Yanadi girls in both mixed villages and tribal colonies whereas the difference between girls and boys in tribal colonies was negligible. Mitra and Singh (2008) studied trends in literacy rates and schooling among the Scheduled Tribe women in India. The sample of tribal women in India revealed that the high status of women among the tribal groups in the north-eastern states has important effects on the literacy rates, enrolment ratios and dropout rates of girls in that region. High poverty rates pose significant obstacles in attaining literacy and education among tribal women in India. However, large differences in literacy rates in various states in India show that social and cultural norms, proximity to the mainstream Hindu culture, and the role of women are also important determinants in achieving literacy among tribal women.

## Problems of the Study

In India, many studies have revealed the educational development of tribal girls measured by quantitative indicators like enrolment, literacy rate and educational facilities. While literacy has been recognised as an important tool of empowerment and also to bring about socio-economic changes in any society, the tribal society has been greatly disadvantaged and the tribal girls are enormously handicapped. Though the

governments have taken several steps for the development of tribal education projects and schemes, much remains to be done. The progress achieved in this field is far from satisfactory. The welfare programmes have not been effective due to inadequacies in the administrative machinery, lack of sensitive, trained management, lack of general preparedness for large investments, deficiency in accounting systems, procedural delays and lack of proper monitoring and evaluation on the one hand. On the other hand, there are different issues like poverty, health and sanitation, weak resource base, low socio-economic status, parents' illiteracy, lack of access to information and facilities provided by various governments, lack of motivation and their inadequate participation in institutions which are mainly responsible for depriving tribal girls from quality education. They are not able to participate in the process of development, as they are not aware of most of the programmes, policies, and its benefits in their standard of living and their overall upliftment in the society. This is mainly due to the high incidence of illiteracy and very low level of education and understanding among the tribal people.

The constitutional directive to provide free and compulsory education to all children has not yet been fulfilled. Educational experts admit that this failure is mainly due to the slow progress of education among girls, SCs and STs. Moreover,

the tribals have no faith in formal education. The low educational status of tribal women is reflected in their lower literacy rate, lower enrolment rate and higher dropouts in the school. It is also true that the fruits of development fail to reach the weaker sections of our society despite our planned efforts. Therefore, it is essential to educate tribals in general and tribal girls in particular with special government and non government initiatives.

## OBJECTIVES OF THE STUDY

This study was undertaken to understand the present status, vulnerabilities, threats and gaps in the fulfillment of universal primary education for the children of tribals in Madhya Pradesh, India. The study was initiated with the following objectives.

1. To understand the current status and delivery of education for tribal girl children

2. To study the attitude of the parents towards their daughters' education

3. To identify the gaps and challenges which currently exist in the school of tribal areas

4. To examine the major steps taken by the government to eradicate barriers to tribal education

The rationale behind the choice of the district is that the tribals of Dindori district have the lowest female literacy, greater gender disparity and dismal retention with high dropout rate.

The parameters taken for the study include the overall tribal situation in the district, number of schools available, schools with percentage of ST enrolment, out of school children among overall community as well as ST community, gross enrolment and net enrolment ratio at the primary and upper primary level, dropout rate, retention rate and transition rate, pupil-teacher ratio and number of male and female teachers of all government schools including the tribal schools. Accordingly, the ambitions of this paper are principally analytically descriptive. The present paper discusses the problems relating to the objective of this study, methodological framework adopted and the rationale thereof. The paper also deals with the overall tribal scenario in the state and looks at the gender dimension of education of tribal children followed by the analysis of the elementary education of tribal girl child in the selected district. The concluding section ends up with summarising the analytical stakes. Therefore, in the paper, an attempt has been made to analyse the present status of educational facilities availed by tribal women and women in Dindori district and the family's attitude towards their girls' education as well as government initiatives for their development.

## METHODOLOGY

Field surveys have been undertaken in 44 remote tribal villages and forest areas in Baiga, Gond, Koal, Pradhan,

Dhulia, Bhoomia and Agaria tribes in Karanjia and Bajag blocks of Dindori district. These tribes have been living there for centuries, being far away from the mainstream in their relatively isolated, inaccessible, less fertile and less agriculturally productive regions of forests, hills and mountains. As far as development is concerned, these tribal groups are as marginalised and continue to be techno-economically backward. The district of Dindori has a special distinction of accommodating about one-sixth of the total tribal population of the State. Tribals only constitute 64.30 per cent of the district and thus, it stands fourth among all 50 districts of the State with highest proportion of tribal concentration. Dindori district is located in the eastern part of Madhya Pradesh and touches Chhattisgarh (Official website of Dindori district, 1998).

The survey sample is the set of respondents who are selected from a larger population through the multi-stage random sampling method for the purpose of participating in the survey. They are studied to gain information about the population as a whole. The sampling plans address the general ability, certainty and precision of results by defining who is included in the survey, how many people are needed and how respondents are selected. The study is mainly based on primary data collected from selected respondents in the affected district of Dindori. The researcher has conducted his study in two blocks of the district, that is

in Karanjia and Bajag. Under these blocks, 24 Gram Panchayats (GPs) were selected. It was decided that 300 sample households would be interviewed, covering all the 44 villages and 32 schools from the 24 GPs and equal number of samples taken from each village and school. One hundred and twenty eight samples taken from 32 schools with an average of 4 respondents (including teachers and students) per school means each school gives 4 respondents to be selected at random. For the remaining 172 samples, the researcher interviewed parents, panchayat leaders, and women self help groups (SHGs). Data were collected from the selected respondents through multi-stage random sampling procedure. The selected sample respondents were contacted at their respective residence and the required primary information was collected.

The database of the study comprises primary data collected through interview schedule of structured and unstructuredquestions and focus group discussions related to educational development and interface. The researcher visited the local government offices and met field functionaries at the block level of the Education and Tribal Welfare departments, perused their monitoring tools, information and field data available in their offices. During the collection of the data, some important aspects like enrolment, attendance and dropout, delivery systems, infrastructural availability, social policy and State services

were also focused. Information with respect to occupation of the parents/guardians, distance of the residence from the school, socio-economic profile of the beneficiaries was also obtained.

Intensive secondary data was collected for this study from various sources and a major part of the analysis of the study is based on the secondary data collected. For secondary data, official perspectives and feedback on tribal education, the researcher primarily engaged with the government department of school education, tribal welfare department, report on selected statistics, published by the statistic division and Ministry of Human Resource Development, New Delhi. Secondary data collection sources included government offices at the state and district level, Tribal Welfare Department at the state and district level through the Integrated Tribal Development Agencies. Several field trips were undertaken for collection of data during different seasons. Information was gathered through oral interviews of the local tribal people. This data then can be analysed quantitatively or qualitatively depending on the objectives and design of the study. Survey can be designed specifically to gather information about knowledge related topics. The study primarily looked at the interventions and delivery of education services in government schools located in the tribal areas of Madhya Pradesh. The

two main parameters on which the study was based are stated below.

- Access for which the primary indicators were enrolment and retention, school dropout rates and out-of-school children, attitudes of parents towards their children's education (especially for girls' education)

- Quality for which the primary indicators were physical infrastructure of schools and hostels, security and safety of students, teacher capacities and training, quality of education material, curriculum and innovations

## Tribal Scenario of the State

According to the Census 2011, there are 31,22,061 total households in the state. The total tribal population in Madhya Pradesh is 1,53,16,784 with males constituting 77,19,404 and females 75,97,380, that is 21.1 per cent of the total population of state and 14.7 per cent of India's total tribal population. There were 46 recognised tribal communities and three of them notified as particularly vulnerable tribal groups (Bhil, Gond and Kol) in the State (Tribal Health Bulletin, January, 2014). Literacy rate among tribals is 50.6 per cent and among males and females, 59.6 per cent and 41.5 per cent respectively. According to the 2011 Census of India, the decadal growth rate of the ST population during 2001–2011 is 25.2 per cent which is higher than the state's decadal growth rate (20.3

per cent). Bhil is the most populous tribe with a total population of 46,18,068, constituting 37.7 per cent of the total ST population. Gond is the second largest tribe, with a population of 43,57,918 constituting 35.6 per cent. The next four populous tribes are Kol, Korku, Sahariya and Baiga respectively. These six tribes constitute 92.2 per cent of the total ST population of the State. Pardhan, Saur Bharia, and Bhumia have a population ranging from 1,05,692 to 1,52,472; together, they form 3.2 per cent. Four tribes, namely, Majhi, Khairwar, Mawasi and Panika having population in the range of 47,806 to 81,335 account for another 2.2 per cent of the ST population; remaining thirty three tribes (out of total of 46 tribes) along with the generic tribes constitute the residual 2.5 per cent of total ST population. Tribes having population below 1,000 are 12 in number. Dindori district had a population of 7,04,525. Males

constituted 49.95 per cent of the population and females 50.05 per cent (Census of India, 2011).

Table 1 shows that out of the total population of the district, about 95.37 per cent live in rural areas and 4.63 per cent live in urban areas, obviously depicting that Dindori district has rural category population in an almost overwhelming majority, far in excess to the state and national proportions (73.5 per cent and 72.99 per cent respectively). Annual population growth for the district is 1.35 per cent per annum, which is less than the average growth rate in Madhya Pradesh (2.43 per cent) and India (2.14 per cent) as per Census, 2001. The above table reveals that 86 per cent of the total population is living in the Dindori block. 100 per cent of the total population is living in Amarpur, Samanapur, Bajag, Karanjia and Mehendawani blocks of Dindori district. 91.59 per cent of population is living in the Shahpura block.

**Table 1**
**Block wise Rural and Urban Population of Dindori district**

| Block | Total Population | Male | Female | Rural | Urban | % of Rural Population to Total Population |
|---|---|---|---|---|---|---|
| Dindori | 1,24,430 | 62,557 | 61,873 | 1,07,008 | 17,422 | 86 |
| Amarpur | 60,704 | 30,308 | 30,396 | 60,704 | – | 100 |
| Samanapur | 69,891 | 35,221 | 34,670 | 69,891 | – | 100 |
| Bajag | 71,611 | 36,224 | 35,387 | 71,611 | – | 100 |
| Karanjia | 75,001 | 37,676 | 37,325 | 75,001 | – | 100 |
| Shahpura | 1,12,297 | 56,331 | 55,966 | 1,02,849 | 9,448 | 91.59 |
| Mehendawani | 66,796 | 33,399 | 33,397 | 66,796 | – | 100 |
| Dindori District | 5,80,730 | 2,91,716 | 2,89,014 | 5,53,860 | 26,870 | 95.37 |

*Sources: District Perspective Plan Year 2007–08 to 2011–12 and Census, 2001*

## Table 2
## Block-wise Scheduled Tribe Population of Dindori district

| Block | Total Population (Ref. Tabl 1) | Total ST Population | Male (in Rural areas) | Female (in Rural areas) | Total in Rural areas | Urban | % of ST Population to Total Population |
|---|---|---|---|---|---|---|---|
| Dindori | 1,24,430 | 68,105 | 31,733 | 32,123 | 63,856 | 4,249 | 54.73 |
| Amarpur | 60,704 | 40,680 | 20,126 | 20,554 | 40,680 | – | 67.01 |
| Samanapur | 69,891 | 44,686 | 22,309 | 22,377 | 44,686 | – | 63.94 |
| Bajag | 71,611 | 50,070 | 27,709 | 22,361 | 50,070 | – | 69.91 |
| Karanjia | 75,001 | 51,182 | 23,396 | 27,786 | 51,182 | – | 68.24 |
| Shahpura | 1,12,297 | 67,447 | 32,596 | 33,303 | 65,899 | 1,548 | 60.06 |
| Mehendawani | 66,796 | 51,277 | 25,503 | 25,774 | 51,277 | – | 76.77 |
| Dindori District | 5,80,730 | 3,73,447 | 1,83,372 | 1,84,278 | 3,67,650 | 5,797 | 64.30 |

*Sources: District Perspective Plan Year 2007–08 to 2011–12*

Table 2 shows that out of total population 64.30 per cent of the Scheduled Tribes are living in the district of Dindori. The district has seven blocks; covered by large number of tribes and most of the tribes belong to the Primitive Vulnerable Tribal Groups. If we compare the rural tribal population with the urban tribal population, we can find that it is highest in rural areas then urban areas. The above table reveals that 98.44 per cent (3,67,650/3,73,447×100) of the total tribal population are living in the rural and forest areas. The district has a large tribal population (64.30 per cent), 29.87 per cent of the population belongs to other categories, while SC (5.83 per cent) population is very less (Census, 2001). It was found that the female sex ratio is slightly higher than the male ratio. The above table reveals that 54.73 per cent of STs live in the Dindori block. About 67.01 per cent live in Amarpur block, 63.94 per cent live in the Samanapur block, 69.91 per cent of tribals live in the block of Bajag; particularly this block is dominated by Baiga tribes (PVTGs). 68.24 per cent of tribals are in the Karanjia block 60.06 per cent live in the Shahpura block and 76.77 per cent of tribals live in the block of Mehendawani block.

## Status of Tribal Girls' Education

The plan for tribal education should be prepared keeping the fact in mind that existing schemes could be dovetailed to maximise the outcome. Existing critical gaps of infrastructure and qualified manpower should be practically envisaged in a manner that the formulated planning exercise may encompass all the vital areas responsible for bringing the tribal education at par with the national level. Education plays a particularly important role as a foundation for

girls' development towards adult life and in enabling girls and women to secure other rights. Girls are less likely to access school, to remain in school or to achieve in education. Education helps men and women claim their rights and realise their potential in the economic, political and social arenas. It is also the single most powerful way to lift people out of poverty. Everybody has the right to education, which has been recognised since the Universal Declaration of Human Rights in 1948. As a minimum, States must ensure that basic education is available, accessible, acceptable and adaptable for all. The right to education for tribal girls is one of the most critical of all rights. The right to free and compulsory primary education, without discrimination and of good quality, has been reaffirmed in all major international human rights conventions. Gender inequality in education is extreme. The convention on the rights of the child and the elimination of all forms of discrimination against women establishes it as a basic human right. In order to achieve the Universal Primary Education, it is very essential to adopt some major components that include 'Early Childhood Care Education', Universalisation of Elementary Education, reduction in school dropout rate, and promoting Sarva Shiksha Abhiyan. In order to improve the literacy rate in the State, Sarva Shiksha Abhiyan has been implemented in all the districts with three objectives, that is, universal

enrollment, retention and quality of education. SSA is Government of India's flagship programme for the achievement of Universal Elementary Education in a time-bound manner. Similarly, for reduction of the gender gap and greater participation of girls in education, two special schemes, the National Programme for Education of Girls at Elementary Level launched in the state in 2006 and Kasturba Gandhi Balika Vidyalaya launched in the state in August, 2004 have been implemented in educationally backward blocks of the State. However, despite improvements over the last decade, the state still has a large number of out-of-school children of school age who remain excluded from educational institutions for various reasons. The persisting problems of tribals in Madhya Pradesh can be resolved through women's education.

The education system should make an individual better suited to the needs of the ever-changing dynamic world. The changes in the educational system should also reduce the social gaps by enabling proper recognition to whatever extent one is able to pursue or acquire a skill. The tribal communities have been subjected to various forms of deprivation such as alienation from land and other resources. Especially the tribal women away from the main stream of national life, but they are not kept away from the impact of socio-economic changes affecting the society in general. In this process of change, the tribal woman are forced

**Table 3**
**Trends in Tribal Literacy Rate in 1981–2011 (Dindori district)**

| Year | Overall population Literacy Rate (%) | Overall ST literacy rate (%) | No. of ST Boys literacy rate (%) | No. of ST Girls literacy rate (%) |
|------|------|------|------|------|
| 1981 | 5,28,865 (19.9%) | 38,316 (14%) | 27,631 (16.18%) | 10,685 (11.51%) |
| 1991 | 5,11,849 (32.6%) | 60,632 (21.57%) | 45,118 (26.42%) | 15,513 (16.71%) |
| 2001 | 5,80,730 (54.2%) | 2,09,563 (53.7%) | 1,36,068 (69.4%) | 73,495 (37.8%) |
| 2011 | 7,04,524 (63.9%) | 2,25,174 (59.96%) | 1,32,143 (71.37%) | 93,031 (48.86%) |

*Note: Number outside the bracket denotes population, percentage inside the bracket is literacy rate.*
*Source: District Census Handbook Dindori, 1981, 1991, 2001 and 2011 and Official Website of Dindori Dist, M.P.*

to adhere to certain norms which may even take away her freedom, her control over the traditional productive system, her house, family and children and even her own life. The fact remains that a large number of tribal women have missed education at different stages, and in order to empower them, there is a great need of providing opportunities, so as to enable them to assume leadership qualities for economic self-reliance and even social transformation. It is often alleged that the level of aspiration of these women as a group is low and they are quite satisfied with what they are and with what they have. It is most often not true only for the women folk but for everyone who feels helpless and frustrated. However, in order to develop and raise their level of aspiration, adequate educational opportunities are to be provided so that they get motivated to participate in the mainstream education and also ultimately learn to initiate their own programmes of development.

Dindori has an average literacy rate of 63.9 per cent, lower than the national average of 72.99 per cent. Male literacy is 75.47 per cent, female literacy is 52.41 per cent and, 16.02 per cent of the population is under 6 years of age in Dindori (District Census Handbook Dindori, 2011). Recognising the Census 2011, the overall literacy rate of tribals was 59.96 per cent whereas in 2001, it was 53.7 per cent; in 1991, it was 21.57 per cent and in 1981, it was 14 per cent. This is significantly lower than that of the general population and is even lower than the literacy rate of the SCs. In the Census of 2011, the literacy rate of tribal boys was 71.37 per cent; which was much lower than the State average literacy rate. The girl's literacy rate of 48.86 per cent was also the lowest of all social groups in terms of literacy. In Census of 2001, the literacy rate of tribal boys was 69.4 per cent and girls was 37.8 per cent. In the Census of 1991, the literacy rate of tribal boys was 26.42 per cent and girls

was 16.71 per cent. In the Census of 1981, the literacy rate of tribal boys was 16.18 per cent and girls was 11.51 per cent. It is seen that the literacy rate of the Scheduled Caste population of the district is 70.84 per cent. It is the highest at 80.71 per cent in Samnapur CD block and the lowest at 67 per cent in Shahpura CD block. The gap in male-female literacy rate is the highest (26.33 per cent) in Bajang CD block. The overall male literacy rate of the district (rural) works out to 83.11 per cent and it is 57.96 per cent for females (District Census Handbook Dindori, 2011). Education is considered to be at the heart of all development; it is evident that the education scenario among Scheduled Tribes is in a very bad shape. It is imperative to know about the gender dimension of the child population scenario, both for the general population and for the ST community in the selected district. The above record also shows that the trend in literacy rate during 1981 to 2011 is increasing simultaneously. If we compare, then we find that  during the period of 1981 to 1998, it was undivided Mandla District that goes under Jabalpur subdivision) the literacy rate is 19.9 per cent. The literacy rate in 1991, is 32.6 per cent. Literacy rate in 2001, is 54.2 per cent and in 2011, is 63.9 per cent.

The Census reveals that the total male tribal literacy rate is 58.4 per cent and the female tribal literacy rate is 33.7 per cent in the district which is very low in comparison to the male ratio. The male literacy rate among the major tribes of the district indicates that Gond has the highest percentage of literates (47 per cent) followed by Agaria (40.5 per cent), Dhulia (39.7 per cent), Pradhan (35.4 per cent), Bhoomia (31.9 per cent), Koal (27.1 per cent) and Baiga (24.3 per cent). Gond has also registered the highest girl's literacy. Baiga has the lowest percentage of literate girls', preceded by Koal and Bhoomia. The Census data has cleared that girls' literacy ratio is low in comparison to the boys' literacy ratio. Among the Gond tribe, the literacy rate of girls' is 30.8 per cent. The literacy rate of the total tribal population among the Dhulia tribe. The literacy rate is 27.6 per cent. Among the Agaria female tribe it is 24.7 per cent, 19.9 per cent among the Pradhan tribe girls, and 18 per cent among the Bhoomia tribe girls. It has been found to be 14.3 per cent among the Koal girl tribes, and 11.1 per cent among the girls of Baiga tribes of Dindori district, which is very low in comparison to other girl tribes of the district (Census, 2001).

Among the tribal literates, 44.7 per cent are either without any educational level or have attained education below primary level. The proportion of literates, who have attained education up to the primary and middle level constitute 28.7 per cent and 13.7 per cent respectively. Literates, who are educated up to secondary/higher secondary level, have a share of 11 per cent only. Graduates and above are 1.5 per cent

**Table 4**
**Levels of Education among the Major Scheduled Tribes: Educational levels
Attained by STs**

| Names of STs | Literate without educational level | Below primary | Educational levels attained | | | | |
|---|---|---|---|---|---|---|---|
| | | | Primary | Middle | Matric/ Secondary Higher Secondary/ Intermediate | Technical & Non-technical Diploma | Graduate and above |
| All STs | 4.4 | 40.3 | 28.7 | 13.7 | 11 | 0.4 | 1.5 |
| Gond | 5.4 | 40.4 | 29.4 | 12.8 | 14.8 | 0.4 | 1.3 |
| Agaria | 2.6 | 34.6 | 27 | 17.7 | 10.3 | 0.6 | 2.6 |
| Dhulia | 3.7 | 40 | 27.5 | 16 | 11.1 | 0.4 | 1.4 |
| Pradhan | 2.7 | 35.7 | 30.8 | 15.4 | 13.3 | 0.5 | 1.6 |
| Bhoomia | 4.6 | 43.9 | 30.6 | 11.4 | 8.3 | 0.3 | 0.9 |
| Koal | 5.1 | 46.2 | 28.6 | 11.2 | 7.8 | 0.3 | 0.8 |
| Baiga | 9.4 | 47.3 | 27.4 | 9.8 | 5.5 | 0.1 | 0.4 |

*Source: Census of India 2011*

while number of technical degree and technical diploma holders constitute less than half per cent (0.4 per cent). Among numerically larger groups, Gond has the highest proportion of matriculates followed by Baiga and Kolha.

The data on the education levels attained by all STs shows that the dropout rate is high after primary level as the percentage of middle level literates is half that of the primary level. It declines sharply from the higher secondary level onwards, as the percentage of students after matriculation drops down to nearly one-third in higher secondary or intermediate level. Out of total 21.4 lakh tribal children in the age group 5–14 years, only 9.8 lakh attend schools constituting 45.8 per cent. Alarmingly, as many as 11.6 lakh children in the corresponding age group do not go to school. Among the major tribes, Gond and Bhoomia have more than half of the total children in the corresponding age group attending schools; this proportion is above 40 per cent among Agaria, Dhulia, and Koal tribes. The survey data indicates that 45.8 per cent of the total tribal children in the age 5–14 years are school going children. Among the Gond tribe, the school going children constituted 56 per cent. It was 41.6 per cent for Agaria, 46.5 per cent for Dhulia, 31.6 per cent for Pradhan, 52.5 per cent for Bhoomia, 44.8 per cent for Kolha and 36.8 per cent for Baiga (Census of India 2011). Educational levels among the major tribes of the study areas are very low in comparison to the other category of people. One of the major factors affecting schooling access is poverty.

The children of the poor tend to be relegated to the margins of the system, and are eventually pushed out altogether. They do not go to school as they work to contribute to the maintenance of the family income and cannot avail the opportunity of learning. A closer analysis shows that economic impoverishment itself is deeply embedded in a discriminatory social structure. Tribal children contribute to the income and engaged in household activities for the family which inhibits school attendance.

## Enrolment of Tribal girls

The enrolment at the primary and upper primary levels of education over time has improved significantly but still more tribal girls are out of school as compared to tribal boys. The enrolment ratio at the upper primary level is much lower than at the primary level. A large number of tribal girls continue to dropout from the system before completion of an education cycle, which severely affects the efficiency of the elementary education system. The tribal girls take more years to become primary graduates than ideally required. The unfinished task in terms of unenrolled and out of school children is a challenging one, rigorous efforts are needed to bring and retain them under the umbrella of education system.

According to Selected Educational Statistics, 2006–07, the total number of elementary schools in Madhya Pradesh was 1,35,440 in the same year (2006) and the number of students enrolled in these schools was 1,18,12,968 at the primary level and around 45,05,506 at the upper primary level. The research data reveals that 57 per cent girls of SC community in the age group 4–6 years enrolled in pre-primary school by the social group and 43 per cent of girls are not attending the school. 78 per cent girls of ST community in the age group of 4 to 6 years enrolled in pre-primary school by the social group and 22 per cent of children are not attending the school. 74 per cent girls of the OBC community in

**Table 5**

**Children Enrolled in Different Types of Pre-primary School**

| Different types of pre-primary school | Category Wise | | | |
|---|---|---|---|---|
| | SC (%) | ST (%) | OBC (%) | General (%) |
| Anganwadi/Balwadi | 25 | 36 | 24 | 15 |
| NGO | 27 | 24 | 22 | 28 |
| Private | 18 | 08 | 28 | 46 |
| Attached to Govt. School | 30 | 34 | 26 | 11 |
| Total | 100 | 100 | 100 | 100 |

*Source: Household survey data, 2015*

the age group of 4 to 6 years enrolled in pre-primary school by the social group and 36 per cent of girl are not attending the school. 59 per cent girls of general community in the age group of 4 to 6 years enrolled in pre-primary school by the social group and 41 per cent of children are not attending the school (Educational Statistics, 2006–07).

Different category of children (SC, ST, OBC and General) enrolled in different types of pre-primary school such as: *anganwadi/balwadi,* NGO, private and attached to the government schools in the study areas. The survey data reveals that 25 per cent of the tribal children in the SC community enrolled in the *anganwadi/balwadi*, 27 per cent of SC girls children are engaged in the NGO for getting their primary pre-education, 18 per cent of SC category girls children are studying in the private schools and 30 per cent of SC girls are attached to the government school. 36 per cent of the tribal children in the ST community enrolled in the *anganwadi/balwadi*, 24 per cent of tribal girls are engaged in the NGO for getting their primary pre-education, 8 per cent of tribal girls are studying in the private schools and 34 per cent of tribals girls are attached to the government school. About 24 per cent of the girls in the OBC community enrolled in the *anganwadi/balwadi*, 22 per cent of the OBC girls are engaged in the NGO for getting their primary pre-education, 28 per cent of girls are

studying in the private schools and 26 per cent of OBC girls are attached to the government school. 15 per cent of the girls in the general community are enrolled in the *anganwadi/balwadi*, 28 per cent of general category girls are engaged in the NGO for getting their primary pre-education, 46 per cent of general category girls are studying in the private schools and 11 per cent of general category girls are attached to the government schools. When we compare it in gender wise, it has cleared that out of 300 respondents only 231 (77 per cent) of tribal girls are attached to the *anganwadi/balwadi*. 141 (47 per cent) of the girls are engaged in NGO school. 138 (46 per cent) of girl's are attached to the private school, which are far away from the tribal belt. Through help of bus connectivity, they have to go to school and 141 (47 per cent) of tribal girls are attached to the government school, which are established nearby village. The most relevant data was collected from the survey that is most of the tribals girls are going to the school by private bus, which covers 5 km to 10 km This is a barrier in the way of tribal girl's education. They spent most of their valuable time going to school. Language is another barrier in the way of tribals girls' education. Teachers appointed in the school are not fluent in the tribal language. Syllabii and curricula of the school are beyond their knowledge, it is not an easy task for them to understand it. Another

important barrier is that the schools are far away from their residence.

## Exploring Absenteeism

The central characteristic of school education is the sustained and active participation of children in teaching-learning processes organised according to a pre-determined curriculum. Learning outcomes are to be viewed largely as the product of such organised learning experiences. To what extent is this taking place in the schools under study? This has been examined partly in terms of their attendance patterns. As part of the investigation, every child's recorded presence in the school register for the previous month was collected. Second, the actual presence of the child on the day of the visit was also taken to find out the average presence of children in the class and the school. Third, for each child, the responsible teacher was asked to indicate how regular the child has been; specifically, how many days did the child attend the school on average in a month. The analysis of data highlights the very high levels of overall absenteeism among students in all the localities. The rates of attendance are particularly low in Dindori district with many children missing a week or more of schooling each month. The most intriguing is that a high proportion of children are absent in Education Guarantee Scheme schools which are supposed to be established and managed by the local communities.

With such high incidence of student absenteeism, the official claim of a very small proportion of 'out-of-school' children sounds quite hollow. The data indicates that large numbers of tribal children fail to complete the elementary cycle of school and less than half reach the end of the elementary cycle. Many drop out, many others fail to progress from one grade to another, and others do not learn even the minimum expected competencies. The priority for policy is therefore, to move from increasing enrolment to achieving greater equity and quality.

The collected data confirm that many tribal children are unable to attend their school regularly. According to the school register, absenteeism is quite high in government schools. For instance, around 33.8 per cent of tribal children attended school regularly in Dindori. Interestingly, teachers do not seem to perceive the problem to be as serious as it is. A considerable number of tribal children were absent on the day of the visit to school. Between 25 per cent and 42 per cent were absent during head counts when schools were visited, suggesting that the data gathered from registers underestimated absence. The uniform structure and transaction of curriculum has put tribal children at a disadvantage. In respect to pedagogy, it has been found that the rigid systems of formal schooling, which emphasise discipline, routine norms, teacher-centred instruction,

etc., have made the children wary of school. This goes against the culture of free interaction and absence of force as embedded in the tribal ethos and culture prevalent at home. This has led to a sharp division between home and school leading to the lack of interest among the tribal children towards school, and research findings have shown this as a major factor behind non-enrolment. Another area is that the staying of tribal children in the relative's house, engagement in domestic work, inherent fear of tribal children towards the teacher, and their inability to establish a communication link with the teacher reflected in low attendance and high dropout rates. These are the important causes due to which they are not able to get the primary and upper primary education. This could be tackled to a great extent by using the regional language as the medium of instruction.

## Problems related to Education

This review clearly underlines that in spite of constitutional guarantees and persistent efforts, tribal communities continue to lag behind the general population in education. The reasons for this can be categorised as external, internal, socio-economic and psychological. The external constraints are related to problems and difficulties at levels of policy planning, implementation, and administration. One of the major constraints of tribal education at the level of planning is the adoption of a dual system of administration. The tribal welfare department deals with tribal life and culture and administers development work at the local level, including education. But the tribal welfare department lacks expertise in educational planning and administration, in general and academic supervision and monitoring, in particular. On the other hand, the education department is the sole authority for planning educational development at the state level. It formulates implementation guidelines and instructions regarding curriculum, textbooks, teacher recruitment, transfer policies, and so on. In this, the department tends to formulate uniform policies for the entire state. The school calendar is a case in point, where vacations and holidays cater to the needs of the formal school set-up in a non-tribal context, with little consideration to the local context and tribals, festivals. This lack of sensitivity to their problems and failure in understanding tribal social reality, coupled with faulty selection and appointment of teachers in tribal areas, have resulted in poor performance and teacher absenteeism in tribal schools. Under the system of dual administration, absence of coordination and complimentarity as well as inadequate scope for reciprocal use of respective expertise and experiences between the two departments has invariably stunted educational development among tribals. Internal constraints refer

to problems associated with the school system, relevance of content, curriculum, medium of instruction, pedagogy, academic supervision, monitoring, and teacher-related problems, basically suitable teachers. Schools in tribal areas just function with bare minimum facilities.

The third set of problems relates to social, economic, and cultural background of tribals and psychological problems of first-generation learners. In a broad sense, these factors can be outlined as poverty and poor economic conditions, social customs, cultural ethos, lack of awareness and understanding of the value of formal education, conflict and gap between the home and school, etc. Studies on educational deprivation of tribals girls have inevitably linked it to their poor economic condition and poverty. The main occupation of tribals is agriculture, practised where productivity remains very low. Consequently, the girl child plays an important role, contributing directly or indirectly to family income by participating in the family occupation and household works like cattle grazing and fuel and fodder collection, and taking care of younger brother and sister, etc.

Even though elementary education is deemed free, and additional incentives are given to tribal children, in practice, it is not free due to several reasons. First, the incentive schemes do not have full coverage, and thus, have limited value at the community level. Second, many of the benefits do not reach the beneficiaries. Third, even though incentives like slates and uniforms are given, they are of poor quality and do not reach in time, thus nullifying the entire purpose. It should be noted that the impoverished economic status of tribals makes even the small amount of private expenditure involved in procuring writing material, clothing, etc., a serious burden on the family. Under these circumstances, it is not surprising if education is not given priority. In an economy dominated by struggle for survival, options are limited. Since education does not provide any visible and immediate benefit and tribals do not see beyond their present state, the participation of tribal children in education also becomes limited. Another reason for low participation is the opportunity cost involved, as the majority of non-enrolled children are required to work in households or family occupations. Even if the economic contribution of children is indirect, they certainly facilitate the participation of parents in the economic activity. In a way, it can be said that these problems seem to be adversely affecting the education of tribal children (Sujatha, 1994).

Language provides social, psychological and emotional expression of an individual in a society. But in the absence of knowledge on the tribal dialect, both students and teachers face the problem of communication and teaching-learning. Tribals speak

different languages and hence the problem of communication comes in the way of tribal education. It is found that tribal students are often ridiculed, humiliated and reprimanded for speaking in their own language, and are punished for failing to talk in their standard language or continuously lapsing back in the mother tongue (Nambissan, 1994, p. 2752). It is the regional and national language that reduces tribals to minorities in their own home. Educating children through the regional and national language is not wrong but the students should be familiar with their own language first to develop enthusiasm in education which in turn brings linguistic and social skills that prepares them for formal education in the future.

With a natural disposition towards the local dialect, tribal children are generally unfamiliar with the state language. As a child's first exposure to education, there is debate around the language used for instruction and communication. Tribal children have limited contact with the state language, and tend to speak in their own local dialect. Government schools, where the tribal girls are largely educated, use the state language for teaching and communication, which is most often not familiar to a tribal child at the primary and upper primary levels. They are thus, unable to fully comprehend classroom teaching and activities, read in the state language or understand the texts

properly. Gradually introducing the state language can boost enrolment, enhance linguistic capital as well as improve the children's potential in mainstream education systems. The use of the tribal language in the initial years helps development of a sense of comfort for the tribal girl. It must be the first language and taught as a means of acquiring knowledge of tribal culture, ethnicity, literature and the arts. The child is required to be exposed to the state language steadily, which is imperative for integration into mainstream schools and society (National Population Education, 1991–1996).

The survey data reveals that 35 per cent of tribal girls never enrolled in the school due to monolingual and bilingual at school. 51 per cent of girls enrolled in the school due to their own dialects and language at school. 14 per cent of tribal girls dropped out of the school due to bilingual language in the school. The data shows that the language used for teaching in the schools is also a prime factor for the enrolment of tribal children. A major reason for this is that in the study areas, the medium of instruction is the regional language. Most tribal children do not understand the textbooks, which are generally in the regional language. The appointment of non-tribal teachers in tribal children's schools is another problem. The teachers do not know the language the children speak and children do not understand the teacher's language. It is evident that

the number of bilingual schools are more in the State. The data indicates that there is a need for more number of monolingual schools in the State, particularly in these tribal dominated districts to enhance the enrolment of tribal children. The fact seems to be that the tribal children can relate to and internalise the education better in their own language and can be attracted to schools. It may be required to open more schools imparting education in the languages of the tribal children. The teaching materials and books should be in the local tribal languages and thus, the linguistic imposition may prove out to be detrimental to the realisation of the goal of universalisation of elementary education, reduction in school dropout rate, and promoting Sarva Shiksha Abhiyan. Considering the language issue faced by the tribal children in the tribal areas and with the aim to boost enrolment, the State Tribal Advisory Committee in the year 2006 decided to adopt ten tribal languages as the mother tongue based multilingual medium of instruction in the tribal districts.

It is observed that 65 per cent of teachers agree that distance is one of the obstacles that compels their parents to stop the education of their girls, whereas only 18 per cent of families provide all facilities to overcome the distance factor. It is because they have a strong background and determination for their girls' education. So here, the government should take initiatives to establish more schools within a 2 km distance to the village. About 76 per cent of the respondents say that the present location and infrastructure is one of the serious obstacles, which affect the education of tribal girls, and this is the cause to change daughter's school by tribal families. About 24 per cent of the respondents still disagree with the statement that it is because their schools have proper location and facilities. After a critical analysis, it was found that 83 per cent of the teachers have revealed that the family's poor economic condition is one of the major problems in the path of their girls' education, whereas 17 per cent of the respondents do not think finance to be a problem for tribal families. Here, it may be derived that more than 77 per cent families have no idea about free opportunity of girls' education. On the other side, 62 per cent of the respondents realise that parents' illiteracy has a bad impact on their girls' education and future, and 38 per cent of the respondents deny this and state that it is because literacy programmes are not organised within the district properly.

## Infrastructure Facilities in Educational Institutions

Infrastructure of tribal education refers to the quality of school provision, suitable teachers, relevance of content and curriculum, medium of instruction, etc. Large numbers of schools in tribal areas run without better infrastructural

facilities. The condition of the School's building is very bad. Schools lack basic infrastructural facilities. The schools basically have thatched roofs, dilapidated walls and non-pastoral floors. (Awais, Alam and Asif, 2009). In Ashram schools which are residential in nature, there is no space for the children to sleep. As a consequence, the classrooms turn into a dormitory and vice versa. In addition to poor maintenance of the school and classrooms, inadequate teaching-learning materials such as blackboards and chalks cause problems for the teachers and students in teaching and understanding the content. Shortage of sufficient number of teachers in the school is another negative aspect of tribal education. Appointment of teachers is required in the school. In reality, most of the primary schools in the tribal areas are single teacher-managed, whose presence in the school is more of an exception than a rule (Hasnain, 2004). The teacher feels isolated and unhappy and a disgruntled teacher is, certainly, not the best communicator of modern ideas and messages to tribal children. As regards the appointment of teachers, more and more appointments should be made from among the tribal population so that the teachers become accepted and they deal with the tribal students by using a more permissive and motivational approach. The existing teachers should be provided with adequate facilities and they should be properly oriented. The number

of teachers and the student-teacher ratio over time has improved significantly, but still, there are some schools that do not have sufficient number of teachers and instructional rooms. The number of female teachers over time improved significantly, but still their number is much lesser than their male counterparts. About 45 per cent of respondents agree on this point that insufficient number of women teachers within the school is one of the problems of girls' education. The remaining 55 per cent are till now not aware about the importance of female teachers in the educational system. Whereas 45–55 per cent respondents cited that girls' school and the language teacher are immensely necessary for tribal girls' education, the rest responded against it. It should be a must for the teachers to learn the tribal language and there can also be attempts at writing textbooks in tribal languages. Non-availability of trained, experienced and competent teachers has serious impacts on the learning level of children and teachers' absenteeism seems to be an additional problem. Teachers' absenteeism greatly hampers punctuality. The goal of universal elementary education cannot be achieved, without attaining the status of universal primary enrolment.

A few schools still do not have infrastructural facilities. However, majority of the schools lack even the most basic facilities such as drinking water and toilets; electricity

is available in only one out of five schools. The first impression one gets in the field is that schools have the necessary physical facilities. In fact, school buildings can be found in almost all villages. But good quality education requires several other facilities in the school. There are improvements taking place with respect to infrastructure, but this seems to be only in bigger habitations and in schools close to the main roads. The data suggests that most schools are not adequately equipped with the necessary facilities. The situation is most alarming in the schools located in the tribal areas. Beyond the lack of physical infrastructure, many of these schools are single teacher and single classroom schools practising multigrade teaching; some schools do not even have a blackboard. A library is a rare facility, available only in a few schools. More efforts are required to adequately create, utilise and make available alternative facilities in all unserved habitations and areas where out-of-school children concentrate. This clearly points out towards the need to establish a set of priorities in equipping schools with infrastructure and also the need to give urgent attention to ensuring the provision of basic facilities in tribal areas it is generally assumed that the availability of school is not a problem. With the enormous expansion that has been witnessed in recent years, research revealed that while expansion in facilities can be seen in these areas, it is quite uneven across the areas and does not fully guarantee adequate access even to eight years of elementary schooling.

## Attitude of Parents towards their Children's Education

The illiteracy of tribal parents does not permit them to understand the long term values of education. As education does not yield them any immediate economic return, they prefer to engage their children in remunerative employment which supplements the family income and strengthens the family economy. Further, a few parents, who have become aware of the values of education, fail to accord education to their children as they cannot afford the finances for it. The attitude of the parents to their children's education is both negative and positive. The negative attitude of the parents prevents their children from getting education, that is, less support in school work, low level of motivation and the result is poor self-esteem of children. On the other hand, the positive attitude of parents is beneficial to their children as in many cases, it reflects in improvement in class performance, creating interest among children to learn, and higher achievement scores in reading and writing.

The survey data revealed that 42 per cent of the respondents agreed that parents are realising the importance of education in their life and they are fully aware about their children's education. At the same

time, about 58 per cent respondents are realising that parents are yet to give importance to their girls' education properly. Amongst the families with positive attitudes, nearly 35 per cent are providing full support to their daughter whereas 75 per cent are still not clear about the role of education in the development of their children's future. About 15 per cent respondents gave the opinion that parents were playing their role as a teacher properly at home, solving many problems pertaining to their girls' education and facilitate their girls for their future education. However, more than 85 per cent of the respondents feel that parents are not aware of the necessity and influence of their role at home for the proper education of their girls. About 18 per cent of the parents have an understanding that they should take part in the decision making activities organised by the schools. It is noticed that there is a lack of awareness with 82 per cent of the parents about the utility of education for their life and living, which was observed by examining the teachers' perception. About 21 per cent of the parents are of the opinion that there is a need to participate for the scholarly improvement of the school environment that will enhance the system of education, in general and their girls' school, in particular. That means they have the idea about the participation influence on schools. At the same time, 79 per cent of the families still have no regular

participation to develop the school environment, which was revealed by the teachers. This shows that they need more awareness programmes on highlighting the benefits of participation. The education provided to tribal girls, is not so qualitative due to the lack of skilled teachers to transact the curriculum. So, the teacher and some changes in the curriculum are needed. It is revealed that 18 per cent of the families are curious for education of their daughters and provided all the requirements like tutor, cycle, etc., and 82 per cent of the parents are still required to develop their understanding about the requirements for their girls for proper education which was the perception of the teachers.

## Gender Dimension of Education of Tribal Children

There is enough evidence that investment in the tribal girl child results in making a better, healthier, happier, and more creative family, community and society (Nayar, 2011, 20). When family, schools, neighborhood and communities take this as the agenda for action, it is likely to result in a great contribution for the present and future generations of the nation. To make tribal girls' care and protection a reality for every tribal girl in every place, requires not only our resources and policies, but also our voices and actions. But more than that, love, respect and support for tribal girls must be the

reality of all our homes, schools and communities.

It should be noted that professional hierarchies and models of social mobility are surprisingly similar in all societies. As education and participation in society expand, the effect of social background weakens slightly (Dronkers, 1993), but this weakening can be different for students in different fields of study in education (Ayalon and Yogev, 2005). The persistence of differences and inequality takes distinct forms, including both the social and economic values of schooling and also the contents and the format of each kind of education (Bills, 2004). Although the access of tribal girls to education has improved, patterns of access are gendered. More than half of the parents of tribal girls who never attended school were of the opinion that they do not need to send their girls to school. The reality of tribal girls' exclusion is further complicated by caste, religion, ethnicity and age. These percentages are less than the national level and thus, these are worrisome figures. Girls from poor, SC, ST and Muslim communities tend to be more disadvantaged than their male counterparts, and a larger proportion of tribal girls than boys from these groups are denied access to schooling.

There are substantial social, regional and gender gaps in literacy. Gender gap refers to the percentage share of tribal girls to the total enrolment both at the primary and upper primary levels of education. The ST female literacy has increased from a very low level of 11.51 per cent in 1981 to 38.48 per cent in 2001, which is significantly lower than the SC and general female literacy. Though the ST male literacy has increased from 16.18 per cent in 1981 to 55.41 per cent in 2001, there is still a big gap between that and the general male literacy. The following Census data shows the gender gap in literacy in selected districts of Madhya Pradesh in 2011. The Census data depicts that the gender literacy gap in the state is 25.8 per cent. In terms of gender, Dindori district clearly gives a different picture of male and female literacy rate to the overall children and overall literacy rate. This leaves scope for a lot of empirical curiosity. Among all other areas of the district, only the rural areas are showing a visible variation between males and females (males being 68.9 per cent, females being 36.6 per cent and overall 52.8 per cent). However, it is also to be noted that urban areas of the district have a male literacy rate as 60.6 per cent, female literacy rate as 70.8 per cent and overall literacy rate as 81 per cent. The Karanjia and Bajag blocks of the selected district reveal that the overall literacy rate is 56.3 per cent, female literacy rate is 40 per cent and male literacy rate is 72.5 per cent. The data also indicates that the gender parity among the ST children in Dindori district is 31.7 per cent. The data also reveals that the gender literacy gap in rural areas

is 32.2 per cent and 19.8 per cent in urban areas. It has also recorded that 32.5 per cent of gender literacy gap is found in Karanjia and Bajag Blocks of the District (Census of India, 2011).

Bajag and Karanjiya have fewer girls than boys enrolled—about 48 per cent, but girls make up 52 per cent of those enrolled in Dindori. Further, percentages of girls amongst those never enrolled in the three clusters are 57 per cent in Bajag, 47 per cent in Karanjiya and 54 per cent in Dindori. These percentages are less than the national level; nevertheless, these are worrisome figures. Girls from poor, SC, ST and Muslim communities tend to be more disadvantaged than their male counterparts, and a larger proportion of girls than boys from these groups are denied access to schooling.

## Government Initiative

A number of schemes and programmes have been initiated or implemented, such as schemes of incentives, financial assistance, establishment of ashram schools, establishment of hostels for boys and girls. For the promotion of education among tribals, the government provides scholarships, coaching and allied schemes for the Scheduled Castes and Scheduled Tribes. The government has also established schools in some tribal areas. The students belonging to Scheduled Tribes are getting various concessions such as free tuition, stipends, scholarships, free

supply of textbooks, stationery and other equipments. Pre-examination training centres are established in some places to help them to appear for competitive examinations. In many tribal areas, mid-day meals are also supplied to generate interest for education among tribal children. For the Scheduled Tribes and also Scheduled Castes, 20 per cent of seats are reserved in technical education and relaxation is made in respect of age limit and qualifying marks (Rao 1995). In addition to this, the government also gives aid to voluntary organisations involved in the promotion of education among tribals. There are some ashram schools situated in study areas which provide both basic education and vocational training. In fact, ashram schools are greatly beneficial, especially, for the girl child. These are essentially residential schools with free boarding and lodging available to the pupil. In such residential schools, besides study, there is training in various crafts such as weaving, smithy, carpentry, tailoring, etc. As most of the tribes are poor, offer of free boarding and lodging along with training in various crafts attracts most of the tribes. Ashram schools have contributed to increase in the the attendance, reduction in the number of dropouts and ultimately increase in the literacy rate. Vocational training in various allied activities, helps in making girls self sufficient and self reliant. Ashram schools, besides other things, offer

a good environment for study and produced good results, better than ordinary primary schools. Apart from this, various state governments have also taken various steps to meet the educational development of tribal women and the tribal girl child.

In the survey areas, it is observed that only 47 per cent of the respondents are of the opinion that tribal families and girls are getting proper benefit from different govt., awareness programmes regarding education. Accordingly, they have changed their mind-set. The remaining 53 per cent of the respondents are of the opinion that there is a need for more number of awareness programmes with proper advertisement so the benefits can reach their district. This indicates that the govt., should take initiatives for the proper implementation of the programme. About 25 per cent of the respondents say that the stakeholders that is, know the up-to-date knowledge regarding facilities available for women education. However, the remaining 75 per cent of the respondents say, that the govt., should the still take initiatives for the proper advertisement and implementation of the ongoing programmes. Only 43 per cent respondents agree that parents have an idea about free education of girls in India. Whereas 57 per cent of the respondents said that the tribal society, has no awareness regarding this. As a result, they are not able to take the educational benefits of the govt. that is meant for them. About 18 per cent of the respondents agreed that the beneficiaries have the knowledge about different educational scholarships and fellowships meant for women for better research and education that are going on in India and in their district. It is clearly reflected that there is a lot of work needed by the concerned govt. for giving clarity to the tribal families and women about the different opportunities available in India, stated by 82 per cent of the teachers. So then, they can avail it. They may be interested for education but due to lack of knowledge of different facilities available for them, they may be not motivated for giving education to their girls. About 78 per cent of the teachers agreed that literacy programmes and different micro projects are not effective for tribal parents and girls organised by the government. On this point, it may be concluded that the programmes are running on paper only but it has no physical existence or output for which it is meant. There is a need to supplement this with many more meaningful, need-based activities for ensuring their participation in the field of education.

## SUGGESTIONS

It is now time to seriously tackle the problems of low literacy rate among tribal girls' in and resolve the menace through positive and effective means. Some of the recommendations in this regard can be attributed through the following points. Efforts in these

directions will be very helpful in organising the programme of tribal education as well as promoting economic and other aspects of tribal development. Similarly, a clear policy for language use in schools has to be developed. Research evidence suggests that significantly fewer students drop out of schools in which the language of tribal groups is used for instruction at the primary level. Development of primers in the tribal dialect involving content from the local context will go a long way in ensuring children's active participation in the learning process in school. While there is a general need for improvement in the physical facilities in all schools in remote tribal regions, change in perceptions and outlooks of teachers about tribal children is equally important. Teachers must be sensitised to the cultural and behavioural strengths of tribal children and motivated to do their best for them in schools. Incentives should be initiated to attract effective teachers to work in tribal schools and to retain them there. Only such motivated teachers are likely to generate interest among tribal children towards schools education by attempting to link the contents of the curriculum with the existing realities of tribal communities through the use of innovative technologies. No doubt, the government allocates a large amount of money to promote education in tribal areas; however, there are delays in the process of implementation and

in some cases corruption handicaps the programmes and objectives of universal education. Hence, attention should be given for the speedy execution of policies, strict implementation of existing anti-corruption laws and making tribal-specific laws to check corruption in the tribal areas.

## CONCLUSION

Education is the single most important means by which individuals and society can improve personal endowments, build capacity levels, overcome barriers, and expand opportunities for a sustained improvement in their well-being. It is not only applicable for boys but also for tribal girls. In the context of tribal girls' education, the findings are not a balance between boys and girls, the attitude of tribal families should modify positively and the government should take different steps that ensure a tribal girl's success in mainstream schools. The current policy framework of the participating states gives due emphasis to the medium of instruction in government schools in tribal areas and meeting the needs of sound education of tribal children in terms of the posting of teachers, development of textbooks and curricula, training of teachers, etc. Therefore, the paper recommends wide provision of girls' schools and school related infrastructure in Dindori district to ensure the attendance of teachers, special administrative and managerial

arrangements. The scheduled tribal children have poor ability with regard to concept acquisition and comprehension. Large scale failure of tribal children in general and their girl children, in particular, has been due to the learning difficulties and poor intellectual abilities. The display of poor performance of tribal girl children is mainly due to economic deprivation, malnutrition and low parental education and lack of early childhood care and proper environment as well as the lack of infrastructural facilities in the schools, poor motivation of teacher and lack of administrative responsibility. The disadvantage suffered by the tribal girl children is quite evident from the above analysis of this paper. A large number of tribal girl children still remain out-of-school. The estimates of enrolments and attendance give reasonably sound reasons to believe that stipulated targets may not be achieved in the near future and that the universalisation of tribal girls' education continues to remain a distant dream.

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# Gauging the Educational Potential of Feminist Inroads into Science

Deepika Bansal*

## Abstract

*Feminists have a number of distinct appraisals of and perspectives on science. Beginning with documenting the near absence of women from conventional histories of science, to casting doubt over popular perception that associates reason, mind and objectivity with the male, and emotion, body and subjectivity with the female, feminists have identified sciences as both a source and a locus of other kinds of gender inequalities. The impact of such critiques, however limited, on certain disciplines cannot be ignored and that paves the way for questioning the nature of science as it presents itself and for putting forth viable alternatives. This paper maps the journey of this kind of a scholarship and discusses what has been its impact on three disciplines of archaeology, evolutionary biology, and primatology, and explores the educational role such feminist ideas play.*

## A Short History of Feminist Science Studies

Feminist scholarship in any discipline is motivated by a commitment to overcoming subordination and devaluation of women. Since the early 1970s, research has been getting published that reinterprets and 'profoundly illuminates' women's actions and experiences in a patriarchal setting. It has helped expose distortions in the way of how women were represented in much social science research; insisting that patriarchal biases get reflected in the way questions were posed about women, and that there was an absence of concepts that adequately tapped women's experiences. The researchers called for a social science which was not merely a catalogue of the past and present conditions

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of women, was not just 'about' women, but was essentially 'for' them—a social science that did not exclude information about women but informed that knowledge with an intention to oppose various forms of patriarchy (Westkott, 1979).

Feminists turned their gaze onto science almost around the same time. Feminist reflection on the nature of science, stimulated and engulfed a scientist, 'deeply engaged' in her mathematical biology; and its urgency is best captured by her own words:

> Sometime in the mid-1970's overnight, as it were, another kind of question took precedence, upsetting my entire intellectual hierarchy: How much of the nature of science is bound up with the idea of masculinity, and what would it mean for science if it were otherwise? A lifelong training had labelled that question patently absurd; but once I actually heard it, I could not, either as a woman or as a scientist, any longer avoid it. (Keller, 1985, p. 3)

A stir in the minds of those who were involved in the conversations on gender, the *au courant* issue of the seventies, and 'knew something about the natural sciences' had been caused. It brought into view the hitherto hidden traditional naming of the scientific mind as masculine and the complementary naming of nature as woman. They began asking what these traditional and historical dichotomies meant and what their consequences were. The first book-length response was made by Carolyn Merchant in her work

called *The Death of Nature* in 1980, which according to historians marks the origin of feminist science studies (Schiebinger, 2003). Merchant focussed on the significance of the metaphor of nature as woman for science, for women, for nature and for capitalism (Keller, 1985). She argued that modern science could be characterised by its espousal of the mechanistic worldview which turned nature into a machine. And it was this particular intellectual orientation that allowed for new ways to see order in nature that fostered an attitude of control and domination towards both nature and women (Fehr, 2004).

Soon after this headstart, scholarship began pouring in that investigated different aspects of science and their relationship to women. One thriving strand of these critiques was an obvious and 'visible' issue of absence of women in natural sciences. Historians and other scholars of science have documented historical patterns of exclusion of women from the academies and other formal bodies of scientists. At the same time, they have recovered significant number of women who were ignored by conventional histories of science, thereby producing evidence for women's participation in the sciences, often in the face of stiff resistance (Kohlstedt and Longino, 1997).

Along with this, historians have also turned their attention to the personal and external circumstances that empowered these women, and to those factors that inhibited their

achievement in science. The ways in which women's public and private activities intersected and how for some women, family relations were the source of both support and constraints for their advancement in science have been documented too (Kohlstedt and Longino, 1997). Case studies, biographies, and comprehensive histories are some examples of such kinds of work, amongst which, those of Nobel Prize winner Barbara McClintock and of Rosalind Franklin have garnered some public attention as well.

This sort of historical research on women in science has helped establish that exclusion of women from natural sciences was not due to their inherent weakness or inferiority, as was claimed earlier. Studies on 18th and 19th century culture in Britain and France have elucidated how sciences came to take on a distinct masculine profile (Crasnow, 2015). Ann Shteir shows in her work how women gained considerable expertise as herbalists and horticulturists about 300 years ago in Britain (Shteir, 1997). But in due course of time, certain rules were instituted that circumscribed their participation in botanical science. Becoming a member of some professional organisation was an important aspect of those prescriptions, and those organisations gradually began to take on markedly masculine identities. Professional codes of ethics, particularly those involving competition and social behaviour, were the traditional, aristocratic codes of honour that got translated into professional lives of middle class peoples. As a result, these behavioural norms, along with established rules that determined who could be a member of certain medical and scientific societies, played an elusive but effective role in gendering certain (scientific) activities (Kohlstedt and Longino, 1997).

These inquiries into human actors and their contexts in science have been accompanied, and followed in some cases, by more general analyses of scientific work. The insight that unites different critiques of this latter kind is that science is a social, political, and more specifically, a gendered institution (Wylie, Okruhlik, Thielen-Wilson and Morton, 1989). Feminist scholars have exposed ways in which gender ideologies get incorporated and expressed while deciding on researchable topics and framing research questions. A key example comes from medical sciences wherein women (their ailments and bodies) were not regarded as subjects worth systematic investigations, and male bodies and disease profiles were taken as the norm for medical diagnosis and treatment. The drugs which were very confidently prescribed to women, were in fact, never tested for their efficacy on them as women were never included as human subjects for clinical testing and trials of drugs even up to early- to mid-1980s (Schiebinger, 2000). A well-organised women's movement was required in changing

the relationship that women had, both with their doctors and with their own bodies. Another striking example worth mentioning, comes from the field of research in contraception, in which much greater emphasis has always been on finding procedures and techniques that temporarily or permanently alter female reproductive abilities as opposed to males' (Bal, 2002). Bal reports that despite the fact that both male and female anatomy and physiology offer more or less similar number of ways to prevent fertilisation, more funding and hence, subsequent research has gone into devising strategies that control women's bodies.

A related area of work for scholars of science has been the study of gendered images and metaphors in scientific theorising about non-gendered subjects like the interactions between nucleus (controlling, central, active) and cytoplasm (submissive, peripheral-around the nucleus, passive) in the cell. As Kohlstedt and Longino put it.

> Feminist scholars have drawn attention to the ways in which cultural gender constructs are naturalised and the natural world sexually dichotomised by such linguistic practices. They have also shown how alternative theoretical accounts are marginalised or silenced by the salience of gender, with its attendant metaphors of domination and subordination, attack, and defeat. (Kohlstedt and Longino, 1997, p. 5)

The usage of phrases, and hence, the concepts, of attack and defeat abounds in chemistry wherever reaction mechanisms are discussed. 'Attack by the nucleophile', 'electrophilic effect is dominant in this step' are few instances to testify that use of such linguistic categories cuts across disciplinary boundaries indicating pervasiveness of a particular gender ideology.

Critiques of the kind mentioned up till here have been considered as methodologically and epistemically conservative, that is, all that they aim for, is to show masculine distortions, in the content of science, such as how males, females, sex, and sexual difference have been represented in contemporary scientific theories; how collection, organisation, and interpretation of data gets skewed by gender bias; how research priorities are decided and, what goes into determining the standards of good research. They make use of the established research tools of modern scientific disciplines to critique the same disciplines, and believe that their stricter and reflexive application would serve feminist ends. However, Crasnow (2015) contends that these small scale efforts have resulted in the generation of more deeply challenging questions as well. She states that 'framework assumptions like ontological commitments, explanatory repertoire, conventional categories of description and analysis' have indeed been affected by omission and distortion of women in different aspects of science. So, another thread of conceptual feminist inquiry

has looked into methodological and epistemological features of science. Questions like, how has gender affected our conceptions of knowledge; what does it mean to call one aspect of human experience male and another female, have been asked (Kohlstedt and Longino, 1997). Few scholars have also taken the issue to 'popular mythology that casts objectivity, reason, and mind as male, and subjectivity, feeling, and nature as female' (Keller, 1985, pp. 47–48).

In this division of emotional and intellectual labour, women have been the guarantors and protectors of the personal, the emotional, the particular, whereas science, the province par excellence of the impersonal, the rational, and the general has been the preserve of men.

The consequence of such a division is not simply the exclusion of women from the practice of science. That exclusion itself is a symptom of a wider and deeper rift between feminine and masculine, subjective and objective, indeed between love and power, a rending of the human fabric that affects all of us, as women and men, as members of a society, and even as scientists. (Keller, 1985, pp. 6–7)

Keller and other scholars have focussed explicitly on the language of scientific knowledge generation and communication. They claim how even the ubiquitous and seemingly harmless concept of 'laws of nature' are marked by its political and theological origins.

The philosophical distinction between descriptive and prescriptive laws is invoked to underline the neutrality of scientific description. But nonetheless, laws of nature, like laws of the state, are historically imposed from above and obeyed from below… The extreme case of the desire to turn observed regularity into law is of course the search for the one 'unified' law of nature that embodies all other laws, and that hence will be immune to revision; in Bacon's language, the 'summary law in which nature centres and which is subject and subordinate to God'. (Keller, 1985, p. 132)

She goes on to suggest that though the belief in the laws (or law) of nature is deeply ingrained, and hence seems irreplaceable, the concept of order is an apt alternative. It is wider than law and free from its coercive, hierarchical, and centralising assumptions. She is hopeful that an interest in order rather than law would entail a shift in the focus of scientific inquiry from 'the pursuit of the unified laws of nature to an interest in the multiple and varied kinds of order actually expressed in nature'. And such a shift would imply corresponding changes even in the role of a scientist. The scientist would not be the discoverer of authoritative and deterministic laws that govern the unfolding of a submissive and meek nature, rather the new 'order' would allow nature to be resourceful, generative, and more abundant; an active partner in a more reciprocal relation to the observer, thereby

marking a shift in the relationship of the knower and the known.

Other scholars have attempted to delineate what should be an appropriate feminist epistemological attitude (alternative in few cases) too. Sandra Harding (1989) has been championing the idea of a feminist standpoint on nature and redressing the absence of unique feminine values that should be a part of science. For her, science should be appropriated by each community as its own; should be free from its western, white, middle class origins and different ways of knowing and learning should become a part of what that science is. Others like Helen Longino (1989) have advocated for a kind of objectivity in science that is not the responsibility of individual scientists but of a community of scientists which would allow for a thorough scrutiny of assumptions and values in the knowledge being generated. As a corollary, such an arrangement must have practitioners from a different race, class, gender, in order to provide the lens of difference that would help filter the taken-for-granteds of a particular group.

Thus, we can acknowledge that over the past forty some years, a great deal of work has been done on women's exclusion from science, how gender has been one potent factor structuring scientific institutions and practices, and how gender hierarchies have shaped scientific priorities, theories, values and a good part of its philosophy. In areas like medical research, these critiques and the ever so strong women's movement have had profound effects in the United States of America the hub of feminist scholarship in the sciences (Subramaniam, 2009). There are regulations now from the apex funding body of research in medicine that mandates inclusion of women in clinical trials of drugs. Separate grants have been instituted to promote investigation of women specific diseases like breast cancer and female reproductive ailments. This approach has not only increased the number of women (of many backgrounds) in the medical sciences but has also brought significant improvement in U.S. biomedical research and healthcare (Schiebinger, 2003). Likewise, disciplines of 'pure science' have been influenced in varying degrees by the feminist appraisals. Those with humans as their objects of inquiry have been the target of most feminist scrutiny and hence, have incorporated insights offered to the largest extent (the social and human sciences). Next are those that inquire about other living organism-subjects that are projectively gendered, and quite expectedly, the physical or the 'hard' sciences have remained most impervious to feminist critiques.

In the next section, I discuss the impact that feminist science studies have been able to make in three different disciplines of science, namely archaeology, evolutionary biology, and primatology.

## IMPACT ON DIFFERENT DISCIPLINES

### Archaeology

Though the widespread view of archaeologists is that they dig in the ground for artefacts, some and not all of them indulge in this kind of work. Many studies surface evidence, pottery, paintings, and sculptures, and still others perform chemical studies of stone and clay objects and other geological source materials. A good number of archaeologists work in laboratories making and breaking pottery or studying pollen, bones, and seeds (Hays-Gilpin, 2000). Thus, it would be safe to say that most archaeology practiced is in the intellectual heritage that considers archaeology to be a scientific enterprise strongly linked to empirical phenomena (Conkey, 2003).

Establishment of 'scientificity' of the discipline would unsurprisingly be followed by a note on its male character. As Margaret Conkey, one of the foremost practitioners of the discipline, writes:

The practice of archaeological fieldwork has long been male dominated and much has been written about this with accompanying statistics to show how the 'big digs' have been primarily male led—'the practicing field archaeologist who himself conquers the landscape, brings home the goodies, and takes his data raw!'—and how males have received more funding for such excavation than have females. Not only has fieldwork, and excavation at that, been gendered male, doing excavation (as opposed to other kinds of research such as survey research or the analysis of museum collections) and having one's 'own site' have been privileged as central to the crucial emphasis on fieldwork, as to what defines a 'real' archaeologist. (Conkey, 2003, p. 868)

Not surprisingly then, one of the first and major concerns of feminist inspired archaeology has been to make the women of the past visible. This got accomplished only when archaeologists began to 'see' the androcentric currents in the accounts of the human past that had been prevailing. Motivated by a rejection of the equation of human behaviour with the behaviour of men, the primary task in this case was to identify and assert the presence and activities of women on prehistoric sites (Conkey and Gero, 1997). These studies gained their value from the recognition of female labour in a wide variety of activities, most of which were earlier considered as exclusive male domains. Evidence for the presence and active participation of women were found in the making of cave art, animal husbandry, and mortuary rituals at different sites all over the globe. Equally noteworthy is the increasing literature that takes a gender-sensitive approach to 'the sociology of the field'. A number of journal volumes and issues have dealt with the 'hidden voices' of practising archaeologists—women whose contributions were not

acknowledged or who were underappreciated (Conkey and Gero, 1997).

Another related, significant contribution has been that this interest in women and gender has led to innovations and new directions in research. The historical and traditional concern in archaeology has been research at the macro scale —'big systems' aspects of lives thousands of years ago such as trading networks, socio-political alliances, and demographic trends. But research into past situations where women were more likely to have been present is being done with more intensity, scrutiny and methodological innovation than before. More work at the 'microscale', at the level of the household or daily practices, structured space, local knowledge, and local production, for example, has been taken up with new vigour and success (Conkey, 2003). Highly sophisticated scientific techniques such as micromorphology (study of components, features of soil at microscopic level), bone chemical analysis of skeletal remains, advanced soil chemistry of deposits on house floors have been developed to infer microscale practices. Learning about detailed architectural histories that look at 'life-cycle' of a house or its structure not just in terms of a static form at any one time has been made possible only because of this increased attention to concerns of women and gender. In other words, another major contribution

of feminist inspired archaeologies has been to bring to fore a more explicit multiscalar archaeology (Conkey, 2003).

Another arena which has shed light not only on women and females but also on masculinity, males and varied ways of engendering in ancient societies is visual representations (art, imagery, iconography) in archaeology. Since women are more 'visible' owing to their depictions in murals, figurines and rock art, renewed interest and increasing sophistication in their study has promoted analyses of what these visual artefacts might mean. These analyses have drawn theoretical insights from topics as varied as art history and theories of representation, offering another instance of working with the feminist idea of bringing in multiple perspectives to construct knowledge (Conkey, 2003).

Also to feminism's credit are the efforts to try and understand the manifestations of concepts such as personhood, sexuality, homoeroticism, gendered statuses and symbolic capital in past human societies which may not have presented themselves as areas worth investigating earlier. For example, some archaeologists have scrutinised the sex-gender dichotomy. They call for decoupling the two in order to avoid ruling out all kinds of possibilities that prevailed in the past cultures. Gender, they assert, should be viewed as multidimensional and continuous; archaeologists, instead

of emphasising delineation of gender identities, should focus on individuals and their experiences (Kohlstedt and Longino, 1997).

Similar to this have been feminist interventions in archaeologists' use of visual images while presenting archaeological knowledge. As noted earlier, popular views of 'scenes of the past' majorly comprise men. Be it making tools or sculptures, the 'visual language of archaeology' such as maps, charts and artistic reconstructions of past scenes have been analysed to be not neutral, especially in regard to representations of males, females and gender. A 2013 study that analysed 204 images from 1936 to 2007 in a popular science magazine concluded that gender bias was pervasive and persistent in pictorial representations of the past (Solomento and Moss, 2013). They observe:

> That the scenes most frequently chosen for illustration—hunting, combat, construction, as well as the artists' close attention to male musculature, communicates that men's strength and men's work underwrite the division of tasks, and are responsible for human evolution and the making of civilisation... women's physiques were not emphasised, apart from their breasts... have no place in scenes demanding physical labour, but appear primarily in domestic and market scenes... (Solomento and Moss, 2013, p. 139)

The impact of scenes which convey that men were more responsible for creating our revered cultural artefacts,

effecting technological advances and governing civilisations has been legitimation of contemporary gender roles and other patriarchal notions of authority, hierarchy and value.

Feminists have also taken issue with heretofore assumeds and taken-for-granteds in archaeology, for example, categorisation of the human past periods by technologies or economies (for example, the Stone Age, the Iron Age, hunter gatherers, village agriculturalists); the centrality of tools and technologies in explaining our evolutionary success ('man the toolmaker'). These assumed centralities and objects of knowledge are being questioned in line with contemporary views on gender that accuse this fascination with tools and warfare as highly masculine. These feminists are trying to find out other factors and processes that must have happened over the course of human social and cultural life which will help bring alternative understanding of processes like establishment of social alliances and social relations of production, importance of gathering and hunting in primeval societies to the fore (Conkey, 2003).

## Evolutionary Biology

It is a subfield of biology that studies the evolutionary processes that produced the diversity of life on earth, starting from a single origin of all life. These processes include the descent of species, and the origin of new species. One of the most influential theories in the discipline

that attempts to explain causes and consequences of sexual behaviour is the Parental Investment Theory. Robert L. Trivers, in his landmark paper titled 'Parental Investment and Sexual Selection' in 1972, put forth his thesis on the relation between typical natures associated with the two sexes and (Darwinian) selection of traits, in evolutionary terms. This theory argues that the supposed natures of males and females originated in most sexual species with ancient selection pressures that favoured more parental care by mothers than by fathers, which in turn favoured discriminating, passive females and competitive, profligate, and aggressive males. The logic is based on the fact that females usually have more to lose than males through poor reproductive decisions, so that selection favoured careful, choosy females (Gowaty, 2003).

This theory also explained the Darwinian assertion that the dual mechanisms of male–male competition ('as the male is generally eager to pair with any female and competition among them is for the possession of the other sex') and female mate choice ('females tend to choose the most attractive partner') are the two most prevalent mechanisms of sexual selection (Fehr, 2011). The fact that females of 99 per cent or more of sexual species have bigger sex cells or gametes than males is consistent with the Parental Investment Theory— larger gamete size translates to more

investment, which has allowed it to achieve axiomatic status in disciplines like sociobiology and evolutionary psychology. Because of the tremendous intuitive appeal of the theory, it is an ubiquitous feature in elementary animal behaviour, behavioural ecology, and evolutionary ecology texts as well.

Patricia Adair Gowaty, feminist practitioner of evolutionary biology, alleges that perhaps it is this 'intuitive appeal' of this model that has prevented investigators to test how this theory is associated with sex roles in 'typical species'— species with mother-biased offspring care patterns or in which females invest more time, energy and resources in bringing up their children (Gowaty, 2003). Feminist biologists like Ruth Hubbard have expressed concerns over wholesale application of this model of sexual selection without empirically testing its underlying assumptions. She has also pointed out the close parallels of this Darwin inspired account of eager males competing with one another for access to reticent, choosy females with victorian gender values of the time (Fehr, 2011).

Parental Investment Theory has indeed been a flash point of controversy within and outside evolutionary biology. It has been accused of being just a story that reinforces the *status quo* notions about sex roles; notions that are often used to confine women to their 'natural' roles as mothers and

as subordinates to men. Some have also alleged that this model provides a basis for arguments that rape is 'natural', and is rather an evolutionary given. This model indeed spells doom for any critical feminist aims as, 'even with identical education for men and women and equal access to all professions, men are likely to maintain disproportionate representation in political life, business, and science' (Fehr, 2011).

Feminist critics have repeatedly questioned the Parental Investment Theory on the grounds that observation often fails to match the predictions made. Females have been found to be aggressive and enthusiastic about sex not only in species which have male biased parental investment (like seahorses and pipefish) but also in species with typical mother biased parental investment too. In addition to this, certain feminists have postulated that male manipulation of female behaviour, sexuality and reproduction related decisions may also cause restraining of female sexuality. It is argued, 'if female sexuality is biologically muted by ancient selection pressures, why must men and their families go to extreme lengths to control and contain it?' An evidence for this hypothesis was provided by a study on fruitflies that identified certain ejaculated peptides from males, the exposure to which decreased the lifespan of females. Thus, the male 'chemical weapons' have been shown to prove significant

for understanding the origin of female natures as well (Gowaty, 2003).

Apart from the presence of alternative theories that have tried to dissociate sex specific differences in reproductive success variance from universal sex roles, there have been attempts to test the Parental Investment Theory in other species of fruitfly than Drosophila *melanogaster*. In her paper, *'Sexual Natures: How Feminism Changed Evolutionary Biology'*, (2003), Patricia Adair Gowaty reports working with two different species of fruitflies— Drosophila *hydei* and Drosophila *pseudoobscura* in order to find experimental evidence against this model. The thorough scientist opines that ultimately it is the accumulation of data inconsistent with the current dominant hypotheses that changed science. She ended up finding results which were not consistent with those predicted by parental investment theory in D. *pseudoobscura*. She found that both females and males showed no difference in interest in mating or their 'basic nature.' In the other species, D. *hydei*, males showed statistically significant, higher interest in females than females in males. This observation, too, was in contrast with the predictions of the Parental Investment Theory for this particular species as the gamete sizes are comparable and so allegiance to PTI should have caused the males to be more discriminating and less aggressive.

## Primatology

Studies on primate societies like those of baboons, chimpanzees and other apes have been a cornerstone of most biology departments. Although primatology proper is the study of the behaviour, evolution and biology of primates in their own regard, the knowledge gleaned from such works has been used to draw conclusions about human behavioural evolution as well. Historically, the studies were done on savannah baboons which had social structures that seemed similar to humans. Echoing popular ideological currents, the knowledge generated was such that further 'naturalised' the promiscuous male, passive female stereotypes by providing evidence of such traits in our ancestral predecessors as well. But it was the entry of feminist women in the discipline that instigated, what Donna Haraway calls, a 'powerful methodological revolution'. She credits feminist primatologist Jeanne Altmann who developed a method called focal-animal sampling that undermined previous research that generated sexist accounts of leadership and control in baboons; her method enabled research on female primates and on novel topics such as mothering (Haraway, 1989). Significance of female bonding through matrilineal networks was studied and an analysis of female sexual assertiveness, female social strategies, female cognitive skills, and female competition was done. Conventional wisdom on baboons now recognises that females provide social stability, while males move from group to group (Schiebinger, 2000); and females actively solicit sexual favours from their male counterparts even when mating and collection of sperm for reproduction is not a real agenda. These changes in perspectives happened because a lot of female scientists were entering the profession of primatology and began paying attention to females (Fehr, 2011).

Here a reorientation of field observation practices brought into focus the central role played by females in primate societies, and the importance of 'tactics other than aggression (particularly those that rely on social finesse and the management of relationships),' making it clear that 'hierarchy may or may not have a place in primate society, but that males and females are equally capable of competition' (Strum and Fedigan, 2000; cited in Crasnow, 2015, section 3.1).

## A Word on Physics

It is a well acknowledged fact in feminist science circles that most work has been done on biology to the exclusion of all other sciences. In fact, many find it curious that despite the lack of attention to the physical sciences in feminist critiques, at the level of autobiography or experience, it is physics that gets 'over-represented' (Hammonds and Subramaniam, 2003).

Demography, quite overwhelmingly, seems to be the major feminist issue

relevant to physics. Near absence of women in this discipline that valorises abstract thought and imagination has been a concern ever since feminists steered their critiquing forces toward the natural sciences. It is a no-brainer that women are seriously under represented in physics. Although percentage total enrolment of women has grown from 10.9 per cent in 1950–1951 to a healthy 39.4 per cent in 2000–2001 in India. In 2000–2001, 39.4 per cent of all university science students were women (a slight increase over 37 per cent in 1995–1996), yet, the most serious problems for Indian women in the sciences, above all in physics, start at the post PhD level. The number of women faculty members in the physics departments of Indian universities and research institutes is found to be dismal, rarely crossing even 10 per cent. A survey of eight premier research institutes found 20 of the 245 physics faculty were women, while in the seven Indian Institutes of Technology 16 of 201 physics faculty were women. The universities fared little better: 11 university physics departments surveyed had only 30 women faculty members out of 258. In many cases, this fraction has remained roughly constant over more than a decade (Chandra, Godbole, Gupte, Mehta, Narsimhan, Rao, Sharma and Surya, 2009). The authors of this study provide several recommendations that aim to increase the participation of and retain more women in physics. They include measures such as forming support system for women, such as science camps for girls, for inclusion of underrepresented categories; offering incentives to institutions to hire women and make it possible for their spouses to work at the same place; making workplaces more amenable to women with household responsibilities by providing childcare facilities and flexitime and part time options.

## IMPLICATIONS FOR SCIENCE AND EDUCATION

There is evidence that working scientists either do not take feminist (or other sociological) criticisms of science seriously enough to influence their own work or they dismiss them as inconsequential and ill-founded. Even women scientists interpret these concerns as threatening beyond a certain point; they fear all their gains in science would be disregarded by focusing on their identity as a woman scientist or on their gender (Keller, 1993). Such perspectives stem from a lack of awareness of the concept of gender. Most people, scientists included, conflate gender with women, their concerns and challenges. But gender is a much larger category that encompasses men and women, their experiences and identities, the social and cultural division of labour and activities that produce their differential experiences, and the political and intellectual import of such categorisation.

Such an explication of the concept of gender shows a way forward on how to bring science, science education and feminist criticisms of science closer. Scientists spend nearly a decade of their adult lives in their scientific training, under which they acquire not only the most advanced knowledge of their fields, but the ways of thinking and reasoning about nature and their work, larger methodological and epistemological frameworks that guide their scientific contributions and constitute their worldviews. Expecting a thorough socialisation in a scientific culture to be changed by exposure to feminist ideas much later in their professional lives is a bit far-fetched if not completely untenable. And here comes the value of assimilating feminist perspectives of science with science education.

Research in the field of science education has established that nature of science instruction in schools ought to have an explicit character (McComas, Almazroa and Clough, 1998). Experiments in which students were expected to implicitly reach an understanding of how science proceeds did not show any positive gains in students' understanding of the nature of science issues. Given such a context, a categorical instruction and systematic exposure to feminist perspectives on science holds tremendous potential for improving not just science education but also the practice of science and the products that result from that

practice when students educated thus would go onto become scientists in the future.

We can appreciate from the foregoing discussion that over the four decades of feminist scholarship in the sciences, the internal logic of feminist criticism in the sciences has shifted along a spectrum from liberal to radical (Rolin, 2004). Early feminists were mostly concerned with the issue of fewer women in science, channelising their efforts to understand the particular institutional and social barriers to their participation and uncovering the forgotten contributions of women to science in the past. They examined the historical conditions in which science was institutionalised and the dynamics that led to women's and femininity's exclusion from what counted as science.

Gradually, feminist attention shifted to the 'scientific' or intellectual consequences of historical under-representation of women, and scholars began asking how that under-representation affected the choice of problems, how (inadvertent) bias crept into design of experiments, and interpretation of data and formulation of theories (Keller, 1985). This kind of knowledge also led to an examination of western philosophical structures that legitimated the kind of science produced, and was followed by an affirmation of the roles of philosophical ideas such as reductionism, atomism and

individualism played in forming the basic character of modern science.

We are aware of the many dangers that have befallen us due to this reductive and violent way of generating knowledge about the natural world. The issues are not just 'feminist' but concern the humankind on the whole. Destruction and eradication of forest cover that endangers survival of many bird and animal species, indiscriminate mining for natural resources that adversely affects populations of people around the world, development of monocultures and 'scientific forestry' which reduces plant varieties and thus, contributes to dangers of severe food shortage and disturbance of ecological balance, and increasing global warming that spells doom for the entire planet— the challenges that modern science has given rise to are immense.

I believe that weaving feminist appraisals of science in the teaching of science can serve as one corrective initiative. The preceding discussion on feminist impact on subjects of archaeology, evolutionary biology and primatology has tremendous educational value not just with respect to science, but also social sciences and the larger goals of education. A pervasive theme in feminist analysis of scientific knowledge involves a strong challenge to the masculine-feminine or male-female dichotomy and other oppositional pairings that structure our theoretical world such as reason-emotion, mind-matter, nurture-nature, objective-subjective and mind-body, among others, which map onto the male-female dichotomy directly. Acknowledging the constructed nature of this set of oppositions and the ways in which they serve sexist interpretation of the world can help weaken their power over us.

Feminist archaeologists have been warning their colleagues against superimposing present cultural categories on the narratives weaved about lives of antiquity. There have been studies that illustrate that roles in past societies were not as strictly divided as they are in the present day and age, that both men and women had access to exotic objects and sources of wealth. In fact, it has also been pointed out that wealth or control of material resources was not the sole source of power in those societies (Hays-Gilpin, 2000). Similar counsel has been provided by feminists in primatology. They are wary of capturing and confining the world of primates in concepts that structure human society and thus distort the knowledge that is generated about them.

Another serious issue raises itself when we look to nature for ways of organising our societies and social relations. Feminists have brought to our notice that once animal behaviour or behaviour of humans in prehistory is understood to follow gender norms of modern times, such instances are taken to establish the 'naturalness' of prevalent gender norms. As a result, scientific knowledge ends up

playing a role in the legitimisation of social inequalities. At the same time, emerging feminist scholarship has shown that gender is complicated and multifaceted. Taking it (gender and its complicatedness) into account makes a difference in how we interpret past ways of life and experiences.

Feminist contributions in the field of evolutionary biology have alerted us to the limitation of the scientific method to root out sexist and androcentric biases of the best of our theories. The intuitive appeal of parental investment theory which led to its uncritical acceptance by the scientific community challenges the objectivity and assumed neutrality of science. This can be used as an example to illustrate to students that adequate empirical tests are necessary to prove or disapprove a scientific theory despite its 'natural' appeal. Many a times, the best of scientific minds fall victims to the powerful forces of ideology which sneak into their scientific works.

Extending these criticisms can help teachers and students question other taken-for-granted dichotomies such as public-domestic and sacred-profane which structure the lives and experiences of men and women differently. Making space in our curriculum for a discussion on women from the past whose work was ignored or not duly acknowledged and highlighting the presence and value of women's work in scientific and other public activities are a few

steps towards reclaiming science for young girls and women. Such kinds of discussion have liberatory potential for both students and teachers. Becoming aware of the ways in which science both promotes and limits our thinking is valuable for any human being, and feminist critiques of science are a handy tool to achieve such an understanding.

## Conclusion

Feminists have a number of distinct perspectives on science. They have articulated positions that reveal a variety of gender-based forms of oppression that have characterised science since its ancient origins and its modern reincarnation. Feminist critiques have challenged the soundness of knowledge that is produced in scientific disciplines by exposing how gender ideologies of scientists had crept into different stages of their rational, objective scientific work—from selecting a portion of reality to study, to describing it in certain acceptable terms, to framing testable hypotheses, and to describing the evidence called on to support a particular hypothesis. An increasing feminist consciousness has resulted in increased instances of feminist research ethics being followed, such as democratising research, fostering views on nature from different vantage points, being open to continuous revision in theory, evidence, and interpretation, and favouring theories that do not mask complexity and heterogeneity.

Unfortunately, such revisions to scientific practices and knowledge are few and sporadic. At the same time, the conceptual and fundamental critiques have had the most profound effects on the disciplines which are labelled as 'soft' and in which women are present in comparable numbers to men—social and life sciences. Realising the analytical and political force of feminism requires that similar criticisms be directed against physical sciences too. Weaving feminist criticisms of science with current science education until we have a formal space in curriculum for them is a good strategy to remedy the situation.

The way forward from here seems to involve ourselves in the act of 'reconstruction' (Subramaniam, 2009). Armed with the knowledge of ways in which sexist and androcentric distortions occur in science, we, as actors in the field of (science) education, should make use of this knowledge to convey the truly human character of science to our students. Our pedagogies should incorporate feminist learnings. They should include methods and strategies such as peer instruction, just-in-time teaching, inquiry-based science and physics workshop that have been shown to attract girls and students from other marginalised backgrounds. We should bring to our classrooms the discussion that despite popular opinion, science is not a certain, absolute truth about the world. Scientific knowledge is generated by human actors in very human settings and thus is vulnerable to values scientists hold. But once we stay open to constructive criticism of our work from feminists or other social critics, we have the opportunity to reinvent and improve our own science and along with it our own society.

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# Education and Skill Development for Women Empowerment
## A Case Study of Two NGOs in New Delhi

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## Abstract

*Education is the key to the development of an individual and the society as a whole. It helps in creating a sense of achievement and awareness in an individual's life. Skill training is essential for acquiring new skills as well as improving existing ones. This article presents an empirical case study of two NGOs — Sulabh International and Vidya Foundation, both in New Delhi, with reference to their contribution to education and skill training of women beneficiaries. The objective of the study was to ascertain the significance of education level in skill training and women empowerment. The study showed that the education level of the beneficiaries does affect skill development, in terms of time taken to acquire the skills. The illiterate beneficiaries could also participate in the programme, but it took them a longer time to acquire the skills. The data shows that in Sulabh International and Vidya Foundation, there were illiterate and educated beneficiaries who had joined the skill training and development programme. Beneficiaries from both the NGOs had expressed their opinions on the importance of social and economic empowerment of women. As a result, the skill training programme has changed the outlook of the beneficiaries.*

## EDUCATION AND ITS IMPORTANCE

According to Delors' report (1996), education has a significant contribution to the progress of the individual as well as the society. It is the key to overcome problems of poverty, exclusion, ignorance, oppression and war. It helps in

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developing an individual's talents and makes them aware of their responsibilities. Education, in general, and mass literacy, in particular, is a key contributor to Human Resource Development. Education should not only be about acquiring knowledge, rather it should be related to the social and economic aspects of life. It needs to be related to skill learning and development which helps in the social and economic upliftment of the women in our society.

## SKILL DEVELOPMENT AND WOMEN EMPOWERMENT

With an increasing demand-supply gap in global competition, there is a need to ensure adequate supply of skills and their optimal utilisation. It has been noted that the world population is ageing fast, and India is at an advantageous position in this aspect. It has the youngest population in the world and has the potential to meet the skill requirements of other countries, apart from catering to its own demand of skilled manpower (Knowledge Paper 2011, p. 5). However, India needs to update its labour force, as it is largely encumbered with outdated skills that cannot meet the current and expected economic growth of the country. Skill development has been a major programme for the government since the Eleventh Five Year Plan (2007–2012). The Government of India has established the National Skill Development Corporation in the public-private partnership mode

to facilitate the setting up of large, high quality, non-profit vocational institutions (Knowledge Paper 2011).

The present government has laid great emphasis upon skill development, and they have named their project 'Make in India'. Through this project, the present government plans to meet the demand of 500 million skilled workers by 2022. Low educational level creates an obstacle for skill training. In India, a large portion of the population has a poor educational background, especially women who are engaged in the unorganised sector. Skill development is important for women as it would enable them to be socially and economically empowered.

Women empowerment is essential for the society as women are seen to be the primary guardians responsible for altering the quality and quantity of human resources available in a country to promote sustainable development in the coming generations. Studies have shown that development cannot take place unless gender inequalities are removed, and women are empowered to choose and decide for their own welfare (Gupta and Yesudian, 2006, p. 365).

As Narayan points out, the term "empowerment" means "expansion of freedom of choice and action to shape one's life. It implies the control over resources and decisions" (2005, p. 4). Education, employment, and media exposure are potential sources of women's empowerment that increase

women's access to and control over resources.

## About the Study

The present study was a case study of two NGOs in New Delhi conducted on education and skill development for women's empowerment. The main objective of the study was to determine the significance of education in skill training and women empowerment with reference to two NGOs, namely, Sulabh International and Vidya Foundation, located in New Delhi. These two NGOs were selected as they provide skill training programmes to women residing in slum areas.

For the study, women beneficiaries undergoing skill training, and those who had completed skill training programme provided by the respective NGOs were selected. The sample of the study was restricted to the skill of cutting and tailoring. Hundred beneficiaries each, from two NGOs working in skill training were interviewed. Twenty beneficiaries were enrolled in the programme at the time of the interview, whereas eighty beneficiaries had successfully completed the programme. The time period undertaken for research was ten years, that is, from 2005–2015.

## Sulabh International: A Case Study

Sulabh International Social Service Organisation is a non-profit voluntary social organisation. It was founded by Bindeshwar Pathak in 1970. The NGO has been involved with the slums for 18–20 years. The major activities undertaken by the NGO are education, empowerment of women and sanitation. The educational qualification of beneficiaries who underwent skill development programme under the period of study are as under.

It is interesting to observe that 63 per cent of the beneficiaries had completed primary education, followed

**Table 1**
**Educational Qualification of Beneficiaries**

| Educational Qualification | Per cent |
|---|---|
| Illiterate | 8 |
| Primary Education | 63 |
| Secondary Education | 25 |
| Graduation | 4 |
| **Total** | **100** |

by 25 per cent who had completed their secondary education. To quote a beneficiary who had completed secondary education, "I was not able to complete my education as my parents did not have money for my education and I had to help them in domestic duties." It is quite conflicting to see that 8 per cent of the beneficiaries were illiterate, whereas, four per cent were graduates. This shows that the need for skill development, both for illiterate and educated women are alike. After observing the educational qualifications of the beneficiaries, the researcher looked into the employment status of the beneficiaries.

It may be noted that 33 per cent of the beneficiaries were employed in

### Table 2
### Employment Status of Beneficiaries

| Employment Status | Per cent |
|---|---|
| Government Service | 1 |
| Private Service | 18 |
| Business | 33 |
| Unemployed | 48 |
| **Total** | **100** |

business, that is, they had opened their own boutiques or small tailoring shops to cater to the demands of the people. As many as 48 per cent beneficiaries were unemployed, most of them were still undergoing the skill training programme provided by the NGO. This sub-group was inclusive of those who had remained unemployed even after successfully completing the training programme due to some

reason like lack of interest, lack of funds and no family support.

Hence, we can say that a majority (52 per cent) of the beneficiaries were successful in getting employed after successful completion of the skill at-home training programme. Even those who did not venture out in pursuit of extra income were using their skills at home to save money, which otherwise they would have to spend for getting their own and family members clothes tailored. After examining the employment status of the beneficiaries, the researcher studied the family income of the beneficiaries, before and after, the skill training programme.

Tables 3 and 4 compare the family income of the beneficiaries and their employment status before and after joining the skill training

### Table 3
### Family Income Skill Training Programme vs. Employment Status of Beneficiary (Before)

| Before the Skill Training Programme | Employment Status of Beneficiary | | | | Total |
|---|---|---|---|---|---|
| | Government Service | Private Service | Business | Unemployed | |
| Less than 10,000 | 1 1.0% | 10 10.0% | 25 25.0% | 41 41.0% | 77 77.0% |
| 10,000–20,000 | 0 0.0% | 8 8.0% | 8 8.0% | 5 5.0% | 21 21.0% |
| More than 20,000 | 0 0.0% | 0 0.0% | 0 0.0% | 2 2.0% | 2 2.0% |
| **Total** | **1 1.0%** | **18 18.0%** | **33 33.0%** | **48 48.0%** | **100 100.0%** |

**Table 4**
**Family Income Skill Training Programme vs. Employment Status of Beneficiary (After)**

| After the Skill Training Programme | Employment Status of Beneficiary | | | | Total |
|---|---|---|---|---|---|
| | *Government Service* | *Private Service* | *Business* | *Unemployed* | |
| Less than 10,000 | 1<br>1.2% | 4<br>5.0% | 13<br>16.2% | 20<br>25.0% | 38<br>47.5% |
| 10,000–20,000 | 0<br>0.0% | 11<br>13.8% | 19<br>23.8% | 7<br>8.8% | 37<br>46.2% |
| More than 20,000 | 0<br>0.0% | 3<br>3.8% | 1<br>1.2% | 1<br>1.2% | 5<br>6.2% |
| **Total** | **1**<br>**1.2%** | **18**<br>**22.5%** | **33**<br>**41.2%** | **28**<br>**35.0%** | **80***<br>**100.0%** |

*Note: 20 per cent beneficiaries were not taken as they were currently enrolled in the skill training programme

programme in the NGO. The data is collected from the beneficiaries who have already completed the skill training programme and those who are undergoing the skill training programme. Therefore, a period of 10 years (2005–2015) was taken in the study to see whether the skill training programme has helped them economically. It is a longitudinal study. In Table 4, 20 per cent of the beneficiaries were not taken into consideration as they were undergoing skill training. If we analyse the data, we can see that economically the beneficiaries are earning better when compared to before they joined the skill training programme. Amongst those who are undergoing skill training programme, their economic condition was not good

and they wanted to improve it so they joined the skill training programme.

With reference to the employment status, the tables show that amongst those who have already completed the skill training programme, they are economically well off which provides motivation to others from their area to join the skill training programme. There are less beneficiaries in the lower income group and most of them have improved their economic conditions. This proves that the skill training programme provided by the NGO is empowering the beneficiaries economically.

It may be noticed that 41 per cent of the beneficiaries who were unemployed had a monthly family income of less than ₹ 10,000 (Table 2). It remains to be seen why

the beneficiaries in the first category could not convert their training into job prospects.

After analysing Tables 3 and 4, it can be concluded that the skill training programme did help the beneficiaries financially. Seventy-seven per cent of the beneficiaries came in the monthly family income bracket of less than ₹10,000 before joining the skill training programme, but this figure decreased to around 48 per cent after completion of the programme. Also, there was an increase in the ₹10,000–20,000 monthly family income band before and after the skill training programme. Likewise, there was an increase in the percentage of beneficiaries in the monthly family income band of more than ₹20,000.

The skill training programme benefitted the beneficiaries in terms of employment. It can be observed that 48 per cent beneficiaries were unemployed before the skill training programme. However, after completing the skill training programme, only 35 per cent remained unemployed. This may be due to the interaction between the beneficiaries who had previously completed the programme and given a positive feedback to the others. To quote a beneficiary who started her own business after the skill training programme, "I was unemployed before joining this skill training programme. During the skill training programme, I got in touch with some of the ladies from the previous batch, who gave me the idea to do my own business after this skill training programme. I have opened my own shop and I am earning well." Among those that remained unemployed, reasons other than those relevant to this study were, for instance, work pressure at home, discouragement from family members, and lack of personal interest. Thus, we may conclude that the skill training programme did indeed benefit the beneficiaries in securing a job and financially uplifting them. After examining the employment status of the beneficiaries and their family income, there was a need to study the educational qualification of the beneficiaries and their status before and after the skill training programme.

**Table 5**
**Educational Qualification vs. Status Skill Training (Before)**

| Educational Qualification | Status before Joining the Skill Training Programme | | | Total |
| --- | --- | --- | --- | --- |
| | Wasting time at home | No thoughts | Because of my children | |
| Illiterate | 4<br>4.0% | 3<br>3.0% | 1<br>1.0% | 8<br>8.1% |
| Primary Education | 25<br>25.3% | 27<br>27.3% | 10<br>10.1% | 62<br>62.6% |

| | | | | |
|---|---|---|---|---|
| Secondary Education | 12<br>12.1% | 8<br>8.1% | 5<br>5.1% | 25<br>25.3% |
| Graduation | 1<br>1.0% | 0<br>0.0% | 3<br>3.0% | 4<br>4.0% |
| **Total** | **42**<br>**42.4%** | **38**<br>**38.4%** | **19**<br>**19.2%** | **99***<br>**100.0%** |

**Table 6**
**Educational Qualification vs. Status Skill Training (After)**

| Educational Qualification | Status after Joining the Skill Training Programme | | | Total |
|---|---|---|---|---|
| | *Became confident* | *Improved economic conditions* | *Want to study and work* | |
| Illiterate | 0<br>0.0% | 4<br>4.0% | 4<br>4.0% | 8<br>8.1% |
| Primary Education | 14<br>14.1% | 34<br>34.3% | 14<br>14.1% | 62<br>62.6% |
| Secondary Education | 5<br>5.1% | 11<br>11.1% | 9<br>9.1% | 25<br>25.3% |
| Graduation | 1<br>1.0% | 2<br>2.0% | 1<br>1.0% | 4<br>4.0% |
| **Total** | **20**<br>**20.2%** | **51**<br>**51.5%** | **28**<br>**28.3%** | **99***<br>**100.0%** |

*Note: A sample of 100 was taken of which one beneficiary did not give any opinion.*

It can be noticed in Table 5 that only 4 per cent of the illiterate beneficiaries were not involved in any paid work and they were performing their household chores before they joined the skill training programme. One per cent beneficiaries wanted to utilise their time as their children were still young. To quote a beneficiary, "I wanted to join the skill training programme because I wanted to uplift myself in this society. People often look down upon you when you are not educated or working. This may help in some improvement of my status in my society."

In the primary school educated beneficiaries, about 25 per cent were of the view that they were wasting their time at home and this training could come in handy in the future. There were still about 10 per cent beneficiaries who wanted to do something to add to their family income as they had children, whom they wanted to bring up in an economically better environment Table 5.

Likewise, amongst the secondary school educated, there were about 12 per cent beneficiaries who were of the view that they were doing unpaid work at home. To quote a beneficiary, "Education is the foundation for any job. I wanted to do something which will help in my social and economic upliftment in the society." They were followed by about 8 per cent beneficiaries who did not have any particular reason to join the skill training programme.

Significantly, amongst those who had done graduation, there were 3 per cent of the beneficiaries who wanted to be financially better as they had young children.

Among the illiterate beneficiaries (Table 6), an equal percentage came to improve their economic conditions and had the desire to study and work. It can be seen that the education level of the beneficiaries does affect skill development, in terms of time taken to acquire the skills. The illiterate beneficiaries could also participate in the programme, but it took them a longer time to acquire the skills. To quote a beneficiary, "Having a good social and economic standing would be really good. But, I am taking longer to complete this skill programme. This is a very good medium through which women like us can actually uplift themselves. Education should not be an obstacle."

Hence, by the above tables, we can state that there were about 19 per cent who wanted to give better standard of living to their children who had joined the skill training programme. But after the programme, about 52 per cent wanted to improve their economic condition and about 28 per cent who wanted to study and work. There were about 20 per cent who became confident during their skill training. As a result, the skill training programme has changed the outlook of the beneficiaries.

## VIDYA FOUNDATION: A CASE STUDY

Vidya Foundation was founded by Rashmi Misra in 1985. The NGO is a charitable organisation which specialises in education and empowerment of underprivileged children, youth and women by working with them at an individual level. The educational qualifications of the beneficiaries are portrayed in the following table.

**Table 7**
**Educational Qualification of Beneficiaries**

| Educational Qualification | Per cent |
|---|---|
| Illiterate | 3 |
| Primary Education | 47 |
| Secondary Education | 48 |
| Graduation | 2 |
| **Total** | **100** |

It can be comprehended that 48 per cent of the beneficiaries had completed secondary education, and approximately about an equal percentage (47 per cent) had

completed their primary education. Three per cent of the beneficiaries were illiterate, while, 2 per cent were graduates. To quote a beneficiary who was a graduate, "for my parents, their children going to school and studying was very important. They wanted their children to lead a better standard of life than themselves. These days education is very important for getting a good job." After studying the educational qualification of the beneficiaries, there is a need to see the employment status of the beneficiaries.

**Table 8**
**Employment Status of Beneficiaries**

| Employment Status | Per cent |
|---|---|
| Government Service | 5 |
| Private Service | 19 |
| Business | 35 |
| Unemployed | 41 |
| **Total** | **100** |

It can be grasped that 35 per cent of the beneficiaries were employed in their own business, that is, they had opened their own boutiques or small tailoring shops. Forty one percent beneficiaries were unemployed. It included those who were still undergoing the skill training programme provided by the NGO, and those who had remained unemployed after successfully completing the training programme due to some reason. After observing the educational qualification and employment status of the beneficiaries, the researcher found a need to examine the employment status and the family income before and after the skill training programme.

Tables 9 and 10 examine the family income of the beneficiaries and their employment status before and after joining the skill training programme in the NGO. The data is collected from the beneficiaries who had already completed the skill

**Table 9**
**Family Income before Skill Training Programme vs. Employment Status of Beneficiary**

| Before Skill Training Programme | Employment Status of Beneficiary | | | | Total |
|---|---|---|---|---|---|
| | Government Service | Private Service | Business | Unemployed | |
| Less than 10,000 | 1 1.0% | 11 11.0% | 13 13.0% | 35 35.0% | 60 60.0% |
| 10,000–20,000 | 4 4.0% | 8 8.0% | 20 20.0% | 6 6.0% | 38 38.0% |
| More than 20,000 | 0 0.0% | 0 0.0% | 2 2.0% | 0 0.0% | 2 2.0% |
| **Total** | **5 5.0%** | **19 19.0%** | **35 35.0%** | **41 41.0%** | **100 100.0%** |

**Table 10**
**Family Income after Skill Training Programme vs. Employment Status of Beneficiary**

| After Skill Training Programme | Employment Status of Beneficiary | | | | Total |
|---|---|---|---|---|---|
| | *Government service* | *Private service* | *Business* | *Unemployed* | |
| Less than 10,000 | 0<br>0.0% | 1<br>1.2% | 0<br>0.0% | 21<br>26.2% | 22<br>27.5% |
| 10,000–20,000 | 3<br>3.8% | 13<br>16.2% | 26<br>32.5% | 4<br>5.0% | 46<br>57.5% |
| More than 20,000 | 2<br>2.5% | 2<br>2.5% | 8<br>10.0% | 0<br>0.0% | 12<br>15.0% |
| **Total** | **5**<br>**6.2%** | **16**<br>**20.0%** | **34**<br>**42.5%** | **25**<br>**31.2%** | **80***<br>**100.0%** |

*Note: 20 per cent beneficiaries were not taken as they were currently enrolled in the skill training programme*

training programme and those who are undergoing the skill training programme. For an effective study, a period of 10 years (2005–2015) was taken into consideration to see whether the skill training programme has economically helped them. It is a longitudinal study. In Table 10, 20 per cent of the beneficiaries were not taken into consideration as they were undergoing skill training. If we analyse the data, we can see that economically, the beneficiaries are earning better when compared to before they joined the skill training programme. Amongst those who are undergoing skill training, their economic condition was not good and they wanted to improve it so they joined the programme.

With reference to employment status, the tables show that amongst those who have already completed the skill training programme, they are economically, well off which inspires to others to join the skill training programme. There are few beneficiaries in the lower income group and most of them have improved their economic conditions. This establishes the point that the programme provided by the NGO is empowering the beneficiaries economically.

It can be observed (Table 9) that about 35 per cent of the unemployed beneficiaries had a monthly family income of less than ₹ 10,000. This was followed by around 13 per cent who were employed in their own business but were in this income band.

Four percent beneficiaries were employed in government service with a monthly family income be tween ₹10,000–20,000. Twenty per cent of the beneficiaries had their own business in this income band. It is interesting to note that 2 per cent beneficiaries employed in business

had their monthly family income above ₹ 20,000.

Table 10 shows that around 33 per cent of the beneficiaries with a monthly family income between ₹10,000–20,000 were employed in business. Likewise, about 16 per cent beneficiaries were employed in the private sector with a monthly family income between ₹10,000–20,000. Around 4 per cent of the beneficiaries were employed in government service.

Based on Tables 9 and 10, we can conclude that the skill training programme has financially helped the beneficiaries. It can be noted that the monthly family income increased after beneficiaries joined the skill training programme in the NGO and they enjoyed greater success in the business they had started. To quote a beneficiary, "I have started my business a few years back. I am very happy with the business that I have started. I have become popular, and I get many orders. I am able to save for my children's education." However, about 31 per cent of the beneficiaries remained unemployed. It can be seen that education level of the beneficiaries does affect skill development, in terms of time taken to acquire the skills. The illiterate beneficiaries could also participate in the programme, but it took them a longer time to acquire the skills. To quote a beneficiary, "I feel that some illiterate people would take longer time to complete this programme when compared to educated people. I am taking a longer time. I have taken two months more

than others." The Tables 9 and 10 also reveal that the skill training programme benefitted the beneficiaries in terms of employment. It can be perceived that 41 per cent of the beneficiaries were unemployed before the skill training programme, but, post completion, only about 31 per cent remained unemployed. There may be several reasons for this, including lack of interest in working, absence of encouragement from immediate family, pressure of household responsibilities, and so on. This could be attributed to the interaction between those beneficiaries who had previously completed the programme, and then motivated the next batch to take up work to increase their family income. To quote a beneficiary, "I was unemployed before joining this skill training programme. Then my family members wanted me to use the skill I had learned to earn money. So, I have opened my own shop and I am earning well." Tables 11 and 12 examine the educational qualification of the beneficiaries and their status before and after the skill training programme.

It can be grasped from Table 11 that 2 per cent of the illiterate beneficiaries were involved in unpaid work before they joined the skill training programme. To quote a beneficiary, "One should have a respectable status in the society. Being uneducated is already looked down upon. So, I thought of earning, which will help in uplifting myself

## Table 11
## Educational Qualification vs. Status Before Skill Training Programme

| Educational Qualification | Status before Joining the Skill Training Programme | | | Total |
| --- | --- | --- | --- | --- |
| | *Wasting time at home* | *Children a source of motivation to learn* | *No thoughts* | |
| Illiterate | 2<br>2.0% | 0<br>0.0% | 1<br>1.0% | 3<br>3.0% |
| Primary Education | 39<br>39.0% | 3<br>3.0% | 5<br>5.0% | 47<br>47.0% |
| Secondary Education | 40<br>40.0% | 3<br>3.0% | 5<br>5.0% | 48<br>48.0% |
| Graduation | 0<br>0.0% | 1<br>1.0% | 1<br>1.0% | 2<br>2.0% |
| **Total** | **81**<br>**81.0%** | **7**<br>**7.0%** | **12**<br>**12.0%** | **100**<br>**100.0%** |

## Table 12
## Educational Qualification vs. Status After Skill Training Programme

| Educational Qualification | Status after Joining the Skill Training Programme | | Total (I+II) |
| --- | --- | --- | --- |
| | *Confident to earn (I)* | *Want to study and work (II)* | |
| Illiterate | 3<br>3.0% | 0<br>0.0% | 3<br>3.0% |
| Primary Education | 44<br>44.0% | 3<br>3.0% | 47<br>47.0% |
| Secondary Education | 44<br>44.0% | 4<br>4.0% | 48<br>48.0% |
| Graduation | 2<br>2.0% | 0<br>0.0% | 2<br>2.0% |
| **Total** | **93**<br>**93.0%** | **7**<br>**7.0%** | **100**<br>**100.0%** |

socially and economically." And after joining (Table 12), 3 per cent became confident to earn their living.

Similarly, amid the secondary school educated, there were 40 per cent beneficiaries who were of the view that they would not be doing household activity thereafter. To quote a beneficiary, "Doing nothing at home is very unproductive. While you

are studying or working, people have respect for you. These things make one empowered." There were 44 per cent beneficiaries after joining (Table 12) who became confident to earn their living. Interestingly, with those who had done graduation, there were 1 per cent of the beneficiaries who wanted to do something as they had young children with them.

In Table 12, it can be noticed that there is an almost equal percentage of illiterate and graduate beneficiaries (3 per cent). They had aimed to improve their economic conditions after they had joined the skill training programme provided by the NGO. One illiterate beneficiary was of the opinion that, "It is very interesting to learn these skills. It helps you to learn the skills which will help in social and economic upliftment. It also makes you confident in life."

As can be seen from Tables 11 and 12, we can articulate that there were 93 per cent beneficiaries who wanted to improve their economic conditions and 7 per cent who wanted to study further and work after their skill training. The skill training programme has changed the outlook of the beneficiaries, by making them more confident to take up a job and earn to increase the family income, no matter what their educational qualification were.

## Conclusion

Skill development is within the broader context of the educational policy. For the development process, it is important to provide skill education, so that, the adults can improve upon their skills in their profession.

Sulabh International when compared with Vidya Foundation, had more illiterate beneficiaries who had their family income as less than ₹ 10,000 and there was maximum percentage shift from the income band of less than ₹ 10,000 to the family income band of ₹ 10,000–20,000. Also, there were more beneficiaries (81 per cent) in Vidya when compared to Sulabh International (42 per cent) who thought that they were wasting their time at home before they joined the NGO's programme. On the same lines, in Sulabh International, there were about 20 per cent beneficiaries who became confident to earn while undergoing skill training and development. But, there were 93 per cent beneficiaries from Vidya Foundation who gained confidence to earn during the skill training programme. Thus, beneficiaries from Vidya Foundation were becoming more confident to earn and therefore, improve their status in the society.

The data shows that in Sulabh International and Vidya Foundation, there were illiterate and educated beneficiaries who had joined the skill training and development programme. Beneficiaries from both the NGOs had expressed their opinion on the importance of social and economic empowerment of women. About 85 per cent of the

beneficiaries were unemployed before they joined the skill training programme with monthly family income being less than ₹10,000. This was the main reason that the beneficiaries had opted for the skill training programme, that is, cutting and tailoring provided by the NGO. They wanted to improve the financial conditions of their family, and provide quality education to their children. Most of the beneficiaries have been successful in improving their family's financial conditions. However, there are a few beneficiaries who are either housewives or unemployed for which there may be associated reasons.

Also, the beneficiaries from both the NGOs had improved their status (from before to after) through the skill training programme. The analysis shows that both NGOs have worked for women empowerment (social and economic) through skill development.

Throughout the article, it may be observed that beneficiaries do accept the critical role that education plays in their lives. Thus, we can say that the skill training programme provided by the NGOs to the beneficiaries has been successful and effective in financially and socially empowering the women of the slums.

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# Why is it Difficult to Understand Fractions?

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## Abstract

*Fractions, decimals and percentage are among such topics which are taught in the schools during the initial years of learning mathematics. However, due to poor conceptualisation, the students often find it difficult to understand these topics and a perception starts to grow among the children that mathematics is a difficult subject to study and everyone cannot learn it.*

*The present paper is intended to find out the reasons which make it difficult to understand fractions, be it the inherent nature of fractions or the methods generally used to teach fractions or the psychological reasons related to cognition of the children. The paper discusses the reasons behind difficulties in teaching and learning of fractions, which may give an insight to the teachers about these difficulties from the point of view of the beginners so that they can prepare accordingly to deliver lessons on fractions.*

## Introduction

Fractions play a key role in the learning of mathematics. These are widely used not only in mathematics but also in economics, engineering, physics, chemistry, biology, medical science and other academic offshoots. Fractions are among the topics taught in school during the initial years of learning mathematics. Nevertheless, due to non-clarity of conceptions, students often wrongly perceive mathematics to be a difficult subject. Infact, the students, for a variety of reasons, are not able to understand fractions properly. As a result, due to poor conceptualisation, children cannot solve the basic problems related to fractions. For example, on a national test, only 50 per cent of American

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eighth graders correctly ordered three fractions from the smallest to the largest (see National Council of Teachers of Mathematics, 2007). Even in countries where the majority of students do achieve reasonably good conceptual understanding, such as Japan and China, fractions are considered a difficult topic (Fazio and Siegler, 2011).

Fractions are widely recognised as a very important topic in mathematics which is difficult to teach for the teachers and difficult to understand for the children as well. Teaching of fractions poses a significant challenge for the teachers to present it in such a way that can be adapted easily by the children. It has been found that the understanding and conceptualisation of fractions is weak among children of all age groups around the globe, which creates difficulty for them in learning fractions and they often remain confused (Armstrong and Larson, 1995; Behr, Lesh, Post and Silver, 1983; Clarke and Roche, 2010; Condon and Hilton, 1999; Erlwanger, 1973; Empson and Levi, 2011; Kamii and Clark, 1995; Mack, 1990; Ma, 1999; Moss and Case, 1999; Orpwood, Schollen, Leek, Marinelli-Henriques and Assiri, 2012; Post, Cramer, Lesh, Harel, and Behr, 1993; Perle, Moran and Lutkus, 2005; Stigler, Givvin and Thompson, 2010). The present paper is intended to find out the factors which make the learning of difficult fractions.

## VARIOUS ASPECTS IN TEACHING OF FRACTIONS VIS-À-VIS THE DIFFICULTIES IN UNDERSTANDING AND CONCEPTUALISATION

### The Part-whole Concept

Fractions are normally introduced as 'part-whole' with the help of a circle, a square, a pizza or a bread, by dividing it into 2 or 4 equal parts to introduce the concept of $\frac{1}{2}$ or $\frac{1}{4}$ and so on. Following the similar practice with other geometric figures, the concept of $\frac{1}{3}, \frac{1}{5}, \frac{1}{7}$, etc., is provided to the learners. In all such fractions, the numerator is initially kept as 1. Then the concept of the fractions like $\frac{2}{5}, \frac{5}{7}, \ldots$ are given to the learners in which numerator is some number other than 1. Thereafter, the concept is generalised and fractions are introduced in the form $\frac{x}{y}$, where $x$ and $y$ are two whole numbers, $x$ is called the numerator and y, the denominator.

The part-whole concept, on its own, is not a sufficient foundation for conceptual understanding of fractions (Clarke et al., 2011). It does not work in case of fractions having value greater than 1. Also, it is not possible to explain the basic algebraic operations on fractions on the basis of the part-whole concept. Sometimes, $\frac{x}{y}$ is taught as 'x out of y', the students are asked to divide a geometrical shape into y number of equal parts

and then to choose $x$ number of parts out of it to understand the meaning of $\frac{x}{y}$. However, it is always not easy for the learners to divide a geometric shape into equal parts and the exercise of equal division draws a considerable amount of attention. For example, in case of a circle, it is not easy to divide it into 5 or 7 equal parts and accordingly, it is not easy to explain the fractions like $\frac{2}{5}, \frac{1}{7}, \frac{3}{7}$ using a circle. Another problem is that the method is not able to explain improper fractions like $\frac{9}{7}$, '9 parts out of 7 equal parts'.

## Fractions are Generally not Introduced in a Natural Way

Unfortunately, under the procedure generally adopted by the teachers, the introduction of fraction does not come in a natural way for the beginners. For the learners, fraction becomes entirely a new aspect which is normally taught to them without associating it with their previous knowledge and without telling them the genesis behind introducing fractions. The mathematics of early years is confined to learning of numbers only. Whole numbers, natural numbers, integers, their magnitudes, position of numbers in the number line, arranging numbers in ascending and descending orders are among the basic problems which are part of mathematics during initial few years of learning.

It may, therefore, be in the interest of the learning of the children if introduction of fractions is connected to the number knowledge achieved by them. However, normally it does not happen. Often the fractions are taught without making its connection with the number system. In fact, a fraction is a number; however, since it is not introduced in that manner, the learners often visualise it as a structure made up from numbers.

## Fractions are Introduced as a New Aspect, Different from Numbers

The fractions are taught in such a way that they represent a new mathematical entity having three parts—numerator, denominator and a line separating them. If not taught properly, most of the learners remain more focused on the three parts and less on the fraction. They cannot conceptualise the fraction as a whole. Researchers have reported that a considerable amount of attention of the children gets utilised to understand these three entities (numerator, denominator and bar) and a less amount is left to understand the structure and operations related to fractions. The greater memory load of representing fractions reduces the cognitive resources available for thinking about the procedure needed to solve the problems related with fractions (Lortie-Forgues, et al., 2015; Fuchs, et al., 2013; 2014; Hecht and Vagi, 2012; Jordan et al., 2013; Siegler and Pyke, 2013).

Prior to learning fractions, the students are aware of the whole numbers, natural numbers, integers, etc. With their background about the number knowledge they find fractions as a mathematical entity made from two whole numbers, but they cannot understand that the fraction itself is a number, which is a major threshold in understanding fractions.

## Various Forms are Used to Introduce Fractions

Kieren (see Kieren; 1980) had identified five different interpretations (or sub-constructs) of rational numbers, which are often summarised as part-whole, measure, quotient or division, operator and ratio. Fraction models or notations can be used in all of these five contexts and during teaching, all these models are taught to the children. The problem is that without conceptualisation of fractions, the children are not able to correlate these forms and remain confused. A fraction in the form of $\frac{x}{y}$ denotes a rational number, where x and y are whole numbers. Alternatively, $\frac{x}{y}$ can be said as '*x* divided by *y*' or $x \div y$, that means $\frac{x}{y}$ is the quotient when a whole number *x* is divided by another whole number *y*. $\frac{x}{y}$ also denotes the ratio of two whole numbers *x* and *y*. In other form, $\frac{x}{y}$ can be expressed as '*x* out of *y*', more precisely, $\frac{x}{y}$ can be expressed as '*x* number of parts out of total *y* equal number of parts of something'. In some case, $\frac{x}{y}$ is also used as an operator. For example, when we talk $\frac{3}{4}$ of 100, it means $\frac{3}{4} \times 100 = 75$.

As described above, the term fraction can be used in various forms. Sometimes, the teacher teaches fraction using one particular form and the pupil get confused when they find use of fractions in any other form. Likewise, it can be introduced to the learner in various ways. The basic difficulty before a teacher is how to introduce a fraction—as a rational number or as a ratio or as division of two numbers or as an operator. The main difficulty in teaching and learning the topic is due to the fact that the teachers often remain indulged in choosing the way to introduce the concept and on the other side, the learner gets confused due to its abstract nature and various forms. Among the factors which make rational numbers, in general, and fractions, in particular, difficult to understand are their many representations and interpretations (see Kilpatrick, Swafford and Findell, 2001).

## Absence of Natural Frame of Reference

According to Wu (see Wu, 2014) the difficulty in learning fractions is due to absence of a natural reference point and the inherent abstract nature of the concept.

In learning whole numbers, the children always have a natural reference point—their fingers. In case of fractions, it is normally introduced using a pizza or pie or bread and thus, the pizza, pie or bread become the reference points. These may be good reference points to help the beginners for the purpose of the vocabulary learning aspect. However, these models become awkward in case of fractions bigger than 1 or in describing mathematical operations like addition, subtraction, multiplication, etc. For example, one cannot multiply two pieces of a pie (see Wu, 2014; Hart, 2000). If fractions are introduced as numbers (rational numbers), the number line can act as a reference point with help of which the students can visualise the magnitude and position of a fraction, which may ultimately help them in conceptualisation of fractions.

## Algebraic Operations on Fractions Create Doubts

Apart from the basic structure of fractions, there are some questions related to the basic arithmetic operations on fractions, which creates doubts in the minds of the learners. For example, while adding or subtracting the fractions, it is necessary to form equivalent fractions in such a way that denominator of all the fractions become equal (equal to the LCM of the denominators), whereas while multiplying or dividing the fractions, there is no such requirement of making equivalent fractions. Further, in case of addition or subtraction, after making the equivalent fractions, only numerators are added or subtracted but denominators are not added or subtracted. Contrary to the practice followed in fraction addition or subtraction, both the numerator and denominator are multiplied in case of fraction multiplication. In case of fraction division, the denominator is reversed and then multiplied with the numerator. Some of the common queries, which come in the mind of the beginners, are as follows.

1. Why $\frac{3}{7}$ and $\frac{2}{7}$ are added as $\frac{3}{7} + \frac{2}{7} = \frac{3+2}{7} = \frac{5}{7}$, and why it is wrong to say $\frac{3}{7} + \frac{2}{7} = \frac{3+2}{7+7} = \frac{5}{14}$?

2. Why $\frac{3}{7}$ and $\frac{4}{9}$ cannot be added as $\frac{3}{7} + \frac{4}{9} = \frac{3+4}{7+9} = \frac{7}{16}$?

3. Why it is necessary to obtain LCM of the denominators and to make equivalent fractions in case of addition or subtraction of fractions?

4. If $\frac{3}{7}$ and $\frac{2}{7}$ are added as $\frac{3}{7} + \frac{2}{7} = \frac{3+2}{7} = \frac{5}{7}$, why they are multiplied as $\frac{3}{7} \times \frac{2}{7} = \frac{3 \times 2}{7 \times 7} = \frac{6}{49}$ and not as $\frac{3 \times 2}{7} = \frac{6}{7}$?

5. In case of division of two fractions, what is the logic behind multiplying with the inverse of the fraction in the denominator, i.e., why $\frac{3}{7} \div \frac{2}{7} = \frac{3}{7} \times \frac{7}{2} = \frac{3}{2}$?

6. If a whole number is multiplied with another whole number, the resultant is always greater than the number. However, this practice is not always followed in case of fractions. The result may sometimes be less than the number. Why?

7. Similarly, in case of division by a rational number, the resultant may be greater than the number, unlike in case of the whole numbers where the resultant is always less than the number in case of division. Why?

Though all these queries can be answered mathematically, but these are not normal to understand, do not appear natural and are far from obvious. From the point of view of a beginner, such problems arising during the basic fraction arithmetic are away from realisation, answers to these problems are not apparent and this is one of the important reasons which create difficulty in understanding fractions.

## How to Teach Fractions

The previous section described as to why fractions are difficult to understand for the children and what are the challenges before the teachers while teaching fractions to the beginners. The basic structure and some inherent properties of the fractions make it difficult for both teachers as well as children. However, sometimes the method of teaching and the way the fractions are introduced also contribute to make the learning more difficult for the beginners. These difficulties can be overcome and learning can be made easy by changing the techniques of teaching fractions.

## Fractions are Basically Numbers and may be Introduced Like that

While teaching whole numbers, the concept of the number line is introduced to the children. The children learn to locate a whole number in the number line, which helps them to conceptualise its position and accordingly its magnitude too. When the position and magnitude of the whole numbers are clearly conceptualised, the children can place the given whole numbers in order. They are able to compare the numbers and place them in ascending or descending order. Some basic algebraic operations are also performed on the number line, which helps the children to understand the logic behind the basic operations in mathematics. Similar practice is required to be followed in case of fractions too. The learners must be able to understand that fractions are also numbers. Further, they must be able to find out the magnitude of the fractions and, accordingly, their position on the number line. Once the positions of the fractions are determined, comparison between the fractions and their order on the number line becomes easy, which may help the children to conceptualise fractions.

The following example may be useful for the teachers to introduce fraction.

### Example

When the students become familiar with the numbers, number line, basic operations on number/number line, they may be asked to think what would be there between two whole numbers, say, is there any number which is greater than 5 but less than 6. Similarly, lines having length equal to a whole number can be drawn and children may be asked to find out their length using a ruler. Then, a line of length greater than 4 cm and less than 5 cm may be drawn and the children may be asked to determine its length. This example may provide a thought to the children that there is requirement of numbers other than whole numbers and something may be there between two whole numbers. Several other examples may be formed involving the children. For example, the class may be divided into groups of 4 children each, and each of the groups may be asked to divide 12 toffees or counters equally among themselves. Thereafter, each group may be provided 13 toffees and then they may be asked again to share them equally among themselves. Each group will be left with one toffee which is to be distributed among the four children. With these examples, which can be explained in a practical manner by involving the children, they will start thinking that there is a requirement of numbers other than the whole numbers and there must be numbers between two whole numbers. This may form the background of introducing fractions as rational numbers using the number line.

## Procedural vis-à-vis Conceptual Knowledge

Like other topics of mathematics, the knowledge of fractions also has two parts—conceptual knowledge, and working or procedural knowledge. Both are complementary to each other and are essential for proper understanding of the term fraction. Normally, during the teaching of the fractions, more emphasis of the teachers remains on the procedural knowledge so that the children can perform various operations associated with fractions. However, the beginners must be given sufficient time to conceptualise the fractions first. The procedural knowledge may be provided only after the children conceptualise the structure of fraction properly. Researchers have reported that while imparting the knowledge of fractions, procedural knowledge is generally given more importance by the teachers and less or no emphasis is given on the conceptual understanding of the aspect. As a result, the children learn rote procedures and start calculations without understanding the mathematics behind it (Byrnes and Wasik, 1991; Gabriel et al., 2013; Kerslake, 1986). The conceptual and procedural knowledge is complementary to each other and

must go simultaneously. The teacher is required to skillfully present a mixture of procedural and conceptual knowledge of fractions to one's students so that they can understand and use it properly.

## Comparison of Fractions with the Whole Numbers may be interesting

The teachers must teach fractions like numbers, comparing their properties with the properties of whole numbers to which the students are familiar. It must also be explained to the learners as to why there is a requirement for introducing fractions, what is the significance of fractions, what is the similarity between the fractions and whole numbers and how fractions are different from whole numbers. In addition to this, there are some factors which are also responsible for difficulties faced by the learners. Quality of teaching and the knowledge of the teacher play a pivotal role in minimising the difficulties of the learners. The social, cultural, educational and financial background of the learners as well as of the teacher also makes a great impact on the learning and understanding of the children.

## Problems based on Common Sense may be Useful

Once the concept of fractions is properly understood by the children, they can solve some general problems on fractions, without following the prescribed procedure but just applying their common sense. For example, which is greater: $\frac{2}{11}$ or $\frac{17}{19}$? Mathematically, to solve the problem, we need to form equivalent fractions so that the denominator of both the fractions become equal. Then the fractions can be compared. However, in this problem, it can be said with common sense that $\frac{17}{19}$ would certainly be greater than $\frac{2}{11}$. Consider another problem, which is greater: $\frac{6}{7}$ or $\frac{8}{9}$? One method is to make equivalent fraction as is done usually to solve such problems. Alternatively, $\frac{1}{7}$ is required to make $\frac{6}{7}$ complete, i.e., 1 and $\frac{1}{9}$ is required to make $\frac{8}{9}$ complete. Since, $\frac{1}{7}$ is greater than $\frac{1}{9}$, it can be concluded that $\frac{6}{7}$ is less than $\frac{8}{9}$. Such type of common or alternative thinking can help learners to grasp the fractions but it can be developed only when they understand the fractions thoroughly.

## Learning should not be Made Abstract

All too often, learners think of 'fractions' as being a discrete (and often difficult) topic that has no real connection with any other area of mathematics (McLeod and Newmarch, 2006). However, meaningful connections make learning more powerful. Work on fractions needs

to be integrated into other topics of mathematics; number, shape, data handling, and particularly every sort of measure of weight, length, capacity, time, and simple probability. Learners will encounter fractions throughout their work at all entry levels of the numeracy curriculum, example, solving money problems, sharing a bill, comparing prices, calculating journey times, cooking, interpreting data in pictograms and bar charts, using a meter rule, measuring a room, comparing each other's heights, and checking the weight of ingredients (McLeod and Newmarch, 2006). The teaching of mathematics, particularly when it is related to fractions, decimals and percentage, should not be made abstract. If the teaching is kept abstract and we do not relate it with the day to day activities and surroundings, the children lose interest in study and do not try to understand the phenomenon. Once the rhythm is lost and the children do not understand some of the basic steps, they are not able to grasp the further development. Therefore, the teaching methodology should be designed carefully and be supported by the day to day activities and the environment in which the children are growing.

## Various Teaching Tools may be used while Teaching Fractions

Use of teaching tools and audio-visual techniques is important. Developing visual models of rational numbers is critical in building an understanding of multiple and equivalent forms of rational numbers and the relationship among fractions, decimals and percentage (Scaptura and Mahaffey, 2007). It is easy to draw the number line on a paper using a ruler and pencil. It can be divided into equal number of parts to develop the sense of fractions initially. A paper strip may also be used which the children may divide into equal number of parts to understand the number line and the position of various rational numbers or fractions on it.
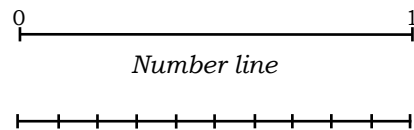


*Number line*



*Divide the number line into 10 equal parts*

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|----|
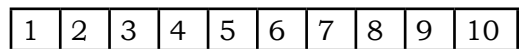
*Figure 1. Paper strip as the number line*

## Conclusion

As suggested in this paper, if the fractions are introduced simply as an extension of the number system, it may be easy for the teachers to teach and the children to follow. If the fractions are introduced using the number line, it will come in a natural way for the beginners as part of the number system. The number line will become the frame of reference, which will help the children to visualise fractions. After understanding the magnitude of fractions and their location on the number line, it becomes easy for the learners to compare two fractions and perform various algebraic operations on it.

If the fractions are taught in the way as suggested in this paper, it will give less load to the beginners towards understanding the structure of fractions and they may be able to focus more towards the operations and properties of fractions. Various difficulties which are being faced by the teachers and the learners while dealing with fractions can be overcome by using the method as suggested in this paper.

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# A Survey on Self-efficacy in Mathematics of Class XI Students in West Bengal

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## Abstract

*The emergent role of self-efficacy in the learning of mathematics has attracted the attention of mathematics educators for a very long time. Students' self-efficacy in mathematics has been a generator that is known to influence their performance in mathematics. This study has attempted to find out students' self-efficacy in mathematics and further investigate any disparity in self-efficacy between students in different streams of study. The population for the study was Class XI students in the southern districts of West Bengal. The sample consisted of 784 students, both boys and girls from randomly selected 24 schools. The tool used is titled Mathematics Self-efficacy Questionnaire. The results show that self-efficacy in mathematics of students with different streams of study is significantly different. In particular, science students have the highest self-efficacy while that of Arts students, and there is significant gender wise difference in self-efficacy in favour of boys.*
**Keywords:** *Self-efficacy, Streams, Performance, Mathematics Southern districts, West Bengal*

## INTRODUCTION

Self-efficacy has been shown to be a forecaster of academic achievement (Fast et al., 2010; Pajaris, 2005). Thus, high self-efficacy implies confidence about academic skills, allowing the student to hone good skills, to expect good results in the examinations and to work objectively for it. Conversely, low self-efficacy relegates the student to expect failure even before attempting

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the task and subsequently low self esteem as per academics.

Self-efficacy is an individual's faith about one's power to carry out a task or perform certain behaviours successfully. Bandura, Barbaranelli, Caprara and Pastorelli (1996) contend that self-efficacy can influence a person's life in diverse ways (p. 1206).

Research has shown that self-efficacy influences various traits in the personalities of people. Bandura et al., (1996) have argued that qualities such as motivation, perseverance and resilience, and the power to think analytically are indications of positive self-efficacy (p. 1206). Thus, just praising the ability of the student will not necessarily induce one's self-efficacy. Rather, the accent should be on praising students' effort and persistence. This is particularly pertinent to the mathematics class. Even if succeeding in mathematics appears to be an uphill task, perseverance in the venture may yield success. Thus, the tenacity of the student in the pursuit of learning mathematics has to be lauded, over and above one's actual level of acquisition of learning.

Self-efficacy leads to less anxiety and greater confidence in tackling problems. Obviously, self-efficacy may lead to success in examinations. Conversely, students with low self-efficacy anticipate failure even before sitting for examinations, and thus, may not be very successful. This is all too relevant for mathematics examinations, where students may be expected to solve problems.

Geometry is a part of mathematics that requires the student to reflect on perceptions of spatial constructs. Cultivating a consciousness of visual spatial characteristics of children's environments and circumstances has the potential for enhancing their self-efficacy regarding geometric objects. This may make geometric ideas more intimate and within the control of the student.

Self-efficacy has been shown to power students' mathematical performance (Bandura et al., 1996; Fast et al., 2010; Pajares, 2005). Hodge (1999) found that mathematics self-efficacy is positively correlated with scores in mathematics examinations. Hendel (1980) contended that self-efficacy in mathematics, mathematics anxiety, and mathematics achievements were highly correlated. Moreover, Fast et al., (2010) found that students with low self-efficacy give up easily when confronted with difficult mathematical problems. Research shows that enhanced self-efficacy can improve geometry learning and this can even be achieved by interventions like creative activities (Canturk-Gunhan and Baser, 2007; Saracaloglu and Yenice, 2009; Usher, 2009; Yenilmez and Uygan, 2010).

## NEED AND SIGNIFICANCE

Self-efficacy is one of the important factors of effective mathematics teaching. It is a product of one's confidence and fluidity of the

situations one encounters. Thus, self-efficacy has the power to boost achievement in mathematics. Change in learning mathematics can focus on changing the mindset of students, so that they can develop a positive attitude towards the subject. This, in turn, can increase their self-efficacy and give them confidence in tackling mathematics related problems in academia and in everyday life.

## OBJECTIVES

1. To measure the self-efficacy in mathematics among students of Class XI
2. To compare the self-efficacy in mathematics among Class XI students in different streams of study

## METHODOLOGY

### Sample

*Population:* The population of the study consisted of higher secondary students in southern districts of West Bengal.

### For Quantitative Analysis

The population of this study comprised the boy and girl students studying in Class XI in West Bengal Council of Higher Secondary schools of Bankura and South 24 Parganas districts. Two sub-divisions from each of the districts were randomly selected. Two blocks from each of the sub-division were randomly selected. Three schools were randomly selected from each block. Thus, multi-stage sampling was adopted to select the sample for the present study. The sample consisted of 784 Class XI learners from 24 schools. Formal approval from the school Head Teachers were obtained in order to conduct this research. The sample design is given in the Tables 1 and 2.

**Table 1**
**Method of Drawing the Sample**

| Sample State | Sample Districts/ Cluster | Sample Sub–divisions | Name of Blocks | No. of Sample Schools | Number of Students |
|---|---|---|---|---|---|
| West Bengal | Bankura | Bankura | Bankura I | 3 | 95 |
| | | | Bankura II | 3 | 93 |
| | | Bishnupur | Bishnupur | 3 | 85 |
| | | | Katulpur | 3 | 81 |
| | South 24 Parganas | Baruipur | Baruipur | 3 | 125 |
| | | | Sonarpur | 3 | 119 |
| | | Diamond Harbour | Mandir Bazar | 3 | 95 |
| | | | Magrahat II | 3 | 91 |
| | | | **Total** | **24** | **784** |

**Table 2**
**Stream-wise and Gender-wise Distribution of Students Participated**

| Gender | Streams | | | Total |
|---|---|---|---|---|
| | *Science* | *Arts* | *Commerce* | |
| Boys | 188 | 124 | 95 | 407 |
| Girls | 159 | 181 | 37 | 377 |
| Total | 347 | 305 | 132 | 784 |

*Source: School data obtained during field visit in 2014*

## Delimitation of the Study

Sample was collected from schools affiliated to West Bengal Council of Higher Secondary Education, in only Southern districts of West Bengal.

## Tools Employed

### 1. The Personal Data Sheet

It consisted of particular information about the participants that is, name, age, gender, stream, name of school, marks obtained in Mathematics in Madhyamik examination, parents' educational qualifications, medium of instruction of school.

### 2. Mathematics self-efficacy Questionnaire (MSEQ)

Several scales related to self-efficacy were examined (Dutton, 1954; Dutton and Blum, 1968; Betz and Hackett, 1983; Pajares and Miller 1995). From among these, the Mathematics Self-efficacy and Anxiety Question-naire by Diana K. May (2009) (also used in Rosly et al., 2017) was particularly appropriate for use in the present study. This consisted of two parts: items related to mathematics self-efficacy and those related to mathematics anxiety. The items were Likert type and the responses were Usually, Often, Sometimes, Seldom, Never and No Responses.

The items were positive in nature.

*Adaption*

The 14 items of the above test related to mathematics self efficacy were selected and translated into Bengali with nuances suitable for Bengali culture and language. This adapted questionnaire was named Mathematics Self-efficacy Questionnaire (MSEQ).

## Standardisation

The questionnaire was subjected to validation by five experts for language as well as for semantics, and feedback thereon, was incorporated.

The questionnaire was further subjected to a pilot study on 152 participants to ensure suitability of language of the items and instruction. The feedback from the pilot study was incorporated.

The questionnaire was administered to 190 participants twice with a gap of three weeks. The test-retest correlation of the scores was 0.97 which was significant, thus

ensuring reliability of the adapted questionnaire.

The norms of the scale were established from the sample for standardisation (Anastasi, 1998; Anastasi and Urbana, 2005 p. 62).

**Table 3**
**Self-efficacy Statistics Norms of the scale**

|  |  | Self-efficacy |
|---|---|---|
| N | Valid | 430 |
| Mean | | 49.14 |
| Median | | 51.00 |
| Std. Deviation | | 12.443 |
| Percentiles | 25 | 40.50 |
| | 50 | 51.00 |
| | 75 | 58.00 |

## HYPOTHESES

$H_{0SG}$: There is no significant difference in self-efficacy between the gender groups.

$H_{0SS}$: There is no significant difference in self-efficacy among three streams of study.

$H_{0SBS}$: There is no significant difference in self-efficacy among three streams of study among boys.

$H_{0SGS}$: There is no significant difference in self-efficacy among three streams of study among girls.

## DATA ANALYSES AND FINDINGS

Mathematics Self-efficacy Questionnaire (MSEQ) was administered to the sample and the responses were scored and tabulated, and subjected to descriptive and inferential statistics.

## OBJECTIVE (i): TO MEASURE SELF-EFFICACY IN MATHEMATICS AMONG STUDENTS OF CLASS XI

The self-efficacy scores were tabulated and analysed with reference to:
- The whole sample
- Gender wise analysis

### The whole sample

The descriptive statistics of self-efficacy pertaining to the whole sample are shown below.

**Table 4**
**Self-efficacy: Descriptive Statistics for Whole Sample**

|  |  | Self-efficacy |
|---|---|---|
| N | | 784 |
| Mean | | 50.94 |
| Std. Error of Mean | | .437 |
| Median | | 54.00 |
| Mode | | 57 |
| Std. Deviation | | 12.239 |
| Skewness | | -.632 |
| Std. Error of Skewness | | .087 |
| Kurtosis | | -.341 |
| Std. Error of Kurtosis | | .175 |
| Minimum | | 12 |
| Maximum | | 70 |
| Percentiles | 25 | 42 |
| | 50 | 54 |
| | 75 | 61 |

Table 4 shows that the distribution of self-efficacy scores is negatively skewed, meaning that the participants show generally good self-efficacy as regards mathematics.

The mean self-efficacy scores of all students taken together is slightly higher than the local norm mean score.

The distribution of self-efficacy was tested for normality by the Kolmogorov-Smirnov Test and found to be not normal.

### Gender-wise analysis

The descriptive statistics of self-efficacy scores pertaining to each gender is shown below.

**Table 5**
**Gender-wise Descriptive Statistics of Self-efficacy**

|                        | Self-efficacy | |
|------------------------|--------|--------|
|                        | *Boys* | *Girls* |
| N                      | 407    | 377    |
| Mean                   | 51.93  | 49.87  |
| Std. Error of Mean     | .581   | .655   |
| Median                 | 55.00  | 52.00  |
| Mode                   | 55     | 57     |
| Std. Deviation         | 11.702 | 12.722 |
| Skewness               | -.841  | -.429  |
| Std. Error of Skewness | .121   | .126   |
| Kurtosis               | .189   | -.706  |
| Std. Error of Kurtosis | .242   | .251   |
| Minimum                | 12     | 16     |
| Maximum                | 70     | 69     |
| Percentiles 25         | 45.00  | 40.50  |
| 50                     | 55.00  | 52.00  |
| 75                     | 61.00  | 60.00  |

From Table 5, it can be seen that the distribution of self-efficacy is not normal and is negatively skewed, both for boys and girls. The mean scores for boys and girls are slightly higher than the mean pertaining to the established norms of the sample for standardisation.

### Gender-wise comparison of self-efficacy

Since the distribution of self-efficacy is not normal, the Mann Whitney U test was carried out to compare self-efficacy scores of boys and girls. The null hypothesis is—

$H_{0SG}$: There is no significant difference in self-efficacy between the two gender groups.

The result of the Mann Whitney U test is given under Tables 6 and 7.

**Table 6**
**Mann Whitney U test of Self-efficacy and Gender**

| Gender | N | Mean Rank | Sum of Ranks |
|--------|-----|--------|-----------|
| Self Efficacy 1 | 406 | 408.88 | 166004.50 |
| 2 | 377 | 373.82 | 140931.50 |
| Total | 783 | | |

**Table 7**
**Mann Whitney U test Value**

|                          | Self-efficacy |
|--------------------------|------------|
| Mann-Whitney U           | 69678.500  |
| Wilcoxon W               | 140931.500 |
| z                        | -2.168     |
| Asymp. Sig. (2-tailed)   | .030       |

The Mann Whitney U test shows that the difference between the gender groups is significant at 5 per cent level. Thus, $H_{0SG}$ is to be rejected, and there is a significant difference in self-efficacy between boys and girls. Table 6 shows

that boys show higher self-efficacy than girls.

Hence, it can be concluded that, there exists a significant gender wise difference in self-efficacy in favour of boys.

## OBJECTIVE (ii): TO COMPARE THE SELF-EFFICACY IN MATHEMATICS BETWEEN STUDENTS OF CLASS XI IN DIFFERENT STREAMS OF STUDY

A comparison has been carried out in the following steps with respect to self-efficacy.

- Stream-wise: whole sample
- Stream-wise within each gender
  - ➢ Boys: Stream-wise
  - ➢ Girls: Stream-wise
- Gender within each stream
  - ➢ Science: Gender-wise
  - ➢ Arts: Gender-wise
  - ➢ Commerce: Gender-wise

### *Stream-wise: The whole sample*

The descriptive statistics of self-efficacy scores pertaining to each stream are shown below.

**Table 8**
**Stream-wise Descriptive Statistics of Self-efficacy**

|  | Self-efficacy | | |
|---|---|---|---|
|  | *Science* | *Arts* | *Commerce* |
| N | 347 | 305 | 132 |
| Mean | 57.27 | 43.68 | 51.11 |
| Std. Error of Mean | .495 | .685 | .916 |
| Median | 59.00 | 44.00 | 53.00 |
| Mode | 67 | 37 | 55 |
| Std. Deviation | 9.204 | 11.958 | 10.524 |
| Skewness | -1.183 | -.090 | -.857 |
| Std. Error of Skewness | .131 | .140 | .211 |
| Kurtosis | 1.450 | -.622 | .524 |
| Std. Error of Kurtosis | .261 | .278 | .419 |
| Minimum | 21 | 12 | 17 |
| Maximum | 70 | 68 | 69 |
| Percentiles 25 <br> 50 <br> 75 | 53.00 | 35.00 | 43.25 |
|  | 59.00 | 44.00 | 53.00 |
|  | 64.00 | 54.00 | 58.00 |

The mean self-efficacy score of science students is highest followed by that of commerce students, and with means that are higher than the mean self-efficacy score of the sample for standardisation of the self-efficacy scale. The mean self-efficacy score of arts students is least and is less than mean of the sample for standardisation.

The standard deviation of the scores for science students is the lowest, while that of arts students is the highest. This shows that the scores of science students are more homogeneous, while that of arts students is more dispersed.

The magnitude of skewness for science students is appreciably higher than that of commerce and arts students, showing that a greater proportion of science students have high self-efficacy.

To find out if there is a significant difference in self-efficacy between science, arts and commerce students, the Kruskal Wallis Test has been carried out (as the distributions are not normal). The null hypothesis for this purpose is—

$H_{0SS}$: There is no significant difference in self-efficacy among three streams of study.

**Table 9**
**Kruskal Wallis Test**
**Self-efficacy and Streams**

| Streams | N | Mean Rank |
|---|---|---|
| Self-efficacy  Sc. | 347 | 513.23 |
| Arts | 305 | 257.84 |
| Com. | 132 | 384.21 |
| Total | 784 | |

| | Self-efficacy |
|---|---|
| Chi-square | 207.035 |
| Df | 2 |
| Asymp. Sig. | .000 |

The Kruskal Wallis Test shows that the difference in self-efficacy between the streams is significant. Therefore, $H_{0SS}$ is to be rejected, and this is a significance difference in self-efficacy between science, arts and commerce students.

To find out where this difference lies, the Mann Whitney U Tests were done between science and arts, arts and commerce and science and commerce streams. These tests show that the differences in self-efficacy between students of science and arts, arts and commerce and science and commerce streams are significant.

A summary of the tests is as follows from Table 10.

**Table 10**
**Stream-wise Comparisons (Self-efficacy)**

| Science and Arts | Arts and Commerce | Science and Commerce |
|---|---|---|
| Sc.>Arts** | Com.>Arts** | Sc.> Com.** |

*\*\*Note: significant at 0.01 level of significance*

This shows that science students have better self-efficacy than commerce and arts students. Also, commerce students have better self-efficacy than arts students.

Thus, the above analysis shows that participants in the science stream display significantly higher self-efficacy than those in other streams. Participants in the arts stream display significantly least self-efficacy than those in other streams.

### Stream-wise analyses within each gender

The self-efficacy in mathematics on a stream-wise basis was compared among boys and girls separately.

*Boys: Stream wise*

The descriptive statistics of self-efficacy scores of boys pertaining to each stream is shown in Table 11.

**Table 11**
**Boys: Stream-wise Descriptive Statistics of Self-efficacy in Mathematics**

|  | Self-efficacy | | |
|---|---|---|---|
|  | *Science* | *Arts* | *Commerce* |
| N | 188 | 124 | 95 |
| Mean | 56.41 | 45.19 | 51.93 |
| Std. Error of Mean | .698 | 1.134 | 1.031 |
| Median | 58.00 | 47.00 | 54.00 |
| Mode | 54 | 37 | 55 |
| Std. Deviation | 9.551 | 12.628 | 10.048 |
| Skewness | -1.195 | -.336 | -.850 |
| Std. Error of Skewness | .178 | .217 | .247 |
| Kurtosis | 1.524 | -.687 | .861 |
| Std. Error of Kurtosis | .354 | .431 | .490 |
| Minimum | 21 | 12 | 17 |
| Maximum | 70 | 68 | 69 |
| Percentiles  25 | 52.00 | 35.25 | 46.00 |
| 50 | 58.00 | 47.00 | 54.00 |
| 75 | 63.00 | 55.75 | 59.00 |

To find out if there is a significant difference in self-efficacy between science, arts and commerce boys, the Kruskal Wallis Test has been carried out (as the distributions are not normal). The null hypothesis for this purpose is—

$H_{0SBS}$: There is no significant difference in self-efficacy among three streams of study among boys.

**Table 12**
**Boys: Kruskal Wallis Test Attitude and Streams**

| Streams | N | Mean Rank |
|---|---|---|
| Self-efficacy Sc. | 187 | 249.77 |
| Arts | 124 | 139.23 |
| Com. | 95 | 196.31 |
| Total | 406 | |

| | Self-efficacy |
|---|---|
| Chi-Square | 66.688 |
| Df | 2 |
| Asymp. Sig. | .000 |

The Kruskal Wallis Test shows that the difference in self-efficacy between the streams is significant. Therefore, $H_{0SBS}$ is to be rejected, and this is a significant difference in self-efficacy between science, arts and commerce boys.

To find out where this difference lies, the Mann Whitney U Tests were done between science and arts, arts and commerce and science and commerce streams. These tests show that the differences in self-efficacy between the boys of science and arts, arts and commerce and science and commerce streams are significant.

This is summarised as follows from Table 10.

*Boys: Stream-wise comparison summary*

**Table 13**
**Summary of Stream-wise comparisons for boys**

| | Self-efficacy |
|---|---|
| Boys Science and Arts | Sc.> Arts** |
| Boys Arts and Commerce | Com.> Arts** |
| Boys Commerce and Science | Sc.> Com.** |

**Note: significant at 0.01 level of significance*

This shows that Science stream boy have better self-efficacy than Commerce and Arts stream boys. Also, Commerce boys have better self-efficacy than Arts boys.

### Girls: Stream-wise

The descriptive statistics of self-efficacy scores of girls pertaining to each stream is shown below.

**Table 14**
**Stream-wise Descriptive Statistics of Self-efficacy in Mathematics**

| | Self-efficacy | | |
|---|---|---|---|
| | *Science* | *Arts* | *Commerce* |
| N | 159 | 181 | 37 |
| Mean | 58.29 | 42.65 | 49.00 |
| Std. Error of Mean | .690 | .847 | 1.896 |
| Median | 60.00 | 42.00 | 52.00 |

| Mode | 67 | 42 | 57 |
|---|---|---|---|
| Std. Deviation | 8.699 | 11.397 | 11.535 |
| Skewness | -1.142 | .072 | -.811 |
| Std. Error of Skewness | .192 | .181 | .388 |
| Kurtosis | 1.195 | -.423 | -.126 |
| Std. Error of Kurtosis | .383 | .359 | .759 |
| Minimum | 26 | 16 | 21 |
| Maximum | 69 | 68 | 65 |
| Percentiles 25 | 53.00 | 34.00 | 42.00 |
| 50 | 60.00 | 42.00 | 52.00 |
| 75 | 65.00 | 51.00 | 57.00 |

To find out if there is a significant difference in self-efficacy between Science, Arts and Commerce girls the Kruskal Wallis Test has been carried out (as the distribution are not normal). The null hypothesis for this purpose is—

$H_{0SGS}$: There is no significant difference in self-efficacy among the three Streams of study among girls.

**Table 15**
**Girls: Kruskal Wallis test Self-efficacy and Streams**

| Streams | N | Mean rank |
|---|---|---|
| Self-efficacy 1 Sc. | 159 | 263.53 |
| 2 Arts | 181 | 125.67 |
| 3 Com. | 37 | 178.53 |
| Total | 377 | |

| | Self-efficacy |
|---|---|
| Chi-square | 135.973 |
| Df | 2 |
| Asymp. Sig. | .000 |

The Kruskal Wallis test shows that the difference in self-efficacy between the streams is significant. Therefore, $H_{0SGS}$ is to be rejected, and

this is a significant difference in self-efficacy between Science, Arts and Commerce girls

To find out where this difference lies, the Mann Whitney Tests were done between Science and Arts, Arts and Commerce and Science and Commerce streams. These tests show that the differences in self-efficacy between Girls of Science and Arts, Arts and Commerce and Science and Commerce streams are significant.

This is summarised as follows from Table 13.

**Table 16**
**Summary of Stream-wise Comparison for Girls**

| | Self-efficacy |
|---|---|
| Girls Science and Arts | Sc.> Arts** |
| Girls Arts and Commerce | Com.>Arts** |
| Girls Commerce and Science | Sc.> Com.** |

*Note: Significant at 0.01 level of significance*

This shows that Science streams girls have better self-efficacy than

Commerce and Arts streams girls. Also, Commerce girls have better self-efficacy than arts girls.

### Gender-wise analysis within each stream

To find out if there is significant difference in self-efficacy between Boys and Girls in different streams suitable null hypotheses were formulated and tested by Mann Whitney U tests between Boys and Girls of the streams Science, Arts and Commerce respectively. These tests show that the differences in self-efficacy between Boys and Girls of the streams Science, Arts and Commerce are significant.

This is summarised as follows from tables 10 and 13.

**Table 17**
**Summary of Gender wise analysis within each stream**

|             | Self-efficacy   |
| ----------- | --------------- |
| Science     | Girls > Boys*   |
| Arts        | Boys > Girls*   |
| Commerce    | NS              |

*Note: significant 0.05% level of significance*

### OBSERVATION

The self-efficacy of girls in Science stream is better than that of boys and self-efficacy of boys in Arts stream is better than that of girls.

Thus the above analysis shows that participants in the Science streams display significantly higher self-efficacy than in other streams. Participants in the Arts streams display significantly least self-efficacy than those in other streams.

### DISCUSSION AND CONCLUSION

The sample, taken as a whole, displays a mean self-efficacy score higher than that of the sample for standardisation of the self-efficacy scale. However, when the three streams are observed apart, the mean scores of science and commerce students are higher than the norm set by the standardisation sample, while that of arts students is less. This indicates that arts students lack in self-efficacy.

Self-efficacy for mathematics assists in the confidence with which people can approach problems involving use of mathematics (Reyes, 1984). As science students use mathematics to a large extent, this familiarity with its utility is more profound. Arts students may not be as familiar with mathematical usages and so lack self-efficacy in Mathematics. Bandura's (1994; 1982) work on self-efficacy indicates that familiarity of usage can be a factor in enhanced self-efficacy. In fact, the generally intimidating image of mathematics may lead arts students to develop neurosis or even phobia regarding the subject, resulting in diminished self-efficacy (Belbase, 2013).

Another cause for enhanced self-efficacy among Science students is the nature of their studies as a whole as compared to students in other streams. Students of science require being alert and attentive to facts and having the need, and consequently, tenacity to carry out mathematical tasks. In fact, the process of carrying out scientific reasoning

and mathematical logic requires self validation at every stage (NCERT, 2006). This builds qualities like determination, perseverance and fortitude, and thus strengthens the roots of independent thinking, leading to self efficacy (Pajares, 2002; Griffin et al., 2010).

When the three streams of study are not considered separately, boys appear to display greater self efficacy in Mathematics than girls. This is the expected result that stems from cultural mores whereby boys are expected to be more adept at tackling mathematical problems than girls (Billington et al., 2007).

However, the results show an interesting variance when the sample is considered according to the different streams of study. In the science stream, girls show better self efficacy in Mathematics than boys. This is possibly an outcome of the perception of girls that being in the science stream is indeed a privilege. These girls therefore work towards achieving success, and acquire self confidence in doing mathematics in the process (Mata et al., 2012).

The phenomenon of girls showing better self efficacy than boys self-efficacy in Mathematics in the Science stream may also be the result of the divergent goals in the lives of boys. In our society, boys are on the lookout for opportunities to acquire lucrative vocations, or at least, jobs to earn money. Thus their focus on studies is often less than that of girls. Boys often do not give enough time and attention to the problem solving genre of Mathematics learning, and eventually lack in self-efficacy in the subject.

The finding indicates that the self-efficacy of Science students in Mathematics is higher than that of other students. This self-evident fact shows that students getting entry to the science stream in Indian schools have usually shown better performance in their Class X examination. In other words, the self-efficacy of science students comes from their motivation and determination towards achieving high personal goals. Thus, mathematics teacher should find ways of enhancing mathematics self-efficacy in students and should place emphasis on student's confidence to succeed mathematics achievement. Bandura and Locke (2003) in their study have shown that workers with high self-efficacy are more confident and that they can learn performance specific tasks. On the other hand, workers with low self-efficacy put less effort in learning and performing complex tasks because they cannot be sure they will succeed. The same logic may account for science students having greater self-efficacy.

The result generally showed that the self-efficacy of boys is greater than that of girls. This result has been corroborated in the case of self-efficacy in Mathematics by Belz and Hackett (1983) and Pajares and Miller (1994) They have shown that boys have greater self-efficacy than girls. Kvedere (2014) in Lativia has shown that among grade students, boys shows greater self-efficacy than girls.

Other researchers have shown that there is no gender difference in Mathematics self-efficacy (Cooper and Robinson, 1991; Goodwin, Ostrom and Scott, 2009). Lent et al., (1991) in fact showed that the gender difference decreases when male and female students are subjected to similar prior course work in Mathematics.

Mathematics is often seen to be a male domain (Brandell, 2007; Forgasz et al., 1999), in our society, and educational opportunity often favours boys. This may be a reason for the demonstration of better self-efficacy by boys. Boys are also pressurised to perform well in Mathematics for obtaining vocational opportunities. This pressure may be lacking among girls, many of whom may aspire to be home makers. 'This phenomenon further compounded in Africa where sex-stereotyping is so pervasive that from birth, society fixes gender roles and conditions males to play and act within the confines of intellectually and physically more challenging task like construction, moulding, football, palm-wine tapping, climbing, agriculture, fishing and the like. Women on the other hand, are 'sentenced' to the kitchen and related domestic chores, including child rearing' (Amao and Gbadamosi, 2015; Ezeameyi, 2002). By extension girls usually choose subject like Home economics, Biological science, Nutrition whereas boys select subjects like Chemistry, Physics, Agricultural science, Engineering, Mathematics and further mathematics (Graham, 2001).

In school one hears girls students saying that science subjects are for the boys and this low motivation may further widen the gender gap in science achievement (Mutemeri and Mygweni, 2005). Thus self-efficacy is more evident among boys than girls.

*Contribution of the study:* When three streams are observed apart it shows Science and Commerce students have higher self-efficacy than Arts students.

Arts students may not be as familiar with mathematical usages and so lack of self-efficacy in mathematics.

May be another cause for enhanced self-efficacy among Science students is the nature of their studies as a whole as compared to students in other streams. Students of Science require being alert and attentive to facts and having the need, and consequently, tenacity to carry out mathematical tasks.

When the three streams of study are not considered separately, boys appear to display greater self-efficacy in Mathematics than girls.

When the sample is considered according to the different streams of study it shows an interesting variance. In the Science stream, girls show better self-efficacy in Mathematics than boys. This is possibly an outcome of the perception of girls that being in the Science stream is indeed a privilege.

Thus self-efficacy is more evident among boys than girls.

If mathematics teachers can enhance self-efficacy in mathematic among students, the students will be more motivated and determine towards success.

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# Is there Educational Mobility in India?

## An IV-2SLS Estimation of Intergenerational Effects of Parental Education on Child Education

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**Abstract**

*Analysis of intergenerational relations focusses on the extent to which economic and social status of children is influenced by that of their parents. Intergenerational effects may reflect mere selection, parents with higher ability having higher ability children, or a causal effect, parental social and economic characteristics affect child outcomes. Persistence of intergenerational relations show transmission, whereas intergenerational mobility relates to the progress occurring from one generation to the next. Among various aspects of intergenerational social and economic relations, income, occupation and education mobility are the basic intergenerational effects that determine the progress of a society. This paper estimates the intergenerational educational mobility in India using the IHDS-II (2011–2012) data. To overcome the endogeneity issue, parental education correlated with ability, this paper uses an instrumental variables approach. The instrument used is the New Scheme of Elementary Education (NSEE) introduced in 1953 which made schooling compulsory. The IV-2SLS estimates show a high degree of intergenerational persistence in education. The Indian society seems to be less mobile educationally, and especially, mother-child educational relations reflect intergenerational educational transmission.*

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## INTRODUCTION

In every society, every generation moves ahead of its predecessors, only to be overtaken by its subsequent generations, almost in every respect of life, importantly in social and economic spheres. This intergenerational mobility of individuals as well as society is not only a much desirable attribute but also is a measure of quality of life improvements, equality of opportunity, progress, development and freedom. Although, such social and economic mobility concerns differ in their meaning and nature between developed and developing countries, and between different strata within the society, every change is taken to be a positive progress. Also, country, education, income and social mobility form the cornerstone for the provision of opportunity for development as well as change. The extent to which the economic status is transmitted from one generation to the next has long been the interest of social scientists. Economists are interested in intergenerational relationship and its effects on individual mobility, equality of opportunity, economic progress, and income distribution. Persistence of intergenerational transmission in economic status is an important mechanism in retarding intergenerational mobility that also perpetuates inequality of opportunities in a society. Such persistence of intergenerational effects may differ across groups of people in a society typically by race, community, gender and religion, implying differential access to opportunities for different groups.

It is well known that the aim of free public education in most of the societies is to increase the equality in opportunity. The education system has always been considered as the most effective and equalising process for individuals to improve one's economic and social status. It is widespread knowledge that there is a strong correlation between education and increasing one's economic mobility. Despite the increasing availability of education for all, family background plays a huge role in determining the economic success of generations.

Education is a very important aspect of every human life. In almost all countries worldwide, school level education is generally compulsory and provided free by the public sector. Even in the private sector, it is almost free or heavily subsidised. In India, education is recognised as a fundamental right by the Constitution of India. It is provided to every child in the age of 6 to 14 years and has been made compulsory and free in government schools. According to the Right to Education Act, 25 per cent seats in private schools are reserved for the weaker sections of the society. The ratio of public and private schools is 7:5. In India, a person aged seven years and above who can both read and write with understanding in any language has been taken as literate. The adult literacy rate has shown

an upward trend for females as well as males. As per the 2011 Census of India, it has increased from 61 per cent to 69.3 per cent during the period 2001–2011. As per the NSS 71st round findings, adult literacy rate stands at 70.5 per cent for the year 2014 (Education Statistics at a Glance, 2016). This indicator is generally considered as the stock of human capital of an economy.

It is widely known that more educated parents have more resources, via higher returns to higher education, to provide a better environment for their children to do well in school. The parents' education level has a greater impact than their income level on the probability of young people pursuing and completing graduation. Better educated parents also provide their children with better environment that is more conducive to the child's cognitive development from birth, and this becomes apparent in various ways, including higher grades. Educated parents have higher educational aspirations for their children and are more likely to transmit them to children.

Most studies on intergenerational mobility focus on developed countries. Income and occupational mobility are the common topics of analysis, whereas educational mobility has also been receiving serious attention in developed countries in recent years. The studies on intergenerational mobility are rather scanty in developing countries, limited by lack of data availability. India is particularly a relevant laboratory for the study of intergenerational mobility because of its diversity, variations, caste, religion and culture. In India, the society is deeply stratified by caste which has historically been associated with poor outcomes and very low mobility (Borkotoky et al., 2015). Further, the rigid caste structure is coupled with unity in diversity. In recent decades, India has also experienced rapid economic transformation and is one of the fastest growing economies in the world. However, how far these contrasting features of India contribute to the social and economic mobility of its diverse populations is not yet known clearly, making India an intriguing case study. Mobility analysis by social group shows that scheduled castes (SC) and scheduled tribes (ST)—'historically socially deprived communities—have done much better than others in attaining intergenerational educational mobility (Azam and Bhatt, 2015). Of the SC/ST children who were born to parents with no formal education, the proportion of those who cleared secondary school rose from 8 per cent to 20 per cent between the two generations. In other words, SC/ST children from less educated families witnessed 12 per cent point rise in their upward mobility. The corresponding increase in mobility for non-SC/ST children has been only 4 per cent point.

Intergenerational relations is a term that describes the relationship

between two or more generations in a society. The term was coined as a social movement within or between social classes and occupations, the change occurring from one generation to the next generation. Intergenerational relations describe a wide range of patterns of interaction among individuals in different generations of a family: for example, between those in older generations, such as parents and grandparents, aunt, uncle, and those in younger generations, such as children and grandchildren, nieces and nephews. Intergenerational mobility is when the background, resources, income, occupation, education, ethnicity, culture, place of residence, etc., of one generation determine the social and economic status of the future generation. The term is also frequently used to describe behaviours involving older and younger people in society at large, even if they are unrelated to one another. Such intergenerational relations comprise two mutually exclusive components the intergenerational relations may simply transmit or deviate. The former is generally described intergenerational transmission and the latter is called as intergenerational mobility. For example, genetic characteristics simply transmit from one generation to another and intergenerational mobility brings positive changes between the generations.

Intergenerational educational mobility analysis focuses on the causal relationship between the education of parents and their children. It concentrates on how children's education correlates with the education of their parents. There is not much empirical evidence available, especially in developing countries, that too in India. It is only recently that empirical studies in developed countries have begun to focus on disentangling the intergenerational relations in education, either mobility or transmission, that is differentiating causal relationship from mere selection in which better educated parents have better educated children. The few available empirical studies on intergenerational effects of education produce conflicting findings. There is dearth of empirical evidence on the exact role of parental education in the educational attainment of children.

Therefore, this paper tries to disentangle the intergenerational links between educational outcomes using educational attainment of parents and their children. Specifically, this paper tests the mobility or transmission aspects of intergenerational educational relationship in India, focusing on the relationship between parents' and children's education. Using the nationwide Indian Human Development Survey (IHDS-II 2011–2012), and the Instrumental Variable-Two Stage Least Squares (IV-2SLS) method, the paper examines the impact of parental education on child education to assess the nature of intergenerational relations in education in the state of Tamil Nadu in India.

## BRIEF REVIEW OF RECENT STUDIES

Literature on intergenerational economic mobility in developed countries mostly focuses on intergenerational correlation between father-son incomes (Solon, 1999; Black and Devereux, 2011). The early intergenerational relations research concentrated on estimating the intergenerational regression and correlation coefficients, and later refining the estimation methods. Hertz et al., (2008) review the trends in intergenerational transmission of education for a sample of 42 countries. They document large regional differences in educational persistence, with Latin America displaying the highest intergenerational correlations, and the Nordic countries, the lowest. The correlation coefficient is about 0.60 in South America; about 0.40 in Western Europe, 0.46 in the US, and 0.20 in Nordic countries. They estimate the global average correlation between parents' and child's schooling to be around 0.420 for the fifty years under review. Interestingly, they also find a 30-point reduction in the estimated mean regression coefficient over the 60 years, from 0.80 in 1920 to 0.50 in 1980.

Some studies focus on intergenerational mobility in education. Results from the US and UK suggest intergenerational education elasticity between 0.20 and 0.45 (Deardon et al., 1997; Mulligan, 1999; Corak, 2013). Most studies find that parental education has at least a small impact on children's schooling. In order to deal with endogeneity of parental education, another group of studies use instrumental variable estimates. The instrumental variable approach provides exogenous variations and permits causal effects of parental education across generations without affecting parental innate abilities or their endowments. This way enables the estimation of the causal effect of increase in parental education on children's education. Oreopoulos et al., (2006) consider IV estimation with historical changes in compulsory schooling legislation in the US as an instrument for parental educational attainment and find that an increase in the schooling of either parent reduces the probability that a child repeats a grade and that 15–16 years old will drop out of school.

Black et al., (2005) using a Norwegian education system reform as IV for parental education, estimate the casual link between parents' and children's education in Norway. The census data from Norway Statistics provides little evidence of a causal relationship between fathers' education and children's education, despite significant and large OLS relationships. There is a small but significant causal relationship between a mother's education and her son's education but no causal relationship between a mother's and a daughter's education. Thus, studies find conflicting statistical intergenerational educational

relations when IV estimation is employed.

The issue of intergenerational mobility in India has recently started to receive attention in India (Jalan and Murgai, 2007; Maitra and Sharma, 2009; Majumder, 2010; Hnatkovska et al., 2013; Azam and Bhatt, 2015; Borkotoky et al., 2015; Kishan, 2018). The issues analysed ranges over mobility in income, occupation, education, and mobility differentials across social groups. Jalan and Murgai (2008) investigate the educational mobility of the age group 15–19, using 1992–1993 and 1998–1999 National Family Health Survey (NFHS) data. They found that educational mobility for age group 15–19 has increased significantly between 1992–1993 and 1999–2000, and that education gaps between backward and forward castes are not that large once other attributes are controlled for. However, in the NFHS data, parental outcomes are not directly known for child-parent pairs living in the same household. As a result, they only focus on children aged 15–19 years who are more likely to be living with their parents.

Sinha (2018) examines the differential effect of economic development in India on the educational and occupational attainment of caste groups over the period 1983 and 2009–2010. Using the six rounds of NSS data, the educational and occupational outcomes of co-resident father-son pairs of social groups of SC/ST and non-SC/ST are compared. The results show that the intergenerational educational mobility gap is closing. Though the gap is converging at the no education level of father, a large absolute gap exists at the higher level of father education.

Some studies use the India Human Development Survey data that directly identifies the children-parent pairs residing in the same household. Maitra and Sharma (2009) use the India Human Development Survey 2004–2005 (IHDS-I) to explore the effect of parental education (both father and mother) on years of schooling of children among the parent-child pairs residing in the same household. They find that the average intergenerational correlation in educational attainment in India is 0.52, significantly higher than the global average of 0.42, reported by Hertz et al., (2008). Hnatkovska et al., (2013) use five rounds of NSS surveys (1983, 1987–1988, 1993–1994, 1999–2000, and 2004–2005), and aggregate occupations in three groups (white collar, blue collar and agriculture) to study occupation mobility in India. Based on occupation switches (son's occupation being different than father's occupation), they find that the overall probability of an occupation switch by next generation relative to the household head has steadily increased from 32 per cent in 1983 to 41 per cent in 2004–2005. For non SC/STs, the switch probability increased from 33 per cent to 42 per cent, while

for SC/STs it has gone from 30 to 39 per cent. They conclude that the difference in intergenerational occupational mobility between SC/STs and non SC/STs has not changed over this period. Majumder (2010) also uses NSS data to study trends in educational and occupational mobility gaps over time among social groups.

Borkotoky *et al.* (2015) use a district level household survey conducted in 2007–2008 to estimate the process of partner selection and differential fertility with the intergenerational transmission of education. The educational attainment of children was estimated by fitting the estimated marriage probabilities and children ever born in the intergenerational transmission model. To estimate this intergenerational transmission model, they use logit, probit and ordered probit for their analysis. The paper considers both direct and indirect pathways that might influence education attainment of women, their age at marriage, age at first birth and choice of marriage partner in estimating distribution of children's education. The study concludes that the intergenerational transmission model of education is appropriate in India. Women having higher education will marry late, marry well-educated and employed men, and have fewer children. Their findings suggest that children are getting higher education than their parents, and better educated

mothers do not show partiality in providing higher education among the children.

In short, studies find that the global average correlation between parental and child schooling is around 0.42, the intergenerational elasticity ranges between 0.20 in US and 0.45 in UK, and the average intergenerational correlation in educational attainment in India is about 0.52. Studies also find a significant relationship between parent's and child education when the IV estimation is employed. Some studies find that children are getting higher education than their parents which suggests intergenerational transmission. The present study is unaware of any other study that has examined the impact of parental education on child education in Tamil Nadu.

## DATA AND METHODOLOGY

The India Human Development Survey–II (2011–2012) is a nationally representative multi-level household survey, a collaborative project by the National Council of Applied Economic Research (NCAER) and the University of Maryland. It consists of 42,152 households in 1,420 villages and 971 urban neighbourhoods across India. The 2011–2012 data are mostly re-interviews of 83 per cent households that were interviewed for IHDS-I in 2004–2005. There are two distinct advantages of using the IHDS data for the analysis of intergenerational educational mobility, over the larger

and commonly used household surveys of India such as National Sample Survey (NSS) and National Family Health Survey (NFHS). First, the IHDS contains additional questions which are not asked in the NSS or NFHS. These questions allow the identification of parental education for the adult population (in the age group 15–24), including parent-child pairs who do not co-reside. The 'ID of father' column in the household roster helps linking individuals to their fathers in the IHDS data set. Second, although the primary goal of the IHDS was the collection of data on income and education of each household, questions on educational history were asked about all household members. These questions allow the calculation of the number of years of schooling for every individual in the sample. An added advantage is that the IHDS contain data on actual years of schooling rather than levels of schooling completed which is generally reported in the NSS

data. This avoids the discontinuities in schooling distribution as a result of the attribution of years of schooling from the categorical variable containing level of schooling completed. Moreover, the IHDS collects direct information on household consumption expenditures or household income. Besides, the IHDS also includes the standard data on household characteristics (caste, religion and demographics), characteristics of the household's dwelling, ownership of various assets, information on health, employment, education, social status, employment, marriage, fertility, wage, etc., and even panchayat composition. For this study, the IHDS-II data pertaining to Tamil Nadu state of India has been used. The sample size is 678 households.

Figure 1 shows the mean years of education of children by parental age. The figure shows that older parents have children who pursue
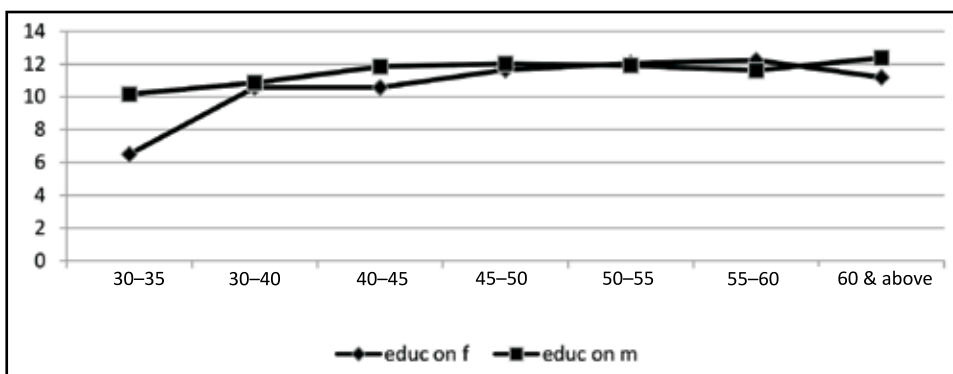


*Figure 1. Mean Years of Child Education by Parent's Age*

higher education. Figures 2 and 3 compare the educational attainment of children with that of the mother's and father's educational attainment. Illiterate parents have higher proportion of children with secondary education as well as higher education. The proportion of children with high school and above is higher for parents with secondary level education. In fact, percentage of children with high school education and above is higher for fathers with high school education than that of mothers.
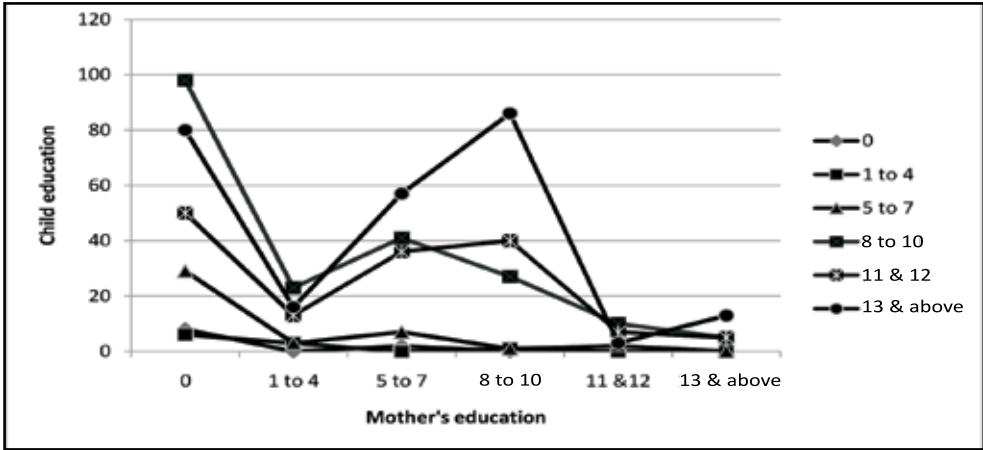
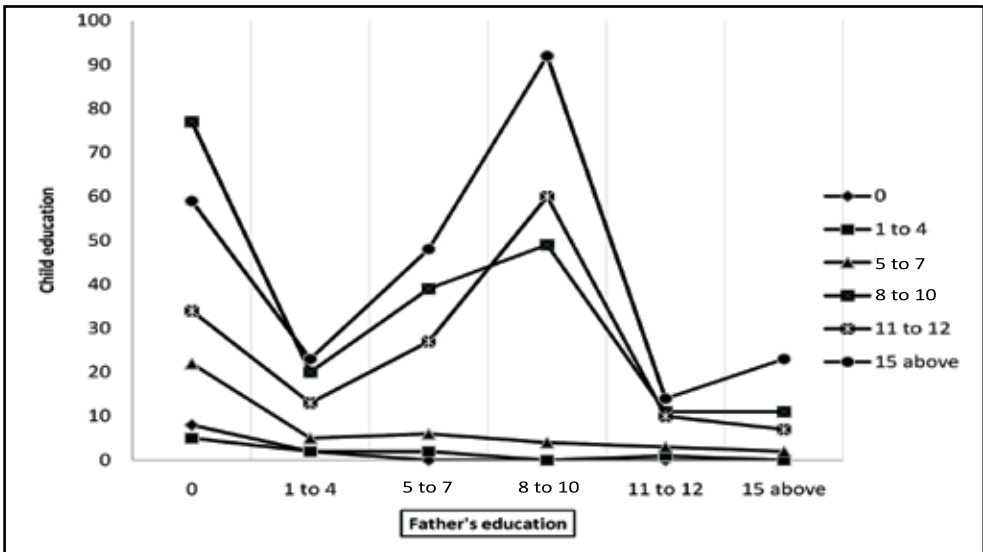

*Figure 2. Child Education by Mother's Education*



*Figure 3. Child Education by Father's Education*

## Instrumental Variable Estimation Method

The high intergenerational relations between parental education and child schooling may simply be a correlation or there may be a causation. Even if there is causation, there may also be the problem of endogeneity. Higher educated parents may choose to give higher education for their children. Therefore, child schooling is influenced by parental ability, and hence father's education and mother's education are endogenous variable. To identify the causal effects of parent's education on child's education, it is useful to have variation in parent's education that is exogenous to parental ability and other factors. Therefore, an instrumental variables (IV) approach is used in this paper to overcome the problem posed by endogeneity. The choice of instrumental variable is the New Scheme of Elementary Education (NSEE) introduced in 1953 which made schooling compulsory. Parental education is highly influenced by this scheme while child schooling is not correlated with this. Therefore, parental education is instrumented by the NSEE.

Consider a structural equation,

$$y_1 = \beta_0 + \beta_1 y_2 + \beta_2 z_1 + u_1 \quad (1)$$

where the y variables are endogenous; the $z$ variable is exogenous. With endogeneity, the OLS point estimates will be biased and inconsistent, since the error term will be correlated with $y_2$. Therefore, $y_2$ need to be replaced with an instrumental variable ($z_2$) such that the IV is correlated with $y_2$, but not correlated with the error term, $u_1$. Rewriting the endogenous explanatory variable in terms of the exogenous variable, including the instrument, $z_2$,

$$y_2 = \pi_0 + \pi_1 z_1 + \pi_2 z_2 + v_1 \quad (2)$$

The key identification condition is that $\pi_2 \neq 0$; that is, after partialing out $z_1$, $y_2$ and $z_2$ are still meaningfully correlated. Under the assumption that $cov(z_2, v_1) = 0$, the instrumental variable estimator of equation (1) is derived by writing down the normal equations for the least squares and solving them for the point estimates.

## Two Stage Least Squares Estimation Method

Consider the structural model with two exogenous variables, $z_2$ and $z_3$, excluded from equation (1), and, under the assumption of exclusion restrictions, are uncorrelated with the error term $u_1$. If $z_2$ and $z_3$ are both correlated with $y_2$, then each variable could be used as an IV. However, there will be two IV estimators, and neither of these would, in general, be efficient. As a way out, any linear combination of the exogenous variable can be a valid IV, since each of $z_1$, $z_2$ and $z_3$ is uncorrelated with $u_1$. The best linear combination IV is the one that is most highly correlated with $y_2$. This is given by the reduced form equation for $y_2$. Therefore,

$$y_2 = \pi_0 + \pi_1 z_1 + \pi_2 z_2 + \pi_3 z_3 + v_2 \quad (3)$$

where $E(v_2) = 0$, cov $(z_1, v_2) = 0$, cov $(z_2, v_2) = 0$, cov $(z_3, v_2) = 0$.

Then, the best IV for $y_2$ is the linear combination of the zs, which can be written as $y_2^*$ given by,

$$y_2^* = \pi_0 + \pi_1 z_1 + \pi_2 z_2 + \pi_3 z_3 \qquad (4)$$

For this IV not to be perfectly correlated with $z_1$ need at least one of $\pi_2$ or $\pi_3$ to be different from zero, which is a key identification assumption, once all zs are assumed to be exogenous. The structural equation is not identified if $\pi_2 \neq 0$ and $\pi_3 \neq 0$, which can tested with an F-statistic. The variable $y_2$ into two components: the first component is $y_2^*$, the part of $y_2$ that is uncorrelated with the error term $u_1$; the second component is $v_2$, which is possibly correlated with the error term with $u_1$, thus making $y_2$ possibly endogenous.

Given data on the zs, $y_2^*$ can be computed for each observation, provided the population parameters $\pi$'s are known. As the population parameters are not known in practice, the reduced form equation may be estimated by OLS. Using the sample, $y_2$ is regressed on $z_1, z_2$ and $z_3$ to yield the fitted values,

$$\hat{y}_2 = \hat{\pi}_0 + \hat{\pi}_1 z_1 + \hat{\pi}_2 z_2 + \hat{\pi}_3 z_3 \qquad (5)$$

The estimated $\hat{y}_2$ can then be used as an IV for $y_2$,

$$\sum_{i=1}^{n} (y_{i1} - \hat{\beta}_0 - \hat{\beta}_1 y_{i2} - \hat{\beta}_2 z_{i1}) = 0 \qquad (6)$$

$$\sum_{i=1}^{n} [z_{i1}(y_{i1} - \hat{\beta}_0 - \hat{\beta}_i y_{i2} - \hat{\beta}_2 z_{i1})] = 0$$

$$\sum_{i=1}^{n} \{z_{i2}(y_{i1} - \hat{\beta}_0 - \hat{\beta}_i y_{i2} - \hat{\beta}_2 z_{i1})\} = 0$$

The three equations for estimating $\beta_0, \beta_1,$ and $\beta_2$ are the first two equations with the third replaced by,

$$\sum_{i=1}^{n} [y_{i2}(y_{i2} - \hat{\beta}_0 - \hat{\beta}_i y_{i2} - \hat{\beta}_2 z_{i1})] = 0 \qquad (7)$$

Solving the three equations in three unknowns gives the IV estimators.

## EMPIRICAL ANALYSIS

The estimating empirical specifications are,

$$Ed_C = \beta_0 + \beta_1 Ed_P + \beta_2 \ln(HINC) + \beta_3 \ln(OINC) + \beta_4 SG + u_i \qquad (8)$$

$$Ed_P = \alpha_0 + \alpha_1 NSEE_P + \alpha_2 \ln(HINC) + \alpha_3 \ln(OINC) + \alpha_4 SG + v_i \qquad (9)$$

where $Ed_C$ is years of education of child, $Ed_P$ (p = father, mother) is years of education of parents, $\ln(HINC)$ is log of total household earned income, $\ln(OINC)$ is log of income of the household from other sources like interest income, rent, etc., and SG is social group, i.e., community to which the household belongs. The instrumental variable NSEE equals 1 if the parent has gone through the New Scheme of Elementary Education, and 0 otherwise. That is, the variable NSEE essentially captures whether the parents went to school before or after 1953 when the scheme was introduced. The equations are estimated by the IV-2SLS method so that equation (9) is the first stage and NSEE serves as an instrumental variable for parental education. Social categories are included as in India, caste is an important socio-economic factor that plays a crucial role in determining education,

occupation, and earnings. The coefficients $\beta_1$ and $\beta_2$ which relate the education level of the child with that of parents and their income are the measures of intergenerational mobility. A higher value for the coefficients implies that parental education has stronger effects on the schooling of their children, and therefore less mobility, that is there is intergenerational transmission. The extent to which these coefficients are less than unity describe how fast differences in education tend to systematically lessen across generations.

Table 1 presents the proportion of individuals whose distribution of education prior to NSEE introduction in 1953 and after the scheme. It can be observed from the table that while the proportion of fathers who were illiterates before the introduction of NSEE in 1953 has declined drastically, there has been only moderate improvement in the case of mothers.

However, proportion of mothers with primary and secondary education has increased substantially. Further, the proportion of both fathers and mothers in post secondary education has declined, perhaps due to the location and distance to higher education institutions.

The summary statistics of the variables in empirical analysis are presented in Table 2. It can be noted from the table that the mean years of education of the child are higher than the education of parents. From the correlation matrix presented in Table 3, it is also to be noted that mother's education has more statistically significant correlation than father's education. Similarly, other income of mother has significant positive correlation with child education, whereas father's other income has no statistically significant correlation with the schooling of the child. Household income also has a positive

**Table 1**
**Percentage Distribution of Education Before and After NSEE**

| Education level | Father | | Mother | |
|---|---|---|---|---|
| | **Before NSEE** | **After NSEE** | **Before NSEE** | **After NSEE** |
| 0 | 33.83 | 21.85 | 43.24 | 41.65 |
| 1–4 | 12.03 | 8.51 | 2.70 | 8.26 |
| 5–7 | 14.28 | 18.70 | 18.92 | 22.81 |
| 8–10 | 23.30 | 31.85 | 16.22 | 21.82 |
| 11–12 | 10.52 | 4.63 | 2.70 | 3.14 |
| 13–15 | 5.26 | 3.89 | 8.11 | 2.31 |
| > 16 | 1.50 | 2.78 | 5.41 | 0.83 |

correlation with years of education of the child. Social group of the household has a negative relation with the educational attainment of children belonging to the backward and deprived community.

**Table 2**
**Descriptive Statistics of Variables**

| Variable | Child | Father | Mother |
|---|---|---|---|
| Age | 22.68 (6.12) | 51.78 (7.81) | 45.13 (7.43) |
| Education | 11.88 (3.56) | 5.70 (4.73) | 4.43 (4.39) |
| ln (HINC) | – | 11.77 (0.80) | – |
| ln (OINC) | – | 9.44 (3.82) | 11.45 (1.39) |
| No. of Obs. | 678 | | |

**Table 3**
**Correlation Matrix**

| Variable | $Edu_c$ | SG | $Ed_f$ | ln(HINC) | ln($OINC_f$) | $Ed_m$ | ln($OINC_m$) |
|---|---|---|---|---|---|---|---|
| $Edu_c$ | 1.00 | | | | | | |
| SG | -0.10 (0.12) | 1.00 | | | | | |
| $Ed_f$ | 0.23* (0.00) | -0.01 (0.84) | 1.00 | | | | |
| ln(HINC) | 0.11** (0.09) | 0.02 (0.75) | 0.30* (0.00) | 1.00 | | | |
| ln($OINC_f$) | 0.04 (0.52) | 0.05 (0.39) | -0.15* (0.02) | 0.156* (0.01) | 1.00 | | |
| $Ed_m$ | 0.25* (0.00) | -0.003 (0.95) | 0.62* (0.00) | 0.347* (0.00) | -0.11** (0.07) | 1.00 | |
| ln($OINC_m$) | 0.12* (0.05) | 0.10 (0.12) | 0.05 (0.41) | 0.44* (0.00) | 0.08 (0.19) | 0.15* (0.01) | 1.00 |

*Notes: t-values in parentheses*
*\*significance at 5 per cent level*
*\*\*significance at 10 per cent level*

**Table 4**
**OLS Estimates of Intergenerational Mobility**

| Variable | Spec.1 | Spec.2 | Spec.3 | Spec.4 | Spec.5 |
|---|---|---|---|---|---|
| **Dependent Variable: Years of Education of Child** | | | | | |
| $Ed_f$ | 0.172* (0.00) | – | 0.121* (0.00) | 0.081* (0.01) | 0.098* (0.00) |
| $Ed_m$ | – | 0.200* (0.00) | 0.191* (0.00) | 0.129* (0.00) | 0.130* (0.00) |
| ln(HINC) | – | – | – | 0.234 (0.15) | 0.071 (0.72) |
| $ln(OINC_f)$ | – | – | – | – | 0.056** (0.093) |
| $ln(OINC_m)$ | – | – | – | – | 0.213* (0.042) |
| SG (SC/ST) | – | – | – | -0.529* (0.035) | -0.56* (0.024) |
| Constant | 10.57* (0.00) | 10.64* (0.00) | 9.48* (0.00) | 7.97* (0.00) | 8.99* (0.00) |
| R-square | 0.209 | 0.226 | 0.433 | 0.383 | 0.459 |
| F-statistic | 30.12 | 35.36 | 50.38 | 46.63 | 55.30 |

Notes: Absolute t-values in parentheses
*significance at 5 per cent level
**significance at 10 per cent level

Table 4 presents the OLS estimates of intergenerational education mobility. The years of education of parents, $Ed_f$, and $Ed_m$, has a positive and statistically significant effect on the years of education of child. Though the effect of household income on child schooling is positive, it is not statistically significant. However, non-earned income of parents is significantly and positively related to educational of child. Note that the effect of both mothers, education and non-labour income on child education is higher than that of the father. Clearly, education of women has a strong influence on children, not only on child education but also on health and behaviour, as has been documented in numerous studies. It is also to be observed that the social group (SC/ST) has a significant negative effect on the education of children belonging to the deprived communities.

As has been pointed out earlier, in order to overcome the endogeneity issue of OLS estimation, the intergenerational education mobility model has been estimated by IV-2SLS method instrumenting parental education with the New Elementary School Education Scheme of 1953. In the IV-2SLS estimation, the first stage equation (9) is first estimated for father education and mother

education separately by regressing on all other exogenous variables and the excluded instrument to obtain predicted values. In the second stage estimation, child education (equation 8) is regressed on the predicted values from the first stage. Table 5 presents the 2SLS results, where the instrument NSEE is the indicator variable whether father and mother attended school before or after 1953. The 2SLS results show that only mother's education and community are statistically significant, while father's education and incomes have no significant effect on child education. While mother's education has a strong positive effect on years of education of child, the negative effect of SC/ST community on child schooling is even stronger in IV-2SLS estimates. Thus, the IV-2SLS estimates show that there is

no intergenerational mobility, but there may be some intergenerational transmission of mother's education.

Table 6 presents the OLS and IV results of intergenerational mobility among the pairs of parent-child households. It can be clearly observed that mother's education is more influencing than the fathers in both parent-son and parent-daughter pairs. Further, only mother's education is positive and statistically significant in the IV estimates, whereas father's education is insignificant in parent-child educational relationship. This result is similar to Black et al., (2005) who observes that the IV estimates, compared to OLS estimates, of mother's education has significant influence on children's education than the father's education.

**Table 5**

**OLS and IV Estimates of Intergenerational Mobility**

| Dependent Variable: Years of Education of Child | | |
|---|---|---|
| *Variable* | *OLS* | *IV-2SLS* |
| $NSEE_f$ | -0.415 (0.66) | 0.047 (0.99) |
| $NSEE_m$ | 0.437* (0.00) | 0.604* (0.00) |
| ln(HINC) | 0.515 (0.64) | 0.879 (0.78) |
| $ln(OINC_f)$ | 0.074 (0.97) | 0.749 (0.77) |
| $ln(OINC_m)$ | 0.054 (0.86) | 0.438 (0.75) |
| SG (SC/ST) | -0.578* (0.00) | -0.828** (0.08) |
| Constant | 5.71* (0.00) | 6.38* (0.00) |
| R-square | 0.228 | 0.357 |
| Wald-Chi 2(6) | 51.32 | 14.37 |

*Notes : Absolute t-values in parentheses*

*\*significance at 5 per cent level*

*\*\*significance at 10 per cent level*

**Table 6**
**Relationship between Parent and Children Education**

| Variable | OLS | IV |
|---|---|---|
| Mother-all | 0.191* (0.00) | 0.600* (0.05) |
| Mother-son | 0.213* (0.00) | 0.638** (0.08) |
| Mother-daughter | 0.173* (0.00) | 0.611** (0.08) |
| Father-all | 0.121* (0.00) | 0.3942 (0.66) |
| Father-son | 0.184* (0.000) | -0.382 (0.80) |
| Father-daughter | 0.124* (0.000) | -0.345 (0.68) |

## CONCLUSION

Education is a primary determinant of long term economic success and a key mechanism of social mobility, capable of lifting the disadvantaged children and improving their chances for success. Also, people who are well educated are likely to have children who are also well educated. The converse holds for people who have low education. The parent-child educational outcomes may simply reflect intergenerational transmission or there may be intergenerational mobility. Thus, there is a strong intergenerational association between parental education and education of their children. This intergenerational mobility is a measure of the change in social status which occurs from parent's to the children's generation. Intergenerational mobility studies concentrate on how children's income or education correlates with the income, occupation or education of their parents. This paper analyses the intergenerational educational relations in India between parental education and educational attainments of their children using the Indian Human Development Survey 2011–12 (IHDS-II) data pertaining to the 678 households in the state of Tamil Nadu.

As there may be endogeneity problem in econometric estimation of intergenerational educational mobility in that parental ability may be correlated with parental education, this paper employs an instrumental variable two stage least squares (IV-2SLS) method for estimation. The instrument chosen is the New Scheme of Elementary Education implemented in Tamil Nadu in 1953, making primary education compulsory. The NSEE provides for variation in parental education that is exogenous to parental ability, and hence NSEE is IV for parental education.

Initial OLS estimation results show that there is some significant positive impact of parent's education on child's education, suggesting intergenerational mobility. Also, mother's education has a stronger influence than father's education on

the educational outcomes of children. The IV-2SLS estimates show that mother's education positively and statistically significantly influences child's schooling. The results are reinforced by the IV estimates of the parent-child pairs of both sons and daughters. Thus, both OLS and IV-2SLS estimates exhibit the strong relevance of mother's education relative to father's education on their child education. Overall, there is intergenerational educational relationship in India, which is positively influenced by female education. With strong intergenerational educational persistence, the Indian society seems to be less mobile intergenerationally, and there is significant intergenerational transmission of education.

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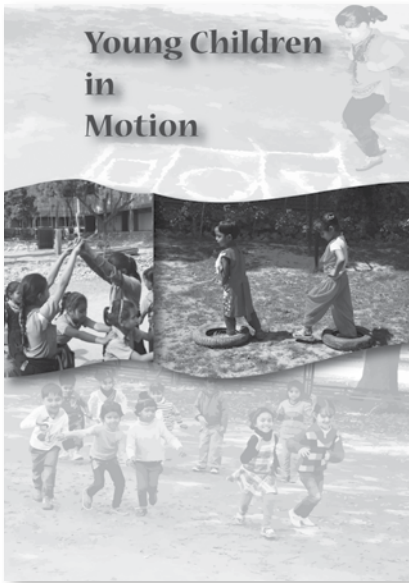
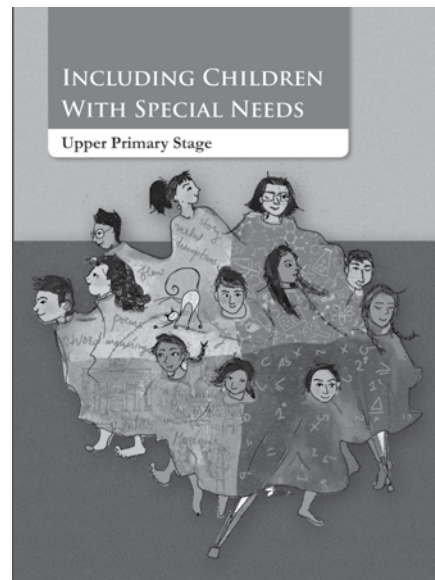## Young Children in Motion
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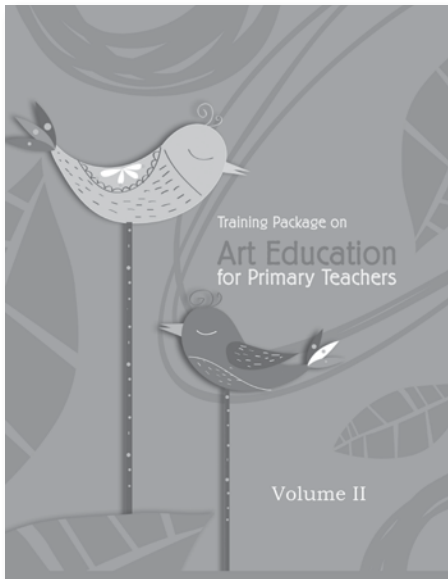
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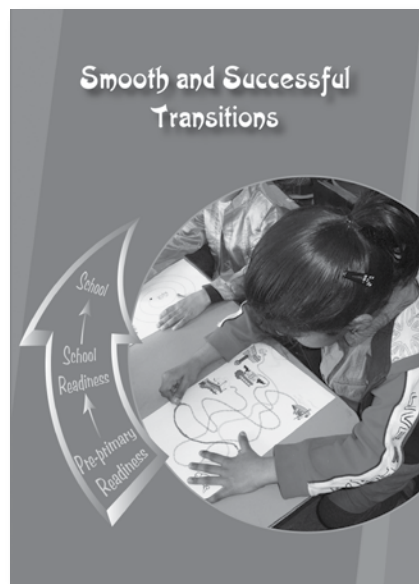**Art Education**
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