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Pre-service Science Teachers' Diaries: Tools for Reflection

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Abstract: *Teaching has no readymade template which can be used by the teachers. Teachers need to know their learners very well. Teachers must understand their strengths and weaknesses as well. They can develop their teaching style by capitalizing on their strengths. If a teacher has a good modulating voice then this can be used effectively for transacting a lesson plan. But only a well informed teacher can make the final decision which again can be re evaluated. A teacher becomes a better decision maker by improving his ability to make sound and apt judgements, through reflection. In teacher education institutions, pre-service teachers must be given opportunities to express their assumptions about children, beliefs about knowledge and processes of learning. Reflection on one's own work is a key component of being a professional (Schon, 1983) and is essential to teacher education. Today, science teaching and learning is no longer restricted to experiments and demonstrations. Analysis, synthesis, inquiry and metacognition are important dimensions of science teaching-learning process. Science teachers across the country need to be able to use these techniques in their classroom pedagogy to provide every learner with optimal learning environments.*

This paper discusses how pre-service teachers in Army Institute of Education, were given orientation to reflection as an important pedagogy. Pre-service teachers were instructed to maintain a reflective diary based on their school life experiences. 34 pre-service science teachers were given certain broad areas to focus on during their reflective writing. This paper examines at the change in the beliefs of the pre-service teachers about nature of children, knowledge and processes of learning. The study shows that science pre-service teachers are better reflective practitioners after undertaking the reflective diary activity.

Keywords: Pre-service teachers, Classroom pedagogy, Reflective diaries, Reflective writing.

Introduction

Pre-service teachers, when get enrolled in teacher education course, bring with them a number of assumptions about the learner, teaching and the institution. Pre-service teachers in teacher education have already had experience of schooling as desired and designed by third person perspective. Due to elongated experience under the thumb of third person perspective in an institutionalized atmosphere and other reason, every novice adult learner internalized certain assumptions, and beliefs regarding human nature, human being, knowledge, learner, learning, schooling and normative structure of institution and intentional states of individual. These assumptions that have been crystallized shape the practices and relations of individuals with human beings, material and morals.

For example, during their school days, pre-service teachers may have experienced educational settings which reinforce the notion that learning means knowing the right answer. Their classroom experiences could be characterized by the use of worksheets, and other product oriented forms of assessment, an emphasis on external forms of motivation such as grades, and other strategies to control their behaviour. They may not have experienced classrooms where they were encouraged to solve their own problems, develop their own questions & search for answers, or use critical analysis & reflection to develop their own ideas about issues, the use of diaries, and discussion of their daily classroom achievements and failures. The teacher education curriculum must provide pre-service teachers opportunities to reflect on their assumptions about children, beliefs about knowledge and processes of learning. Teacher education programme being a course of and on process set a new process of unearthing unconscious, conscious assumptions and beliefs to the fore and provide opportunity to every learner to reflect on one's assumptions.

This paper discusses how 34 pre-service teachers in Army Institute of Education, were given orientation to *reflection as an important pedagogy*. Pre-service teachers were instructed to maintain a reflective diary based on their school life experiences. This paper provides a framework for inclusion of reflection in teacher education curriculum. Reflective practices on one side can help the pre-service science teachers in having a dialogue with oneself and later as a regular teacher knowing the pre existing ideas of learners. This will help pre-service science teachers in understanding their own assumptions and beliefs and to also realize the need for further improvement.

Research Questions

The research questions that guided this study are:

1. What was the change in the beliefs of the pre-service teachers related to nature of learner, knowledge and the learning processes after writing their reflective diaries?
2. What are the bigger ideas exemplified by the comments recorded in the reflective diaries by the pre-service science teachers?

The answers of these questions will help teacher educators as well as teachers in developing and adopting different reflection tools or instruments like reflective diaries. The answers of these questions will help in the effective integration of reflective practices in teacher education curriculum. Reflective practices will help teachers become aware of their existing ideas about knowledge, children and other teaching related issues. This self understanding will later improve their ability to understand their learners better because as learners they process their work, assessing and reconsidering for improved performance, that is, 'doing things right'. This is called reflective learning for improvement.

Theoretical Underpinnings

The importance of integrating experience with reflection was introduced by Dewey (1933), who explained the complexities of learning from practical experiences and the need for teachers to develop a capacity for reflective action. Shulman (1987) was among the first advocates who called for teacher education programs to assist prospective teachers in connecting theory and practice through reflective opportunities. Zeichner and Liston (1987) and Smyth (1989, 1992) called for critically reflective practitioners who were willing and able to reflect on the reasons and consequences of their actions. Prospective teachers must become aware of how their thinking, beliefs, and values impact their actions (Ross, Bondy, & Kyle, 1993) and have methods for evaluating instruction and a process for applying the knowledge they receive in their preparation programs (Dieker & Monda-Amaya, 1997). Reflection is the interaction of experiences with analysis of beliefs about those experiences (Newell, 1996), a developmental process resulting in more in-depth and sophisticated reflection over time (Pultorak, 1996).

To facilitate the development of the process of reflection and reflective learning during training, many professional education programmes engage students in writing reflective journals as one of the learning activities (Conner-Greene, 2000; Patton, Wood & Agarenzo, 1997; Woodward, 1998). The literature indicates that reflective journal writing enhances reflection, critical thinking, integration of theory with practice, and promotes professional growth (Brown and Sorrell, 1993; Callister, 1993; Kea & Backon, 1999; O'Rourke, 1998; Patton, Sinclair & Woodward, 1997). As an assessment method, reflective journals do not only provide evidence of understanding of content knowledge, reflection, professional judgment and application, but also enhance critical self-reflection and self-awareness (Biggs, 1999; O'Rourke, 1998), and improve student assessment performance (Conner-Greene, 2000).

Although a few studies have shown that the majority of students are writing highly reflective journal entries (e.g., Sumsion and Fleet 1996; Williams et al., 2002) but a large number of research studies show a more troubling picture, revealing that the large majority of students are writing merely descriptive accounts of events (e.g., Minott 2008; O'Connell and Dyment, 2004; Richardson and Maltby 1995; Wessel and Larin, 2006. This study was planned to get an insight into the thinking of pre-service science teachers during their school life experience of three years.

Method

The most common way of capturing learning is to use a reflective journal or diary. This approach is encouraged because it not only records events and reactions to them, but also helps to provide a different perspective or clarity to any initial thoughts. Additional benefits include:

- method of storing new ideas, insights, and understanding,
- increasing 'ownership' and confidence,

- developing questioning, problem solving and critical thinking skills,
- allows expressions of intuition, creativity and emotion,
- clarifies achievements, professional goals and career aspirations,
- can be integrated into learning sets and other types of collaborative learning. (Surgenor, 2011)

Science pre-service teachers were asked to reflect on their classroom experiences each day and to write about them freely. This can be considered as '*guided reflective activity*' by pre-service teachers. They were to review events that went well and those that did not and to try to explain why the events turned out as they did. They were encouraged to express their feelings about the day and the people involved.

I. General Discussion

Before starting this reflective diary writing activity, pre-service teachers had a general discussion with the researcher. The purpose of this discussion was to get an idea about their beliefs about the nature of the learner, learning and assessment etc.

II. Guided Reflective Diary Entries

In their diaries, pre-service science teachers were expected to write about:

1. Background Information.
2. Writing about ten major concerns – Write your ten major concerns before commencement of teaching like: discipline, maintaining relations with students, faculty members etc.
3. Reflective Diary (day-to-day basis).

Instructions given to pre-service science teachers in writing their diaries were:

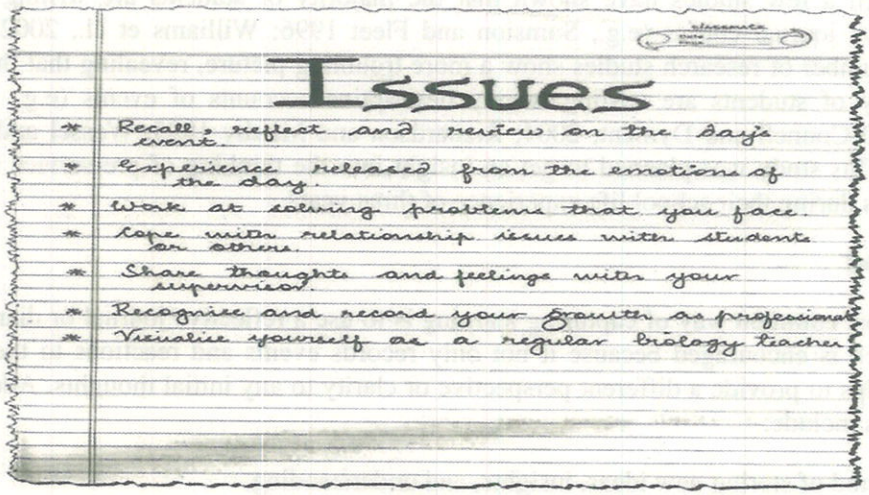


Figure 1

- Recall, review and reflect on the day's events.
- Experience release from the emotions of the day.
- Work at solving problems that they face.
- Cope with relationship issues, with students or others.
- Share thoughts and feelings with their supervisor.
- Recognize and record their growth as professionals. (Schwebel, S.L. & Schwebel, D.S. 2001)

4. Summing Up
   - Reflective Diary writing was followed by.

III. Filling a Questionnaire (developed by the researcher)

IV. Personal Interviews

VI. Analysis of an Exemplar Reflective Diary

V. Analysis of all the Reflective Diaries to identify bigger ideas.

The analysis of the reflective diaries was initiated by organising the reflections of the pre-service teachers. Then an effort was made to find **common themes** among all these comments. Then researcher tried to see if there is anything in common. Researcher tried to identify big ideas exemplified by these comments. Can these big ideas be linked to 10 major concerns of the teachers?

Sample

The sample consists of 34 science pre-service teachers of Army Institute of Education, Delhi Cantt, New Delhi, India. The respondents were 34 pre-service science teachers in a one-year teacher preparation programme conducted at the Army Institute of Education, Delhi Cantt, (affiliated to I.P. University). All the respondents were army dependents. A majority of the respondents (85.3%) were female. These respondents taught chemistry as well as biology during their school life experience. On the basis of their educational background respondents were categorised as general science graduates (50%), chemistry postgraduates (22%) and biology postgraduates (28%). Most of those science pre-service teachers (95%) were young with a few life experiences.

The reflective diaries were maintained by the pre-service science teachers during the school life experience of the 2010-2011 academic years. School life experience/school teaching practice is an important component of pre-service teacher education programme. Pre-service teachers visit nearby schools allotted to them along with their supervisors. They visit their school three times in a week and minimum number of school teaching practice days are 40. They maintained their diaries during school life experience (Oct. to Jan.) and submitted it in the month of Feb. 2011.

Analysis of the Reflective Diaries

I. General Discussion

During general discussion before starting reflective diary writing activity, most of the pre-service teachers were quite vague about nature of learner, classroom management strategies, time management, need for content mastery, introduction of the lesson plan, activities and stimulus variation. Hardly any teacher had understanding about the thinking capabilities of their learners.

II. Ten Major Concerns of the Science Pre-service Teachers

The ten major concerns (in order of their preference) identified by the science pre-service teachers are:

1. *Uncertainty about What to Expect*: Most of the pre-service teachers had the *fear of unknown*. They were not aware of the expectations of others from them. They were worried more about the type of school they will be put into. They were also worried whether they will be able to bring a sense of moral well being into their students? Will they be able to put their ideas and their methods of teaching into actual practice? Will they be able to come up to the expectations of their supervisors? Will they be able to help their students in their thinking and learning process?

2. *Discipline*: Being from Army background, discipline was their major concern. Most (70%) of them felt that discipline can make life smooth and well structured. So, they wanted their practice teaching school as well as their classes to be taught to be well disciplined.

3. *Relationship with Students*: Having a good rapport with the students was their another concern. Most of them wanted to be a firm yet friendly. They were apprehensive about striking a balance between the two.

4. *Relationship with Staff Members*: Pre-service teachers considered this to be an important concern because only school teachers would have allowed them to use their own methods/styles of teaching.

5. *Methods and Motivation*: Will I be able to incorporate some kind of fun in my class? Will I be able to make my class interesting? Will my methods of teaching motivate my students to try and learn new things? These were some of the questions raised by pre-service teachers related to teaching method and student motivation.

6. *Resources Available*: Will there be enough resources in the practice teaching school allotted to me? Will I be able to get the laboratory facilities as well as other required materials for teaching? Will the subject teacher allow me or permit me to take the students to laboratory or do an activity in the middle of a

class if and when needed? What is the condition of the library? Are plenty of good books available for the students to read?

7. *Self Image*: Once school for teaching practice was allotted, then most of pre-service teachers started feeling like a teacher. They felt the pressure of behaving in a much matured way in front of their students. They felt pressurized to put across themselves as well behaved, well mannered and tolerant teachers.

8. *Lesson Plan*: Pre-service teachers were expected to make lesson plans before and during teaching practice. They had lots of concerns regarding this like – Whether they will get enough chapters to make lesson plans as per the expectation of the Army Institute of Education? Whether they will be able to make lessons more interactive and implement the same in the class too?

9. *Obtaining a Good Job after B.Ed:* They also had this concern that whether they will be able to get a good job after B.Ed. or not? Most of them were interested in becoming self-sufficient after B.Ed.

10. *Individual Attention to Each Student*: Will my all the students be able to understand the concepts if I come well prepared for the class/prepare teaching aids? What can I do for the weak students of the class? Will it be possible for me to manage the class and at the same time perform my job and duty as a teacher who pays individual attention to each student? How to handle those students who are not interested in studies? How to bring a positive change in their behaviour?

III. Analysis of an Exemplar Reflective Diary

For detailed picture about sharing of school life experiences by pre-service science teachers, one reflective diary of a student AB was chosen. Researcher found this reflective diary to be the representative of the responses of the other pre-service teachers. Therefore, this reflective diary was taken as the exemplar.

Case I	AB
Class allotted	VII B
Subject	Life Science
Chapters Taught	1) Weather 2) Climate and Adaptations of Animals to Climate 3) Respiration in organisms

Month	Topic	Misconceptions of Students	Problems Faced	Strategies Adopted	Lessons Learned	Reasons to be Happy/Unhappy
October (Fig. 2)	Weather	Distinction between climate and weather was not clear	1) At times, it becomes difficult to explain a concept to weak students, since they do not pay attention as it is difficult for them to understand the concept. 2) The major problem is to maintain the classroom discipline since the students pay attention for a very little time.	1) Quoting examples from their daily life 2) Giving students opportunities to derive the definition	1) To be patient with students. They might not listen to you continuously for which we need to change our methods frequently so that it does not get boring with the students. 2) Pictorial depiction helps in better retention.	---
(Fig. 3)	Adaptations and Migration		1) Some children distract the class and do not wish to study for themselves and do not let others to do as well. 2) Lack of resources and study material for children. 3) The library does not have good books for children to study.	1) Use of analogies 2) I decided to take an Encyclopaedia with me to show pictures of Red Eyed Frog, and several other animals living with similar adaptations in these forests.	1) Experimentation with newer methods. 2) I need to make myself more audible and a bit strict. 3) As a teacher and as a professional I might be evolving, but as a regular biology teacher there are things which need to be taken care of. 4) The students have learnt to observe their surroundings but their thinking power is very poor. 5) Very few	1) ☺ Use of Encyclopaedia as well good examples made children enjoy the class and there wasn't a single student whose attention deviated for a single minute.

					students ask questions.	
(Fig. 4)	Respiration in Organisms		1) Students were not able to visualise shape and structure of yeast while I was explaining fermentation in yeast.	1) I explained with the help of the diagram of yeast. 2) Good classroom interaction by asking such questions which can make students think. 3) I made a model to explain the breathing mechanism in man.	1) I need to always find a suitable method to come down to their level. 2) Students remember things easier when they are written in the form of a flow chart.	1) ☺ The class now runs smoothly since the students are familiar with my style of teaching.
November	Respiration in Organisms		1) In a Govt. school, the exposure of students is very less. 2) Students at times could not make out what I asked.	1) Use of different strategies by teachers was appreciated by students. 2) I have tried to make my lessons interesting and have made certain plans for helping the students do some projects and assignments. 3) I rephrased the question when students could not understand.	1) Although, I use a lot of teaching aids and at times real objects also, but still I have yet to inspire and motivate my students to develop 'Out of Box' thinking and not just restrict themselves to textbooks.	1) ☺ My students respect me as teachers, and therefore I feel that I should do much more for them. 2) ☺ Students asked good questions while explaining about Respiration in Dolphins and Whales like: Why do they have fountain of water coming from their blowholes? Do they have gills?
January	Forests:			1) Role-play	1) We must	1) ☺

(Fig. 5)	Our Lifeline			followed by Brain storming session and then discussion on importance of forests.	sensitize children on issues related to environment.	Consider-able improvement in classroom management stratagies. 2) Students have become more cooperative. 3) Kuldeep, my student, who never used to speak earlier has now started raising hands very frequently.

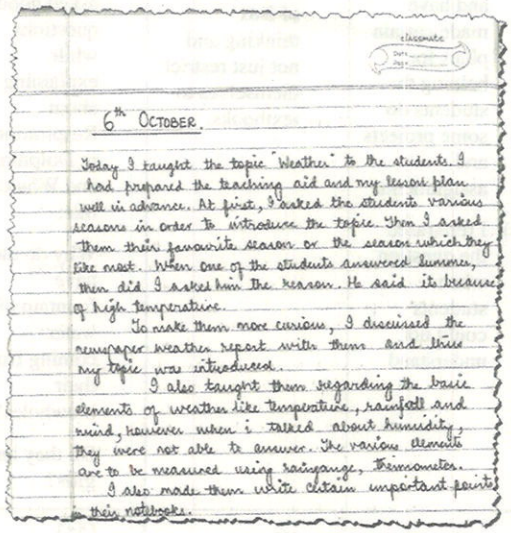
Conclusion:

AB writes that "*Writing this diary has helped me to reflect on teaching, thus providing a focus for analysing and developing the teaching learning process. The first few days in the teahing practice went in achieving proper classroom control and management. Building a rapport with the students was difficult in the beginning but with the passage of time things changed. Then the focus shifted to attaining maximum level as a professional biology teacher. I learned to relate ideas and concepts with daily life.*

This reflective diary writing helped me to focus on certain key issues like class management, a group of children or a single student, childrens skills and strategies for coping up.

It also helped me to know myself better and my untapped qualities and talents also came on the surface.

It gave us maximum space for self-improvement and growth as a professional teacher.



6th OCTOBER.

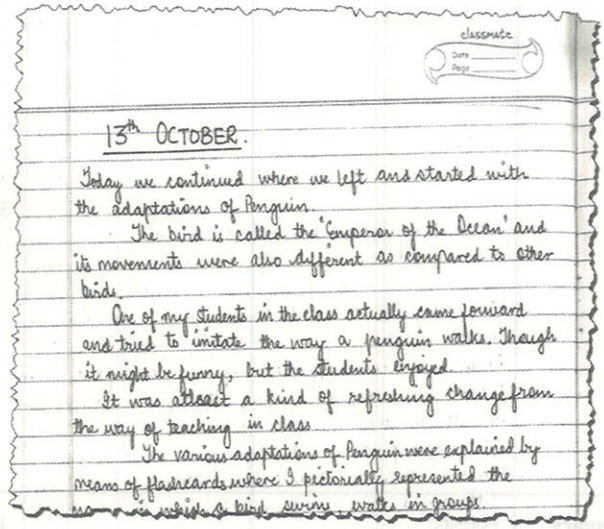
Today I taught the topic 'Weather' to the students. I had prepared the teaching aid and my lesson plan well in advance. At first, I asked the students various seasons in order to introduce the topic. Then I asked them their favourite season or the season which they like most. When one of the students answered Summer, then did I asked him the reason. He said its because of high temperature.

To make them more curious, I discussed the newspaper weather report with them and thus my topic was introduced.

I also taught them regarding the basic elements of weather like temperature, rainfall and wind, however when i talked about humidity, they were not able to answer. The various elements are to be measured using raingauge, thermometer.

I also made them write certain important points in their notebooks.

Figure 2



13th OCTOBER.

Today we continued where we left and started with the adaptations of Penguin.

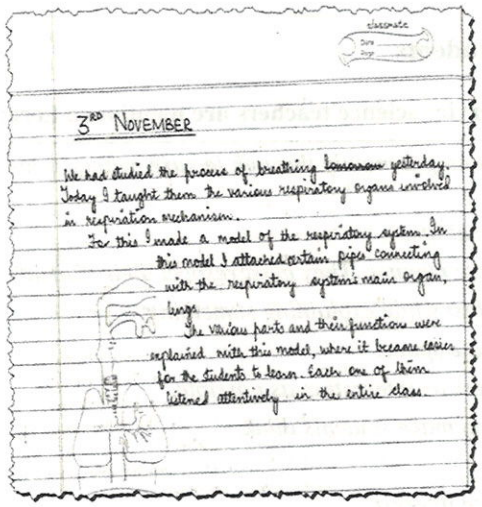
The bird is called the 'Emperor of the Ocean' and its movements were also different as compared to other birds.

One of my students in the class actually came forward and tried to imitate the way a penguin walks. Though it might be funny, but the students enjoyed.

It was atleast a kind of refreshing change from the way of teaching in class.

The various adaptations of Penguin were explained by means of flashcards where I pictorially represented the

Figure 3



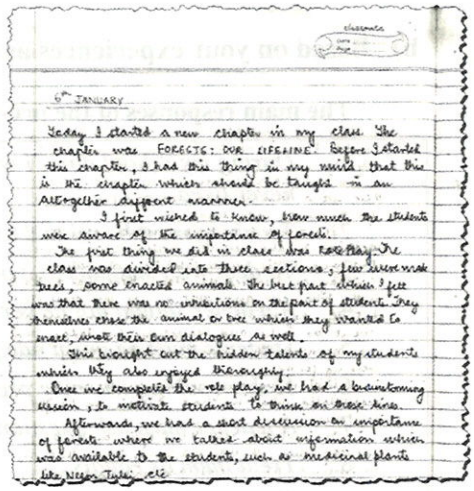
3rd NOVEMBER

We had studied the process of breathing ~~tomorrow~~ yesterday. Today I taught them the various respiratory organs involved in respiration mechanism.

For this I made a model of the respiratory system. In this model I attached certain pipes connecting with the respiratory system's main organ, lungs.

The various parts and their functions were explained with this model, where it became easier for the students to learn. Each one of them listened attentively in the entire class.

Figure 4



6th JANUARY

Today I started a new chapter in my class. The chapter was FORESTS: OUR LIFELINE. Before I started this chapter, I had one thing in my mind that this is the chapter which should be taught in an altogether different manner.

I first wished to know, how much the students were aware of the importance of forests.

The first thing we did in class was role play. The class was divided into three sections; few were made trees, some enacted animals. The best part about I felt was that there was no intervention on the part of students. They themselves chose the animal or tree which they wanted to enact, with their own dialogues as well.

This brought out the hidden talents of my students which they also enjoyed thoroughly.

Once we completed the role play, we had a brainstorming session, to motivate students to think on these lines.

Afterwards, we had a short discussion on importance of forests where we talked about information which were available to the students, such as medicinal plants like Neem, Tulsi, etc.

Figure 5

IV. Analysis of the items of the Questionnaire

After writing the reflective diaries, the pre-service science teachers were given a questionnaire related to *science teaching* and *how did they find this habit of reflection on their teaching*? The questionnaire included 3 items where pre-service science teachers expressed their views. These items were *subjective* and did not bind them to stick to certain identified/pre defined ideas.

Item I: *How can you improve your teaching practices? Give anecdotes wherever possible?*

a) Based on self learning

The main responses of the pre-service science teachers are given here:

1. *I was quite dominating in the beginning, now I will be more interactive.*
2. *I will use a variety of teaching methods and conduct a number of interesting activities.*
3. *I must learn to interact more.*
4. *I must read more and more literature to increase my knowledge. I must be aware of recent developments in my discipline.*
5. *I am quite introvert so I must learn to interact more.*
6. *I must update myself as I am not aware of the recent discoveries.*
7. *I shall try to go beyond the book and try to have more classroom discussions.*
8. *I need to gain more confidence and at the same time to be more patient.*
9. *At times I am not able to come down to their level, so I must learn to simplify things keeping in mind their level.*
10. *I must encourage them to ask questions.*
11. *I get many new ideas about teaching aids after teaching the topic so therefore I must write about these ideas and later make use of them.*
12. *I must devote more time for preparing the topic.*
13. *I must learn to handle my class more effectively.*
14. *I must learn more about my students.*
15. *I need to improve my communication skills.*

b) Based on your experiences as students

The main responses of the pre-service science teachers are mentioned here:

1. *During my school days, I was taught mainly through lecture method which I never liked.*
2. *Teaching must be related to real life.*
3. *To deal with students in a polite manner. They must respect their students.*
4. *A teacher should not be very fast while explaining something.*
5. *Students must be given adequate space.*
6. *Make teaching-learning process as interesting as possible.*
7. *A teacher must ask questions to make students think.*
8. *Treat them as equals.*
9. *Vary teaching method to create interest.*
10. *Involve students in projects and various other activities.*
11. *Pay attention to students and make teaching interactive and interesting.*
12. *Teachers should be knowledgeable and enthusiastic.*
13. *Teachers must be role models.*
14. *Teachers must understand the psychology of the child and must learn to come down to their level.*
15. *Teachers must be devoted to teaching and ready to experiment.*

c) Based on the teaching methodology taught/interaction with the methodology teacher

The main responses of the pre-service science teachers are mentioned here:

1. *Classes to be more interactive and use of relevant examples during explanation.*
2. *Realistically possible planning.*
3. *Interesting introduction and varying the teaching method like* "I used firkis, activities with Balloons, candle activities etc. for explaining the topic AIR.
4. *Explaining concepts, processes with the help of diagrams, demonstrations, models etc.*
5. *Use of good teaching aids like* "I used a sample of a weather report for explaining the topic CLIMATE".
6. *Use of different activities like* "I conducted a role-play for explaining Plant Waste topic.
7. *Need to improve BB summary.*
8. *Different types of teaching aids like* "I used a map of India to write names of different National Parks" while teaching a topic NATIONAL PARKS.
9. *Activity based learning to make them interested.*

d) Based on an understanding of thinking of students

The main responses of the pre-service science teachers are mentioned here:

1. *Students respect teachers who are knowledgeable, enthusiastic, just and ready to experiment.*
2. *Ask questions to find out the level of the students.*
3. *Wherever possible, take them to visit different places to have first hand learning experience like "I take them to the school lawn while teaching about plants".*
4. *Use of educational games to make teaching learning-learning process interesting.*
5. *Take feedback/suggestions from students like in my case they found my language to be very difficult.*
6. *No book reading in the class.*
7. *Teachers should be approachable, knowledgeable, ask questions and give them clues in case they are unable to answer.*
8. *Retention is more if content is transacted in an interesting manner like use of flowcharts, pictures and drawings.*

Item II: *Write about any ONE teaching experience where you involved students actively. Write name of topic, class, school's name and active teaching-learning method used. Give the reaction of the students, along with your experience. Did you find any chaos in the class?*

I am mentioning here just one response chosen randomly.

Name Of Topic – Deforestation,

Class – VII,

School – N.P.Co.Ed. Sec. Laxmi Bai Nagar,

Method – Role-Play

Mostly Role-play method is used only with a group of 5-6 students, but here I had tried to give chance to more students, and they also participated with great enthusiasm and energy. The class was divided into THREE groups – Group A: Plants and Trees; Group B: Animals; Group C: Human Beings.

All these groups had prepared their dialogues on their own, acted and made noises like animals. The Group C was more of the narrator kinds, where they were describing the situations BEFORE (the uses of forests) and AFTER (effects of deforestation).

Item III: *How keeping a reflective diary did help you? Write your views in detail?*

The main responses of the pre-service science teachers are mentioned here:

1. *A reflective diary is a mirror that shows you your own self and need to improve so that you and your students both may gain.*
2. *A reflective diary helps a new teacher by providing opportunities to examine their apprehensions and misconceptions.*
3. *A reflective diary helped me in my growth because keeping this diary helped me in updating content knowledge.*
4. *Keeping a diary helped me a lot in understanding myself in a better way. From everyday we learn something. We come to know where we went wrong and what other options were possible.*
5. *It is an important tool. Actually we remember what we write. I experienced many times that my students are not listening to me and when reflected back then realised that I have become too friendly with them.*
6. *It is quite helping because it shows the way to follow by stimulating our thinking.*

Item IV: *Perceptions of Pre-service Science Teachers regarding Good Science Classroom Teaching*

On the basis of their personal interviews, pre-service science teachers' perceptions of a good science classroom teaching were revealed like:

1. *Classrooms to be highly interactive, open and good understanding between science teacher and the students (44.1% pre-service teachers).*
2. *Science classrooms to be full of well made charts and models, live and preserved specimens so as to relate to topic (29.4% pre-service teachers).*
3. *In science teaching students should be closer to the environment (nature), they must develop fondness with nature, and can relate their learning with the world around them (5.9% pre-service teachers).*
4. *Science classroom should be full of enthusiasm and students should be curious enough to bombard the questions (8.8% pre-service teachers).*
5. *In science teaching students must have the freedom to experience new things and are able to relate their classroom teaching to daily life, and not restricted to text-books (11.8% pre-service teachers).*

Conclusion and Discussion

Comparison of the views and beliefs gathered from pre-service science teachers during initial general discussion with views gathered after conducting the activity (including responses of the questionnaires and personal interviews) show an evident change. After guided reflective diary activity, most of them (90%) are of the opinion that learners are thinkers and teachers must adopt strategies to develop 'out of box' thinking. The study at the culmination of the activity shows that most of the pre-service teachers (80%) now understand that knowledge is not embedded in the textbooks. Rather knowledge is constructed in the classrooms through discussions, role plays, asking questions and sharing their experiences. Knowledge is contextual. This point was reflected in their comments where they emphasized on relating teaching to their daily life, day-to-day problems environment problems like pollution, deforestation and urbanization. A number of diary comments show that most of the pre-service teachers have learned to manage classrooms well, have started adopting different teaching strategies keeping in mind their learners, nature of the topic as well the resources available. Pre-service teachers have better understanding of their learners like a pre-service teacher writes in her diary that "doing a role play is very challenging, you cannot do it unless you understand your learners and have good rapport with them". Most of them have concluded their diaries with a positive note like 'now started enjoying teaching', 'a good profession', 'being confident', and 'good learning phase of my life'.

During the beginning of the teaching-learning journey, all of them were scared, anxious, lacking confidence and vague about the nature of the learner, knowledge and learning processes. But with the passage of time as they started teaching and recording day-to-day events in a little bit structured form, they became more and more confident, acquired teaching skills, better planning of the lessons, improvising resources and developed better rapport with the learners. Many of them have mentioned even learning many things from the learners. Therefore, most of the pre-service teachers' (85%) diary entries, personal interviews and questionnaire responses point towards better reflective abilities of teachers.

There are many bigger ideas which can be identified from their diary comments like issues related to teaching, discipline, classrooms, resources, study materials and recognizing thinking abilities of learners (shift from child as a knower to child as a thinker). Aspects related to teaching include importance of previous knowledge of learners and time management (planning), interesting introduction (set induction), importance of lesson plan making, arranging resources, guiding more able pupils as well as those working below age related expectations and also those who are failing to achieve their potential in learning (inclusion, equal opportunities), questioning and discussion (interactive teaching), and modulation (stimulus variation). The aspects related to discipline include appropriate seating arrangements, clear rules and procedures and conducting activities. The aspects related to classrooms include calling students by their names, class size, unbiased approach towards learners, and equal distribution of questions in order to create a motivating classroom environment. Other aspects include

improvisation of teaching aids, use of teachers' personal resources and study materials for teaching. The most important aspect identified through their comments is *accepting children as thinkers*. Many of these identified ideas can be linked to the ten major concerns discussed earlier.

This study clearly shows that guided reflective activity through diaries has helped science pre-service teachers to become better practitioners. Other points reiterated in the diaries which are worth mentioning here are learning to control class, use of different methods, good rapport, content mastery etc. The bigger ideas identified through the comments of the reflective diaries include better planning of the lesson, set induction, inclusion, interaction, stimulus variation, classroom management, pleasant classroom environment, use of teacher made materials and provision of opportunities for 'out of the box' thinking

Implications

There are a number of implications of this research study for science teacher preparation programme which include:

1. Journal writing as a model of reflection can be integrated in the teacher education curriculum

2. The habit of regular journal writing need to be inculcated in the teachers. Research points to a strong degree of truth in the old adage, "practice makes perfect" (Lauterbach and Hentz).

3. The assumptions of the teachers about the nature of the learner, knowledge, learning processes affect their classroom practices. For example, if a teacher believes that learner is a thinker then his classroom practices will focus on providing opportunities think and answer. Such a teacher will adopt strategies like brainstorming, questioning, providing hypothetical situations. Well-designed opportunities for teacher learning through reflection can produce desired changes in their classroom practices, can enhance their capacity for continued learning and professional growth, and can in turn contribute to improvements in student learning.

4. Journal writing can be fully structured, guided or partly structured or fully unstructured. A comparable study need to be conducted to see the most effective way of journal writing keeping in mind the objectives to be achieved.

5. Students need to be oriented to reflect deeply and critically. It is very easy to describe the event but it is very difficult to write about applications and connections and reflect critically.

References

Biggs, J. (1999). What the Student Does: teaching for enhanced learning, *Higher Education Research & Development*, 18(1), 57-75.

Brown, H.N. & Sorrell, J.M. (1993). Use of clinical journals to enhance critical thinking. *Nurse Educator*, 18(5), 16-19.

Callister, L.C. (1993). The use of student journals in nursing education: Making meaning out of clinical experience. *Journal of Nursing Education*, 32(4), 185-186.

Conner-Greene, P.A. (2000). Making connections: Evaluating the effectiveness of journal writing in enhancing student learning. *Teaching of Psychology*, 27(1), 44-46.

Dewey, J. (1933). *How we think: A relation of reflective thinking to the educative process.* Chicago: Henry Regnery.

Dieker, L.A. and Monda-Amaya, L.E. (1997). Using problem solving and effective teaching frameworks to promote reflective thinking in pre-service special educators. *Teacher Education and Special Education,* 20(1), 22-36.

Francis, D. (1995). Reflective Journal: a window to pre-service teachers, practical Knowledge. *Teaching and Teacher Education*, 11(3), 29-41.

Kea, C.D. & Bacon, E.H. (1999). Journal reflection of pre-service education students on multicultural experiences. *Action-in-Teacher-Education*, 21(2), 34-50.

Lauterbach, S.S. & Hentz, P.B. (2005). Journaling to learn: A strategy in nursing education for developing the person as nurse and the nurse as person. *International Journal for Human Caring.* 9(1), 29-35.

Minott, M.A. (2008). Valli's Typology of Reflection and the Analysis of Pre-service Teachers' Reflective Journals. *Australian Journal of Teacher Education.* 35(5), pp.55-65.

Newell, S.T. (1996). Practical inquiry: Collaboration and reflection in teacher education reform. *Teaching and Teacher Education*, 12:567-576.

O'Connell and Dyment (2004). Journals of post secondary outdoor recreation students: The result of a content analysis. *Journal of Adventure Education and Outdoor Learning*. 4(2), 159-172.

O'Rourke, R. (1998). The learning journal: from chaos to coherence. *Assessment and Evaluation in Higher Education.* 23(4), 403-41.

Patton, J.G., Wood, S.J. & Agarenzo, T. (1997). Enhancing the clinical practicum experience through journal writing. *Journal of Nursing Education*, 36, 238-240.

Pultorak, E. (1996). Following the developmental process of reflection in novice teachers: three years of investigation. *Journal of Teacher Education*, *44*(4), 288-295. http://dx.doi.org/10.1177/0022487193044004007

Richardson, G. and Maltby, M. (1995). Reflection-on-practice: enhancing student learning. *Journal of Advanced Nursing*. 22(2):235-42.

Ross, D., Bondy, E. & Kyle, D. (1993). *Reflective teaching for student empowerment: Elementary curriculum and methods.* (pp.1-4). New York: MacMillan.

Schon, D.A. (1983). *The Reflective Practitioner: how professionals think in action.* London: Temple Smith.

Schwebel, S.L. & Schwbel, D.C. et al (2001). *The Student Teacher's Handbook.* London: Routledge.

Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1-22.

Smyth, W.J. (1989). Developing and sustaining critical reflection in teacher education. *Journal of Teacher Education*, 40, 2-9.

Smyth, W.J. (1992). Teachers' Work and Politics of Reflection, *American Educational Research Journal*, 29(2), 267-300.

Sumsion, J. & Fleet, A. (1996). Reflection: Can we assess it? Should we assess it? *Assessment and Evaluation in Higher Education,* 21(2), 121-131.

Surgenor, P. (2011). Tutor, Demonstrator and Coordinator Development at UCD.1. Reflective Practice downloaded on Jan. 20, 2014 Retrieved from http://www.ucd.ie/t4cms/Reflective%20Practice.pdf

Wessel, J. & Larin, H. (2006). Change in reflections of physiotherapy students over time in clinical placement. *Learning in Health and Social Care*, 5(3), 119-132.

Williams, R.M., Wessel, J., Gemus, M., & Foster-Seargeantm, E. (2002). Journal writing to promote reflection by physical therapy students during clinical placements. *Physiotherapy Theory and Practice*. 18(8), 5-15.

Woodward, H. (1998). Reflective journals and portfolios: learning through assessment. *Assessment and Evaluation in Higher Education*, 23(4), 415-423.

Zeichner, K.M. & Liston, D.P. (1987). Teaching student teachers to reflect. *Harvard Educational Review*, 57, 23-48.

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Learner Driven Pedagogy: From Constructivism to Connectivism

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Abstract: *The focus of the present paper is learner driven pedagogy. It demands a shift from Teacher Driven Pedagogy to Learner Driven Pedagogy. Only Teacher Driven Pedagogy fails. The concern is realization of learner identity and transcendence from dependent to independent learning through constructivism and connectivism. It examines the probability of the human brain to cognize the entire cosmos. It tries to find meaning with connectivism and realize the need for connectivism in education and teacher education. It focuses on the nodes and links for connectivism and explores the history and the methods of teaching connectivism. Then it presents the importance of networks, foundations and principles of connectivism. A comparative view of Cognitivism, Behaviorism, Constructivism and Connectivism has been presented. Skills of connectivism find expression followed by some illustrations on connectivism. Finally it concludes how connectivism provides the pathways for connecting dot to globe and point to morphology.*

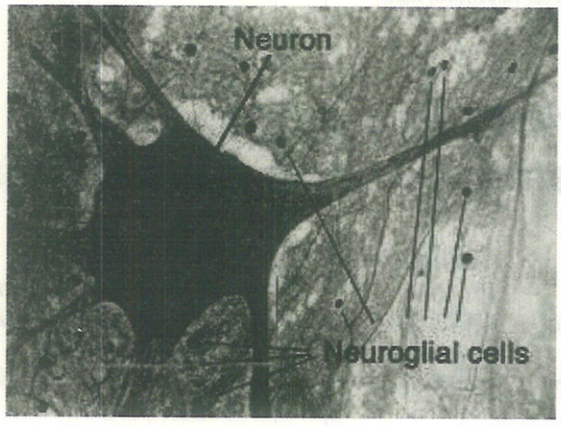
Keywords: Learner driven pedagogy, Teacher driven pedagogy, Cognitivism, Behaviourism, Constructivism and connectivism

Introduction

Despite the focus on Learner Centred Teaching Learning, the learners seem to be neglected. The constructivist approach is frequently talked of in every educational forum in India by everyone, but, the least understood and implemented. The pedagogy is teacher designed and teacher driven than learner designed and driven. Learners very often go on receiving what is presented by the teachers, mostly readymade. The focus of the present paper is Learner Driven Pedagogy, particularly, from Constructivism to Connectivism.

Human Brain Capacity

The human brain has more than one billion nerve cells which are capable of making 10^800 interconnections as follows:



The emerging question is can the human brain reconstruct and cognize the entire universe. There is no answer as such. Further what is reconstruction and storage mechanism? How are the schemas designed and stored? How is the connectivity established amongst the whole of cosmos? How are the images formed and stored. It demands collective wisdom to connect with andcognize the universe. How are these bonds formed? What is connectivity? To what extent it has been realised in Education and Teacher Education?

Heart and Brain Entrainment

When a person feels content or calm, his brain-wave patterns entrain with his heart-rate variability patterns. A measurable synchronicity between the heart rate and brain waves occurs. The heart, not the brain, sets the pace. When a person becomes fearful, this synchronicity is broken off. The heart rate variability patterns become jagged and disordered, but more significantly, the brain wave patterns become unrelated to the heart rate patterns. When fearful or under stress, brain waves cease to be entrained with the heart-rate variability patterns. When the fear is over, the brain's wave patterns can again become entrained with the heart's wave patterns realizing Dopamine and Adrenaline equation.

Emerging Questions

- Can the human brain reconstruct and cognize the entire universe?
- What is reconstruction and storage mechanism?
- How are the schemas designed and stored?
- How is the connectivity amongst the whole of cosmos?
- How are the images formed and stored?
- How are the bonds formed?
- What is connectivity?
- To what extent it has been realised in Education and Teacher Education?

Some Illustrations

a) A Trainer Trains a Learner on Car Driving, particularly, on ABC, that is,

- Accelerator
- Brake and
- Clutch

Trainer Driven Pedagogy Fails the Learner, whereas, the Learner Driven Pedagogy Passes. The learner should learn to drive independent of the trainer.

b) Moving a Static Ball

A ball roles and stops deep under a cot.

- A child hits the ball with another ball from outside.
- Both the balls roll out.

The learner driven pedagogy works and works very well.

c) Two Beetles crossing a Road Rolling Spherical Seed

- Two beetles were crossing a road rolling spherical seed.
- The Push, Pull, Momentum and Control, all, were marvelous.

The Learners Driven Pedagogy Worked Magnificently.

d) Readymade Products: Learner Retardation

- Guides are readily available in the markets.
- Question Banks with solutions are available.
- It has become customary to copy paste, without mental processing.
- Drill and Practice are negligible.

Experts Driven Pedagogy fails many a Novice.

e) Programmed Learners

- Children are Programmed Round the Clock.
- Beauties of Childhood are Lost.
- Booming Energy of the Adolescents goes Stray.
- Vision of the Adults is Lost.
- There is rare Life in the Institutes of Education, but, added focus on life skills.

Where are we Learners?

Dwindling Values and Institutions

- Degeneration of Values and Institutions
- Technological De-Schooling
- Mechanized Education

There is a felt need for Germination, Incubation, Innovation, Creation, Construction, and Connection.

Ways Out

- Technological De-Schooling
- Zero Lecture Program
- Participatory Approach of Problem Solving
- Activity Based learning
- Employing Models of Teaching
- Theory Building and Employing
- Employing Taxonomy of Educational Skills
- Constructivism and Connectivism
- Training Thinking
- Wholistic Learning

Features of Some of the Innovative Programs

- **Personalized Teacher Education (DAVV)**
  - Choice of Volunteers
  - Learner Centered
  - Personalized Classroom Setting
  - Participatory Approach
  - Zero Lecture Programme (ZLP)
  - Freedom for what to study, how to study, when to study, where to study
  - Peer Teaching-Learning-Evaluation
  - Variety in the modes of presentation
  - Successive Discussions
  - Evaluation by Self, Peer and Teacher
  - Emergence of Humanistic and Professional Masters
- **Wholistic Teacher Education (CASE)**
  - Subject Knowledge
  - Inter-disciplinarity

- Environmental Attitude
- Health development
- Emotional development
- Spiritual development
- Integrated development
- Universe Development Index (UDI)

- **Problem Solving through Participatory Approach (DAVV)**

  - The M.C.Ed. class, DAVV, Indore was very often given a problem to be solved through a computer program.
  - Number of different programmes would emerge from the entire class.
  - Each program was presented by one of the programmers to the rest of the class and rated by all the students on different criteria, namely, compactness of source code, fetch and execute cycle size, response time, memory used, programming discipline level and programme intelligibility.
  - Also, the students developed programme to calculate Kendell's Coefficient of Concordance through 'C' language. They then computed Kendell's coefficient of concordance individual criterion wise and with respect to the comprehensive criteria.
  - There is a significant cognitive development through cognitively mapping the algorithms and solution to a problem. This approach cuts across students of varied profiles, simultaneously. Participatory approach may be introduced in various disciplines to enhance learning in all domains. It facilitates creative production and independent thinking. Also, it provides scope to experience and appreciate the cognitive maps of others.

- **Development of Creative Writing Ability Amongst Students Through Participatory Approach (CASE)**

  - Recitation of Model Poems by the Teacher in Class Situation
  - Appreciation of the poem by the class and identification of the various components of creative composition
  - Composition of a variety of poems by the students individually, and in groups
  - Recitation of the self composed poems by the classmates and appreciation by rest of the class
  - Participatory approach of creative writing facilitates expression of the latent creative faculties in terms of original production.

- **Learner Driven Pedagogy**

Here is a poem presenting learner driven pedagogy:

ABC of Learner Driven Pedagogy

Mere Trainer Driven Pedagogy Failed Me Grossly as a Learner Accelerator-Break-Clutch and Gear Was Full of Diffidence and Fear	Fully Learner Driven Pedagogy Passed Me Gracefully as a Learner Driving Easily in Any Direction With Confidence & Conviction
Driving demands knowledge of techniques Driving demands motor muscle skills Driving demands concept of space and time Driving drives both body & mind	Driving tunes with multivariate setting Driving rules with multiple controls Driving has its own methodology Driving has its own Science & Technology
Driving drives Self and Vehicle Driving derives concepts and principles Driving is full of arrays of Skills Slight Negligence Bumps Hurts & Kills	Driving demands a Taxonomy of Skills Compatible Drivers, Ways and Vehicles Whether driving Man or Machine Driving demands Wit Will and Skills
Pedals With or Against Currents Lift Thrust Ailerons & Rudder Pedals Let us Drive Hills-Valleys-Plains all the Ways Up-Down Back-Forth Left-Right All the Days	Replacement of SMPS Insertion of CMOS Fixing of RAM Fabrication of Chips Tide Sun Moon Opposite Side Universe with Wit Might & Delight
Clouds in the Sky Rains and Storms Dew Drops on Petals Sweat of the Workers	Salute to Thee for Thy Grace Resonating Drives Always All Ways Electrons in Orbits Ribosome in DNA All the Entities in Wonderful Constellation!

Connectivism

Connectivism is a hypothesis of learning which emphasizes the role of social and cultural context. Connectivism is often associated with and proposes a perspective similar to Vygotsky's 'zone of proximal development' (ZPD), an idea later transposed into Engeström's (2001) Activity Theory. The relationship between work experience, learning, and knowledge, as expressed in the concept of 'connectivity' is central to connectivism, motivating the theory's name. It is somewhat similar to Bandura's Social Learning Theory that proposes that people learn through contact. The phrase "a learning theory for the digital age" indicates the emphasis that connectivism gives to technology's effect on how people live, communicate and learn.

Those who struggle to create an adequate theory of learning must admit that the process is much like stumbling in the dark. So much of our thought structure is shaped by hidden assumptions evident in our existing learning and educational systems (Siemens, 2005).

Connectivism is a learning theory for the digital age. Learning has transformed from the last several decades. The theories of behaviourism, cognitivism, and constructivism provide an effect view of learning in many and related environments respectively. Connectivism basically postulates that learning occurs through connections within the networks.

The Connectivism comprises of the networks with nodes and connections to define the learning. Constructivism highlighted on the construction of knowledge and meaning making activity and applying the known to the unknown. Here in Connectivism the generated knowledge gets networked with other new knowledge and the network develops and moves on. It is the philosophy of learning where the Knowledge constructed consists of connections between entities in a network; also the learning consists of developing and traversing these networks. It asserts that knowledge and learning are of not completely the content but about the connections.

Behaviorism offers laws to govern behaviour that can inform a teacher's manipulation of the learning environment (including texts and activities) to promote learning, where knowledge is perceived as facts that can be transmitted from teacher to student. Cognitivism opens up the black box of the mind, regarding the learner as an information processor. Social constructivism in which it has an "ontology in which reality is subjective, a social product constructed and interpreted by learners. Hence social constructivism places a greater emphasis on the importance of social interactions in affecting the individual's generation of knowledge or facts about the world. The whole is greater than the sum of the parts, and knowledge becomes a cultural artefact, associated with groups within a specific context.

Nodes and Links

The central aspect of Connectivism is the metaphor of a network with nodes and connections. In this metaphor, a node is anything that can be connected to another node such as an organization, information, data, feelings, and images. Connectivism sees learning as the process of creating connections and expanding or increasing network complexity. Not all connections are of equal strength.

The idea of organisations as cognitive systems where knowledge is distributed across nodes originated from the Perceptron and is directly borrowed from Connectionism- a paradigm in cognitive sciences that sees mental or behavioral phenomena as the emergent processes of interconnected networks of simple units. The network metaphor allows a notion of "know-where" (the understanding of where to find the knowledge when it is needed) to supplement to the ones of "know-how" and "know-what" that make the cornerstones of many theories of learning.

As Downes states: "at its heart, connectivism is the thesis that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks".

History and Foundations

Connectivism was introduced in 2005 by two publications, Siemens' Connectivism: Learning as Network Creation and Downes' An Introduction to Connective Knowledge. Both works received significant attention in the blogosphere and an extended discourse has followed on the appropriateness of Connectivism as a learning theory for the digital age. In 2007 Kerr entered into the debate with a series of lectures and talks on the matter, as did Forster, both at the Online Connectivism Conference at the University of Manitoba. In 2008, in the context of digital and e-learning, Connectivism was reconsidered and its technological implications were discussed by Siemens' and Ally.

Teaching Methods

Summarizing connectivist teaching and learning, Downes states: "to teach is to model and demonstrate, to learn is to practice and reflect." In 2008, Siemens and Downes delivered an online course called "Connectivism and Connective Knowledge". It covered Connectivism as content while attempting to implement some of their ideas. The course was free to anyone who wished to participate, and over 2000 people worldwide enrolled. The phrase "Massive Open Online Course" (MOOC) describes this model. All course content was available through RSS feeds, and learners could participate with their choice of tools: threaded discussions in Moodle, blog posts, Second Life and synchronous online meetings. The course was repeated in 2009 and in 2011.

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Importance of Networks

According to Siemens, "considering technology and meaning-making as learning activities begins to move learning into the digital age" (2005). Inherent to this new viewpoint on learning is the idea that we can no longer personally experience everything there is to experience as we try to learn something new. We must create networks which, simply defined, are connections between entities. By using these networks - of people, of technology, of social structures, of systems, of power grids, etc. - learning communities can share their ideas with others, thereby "cross-pollinating" the learning environment (Siemens, 2005).

Downes and Siemens have brought together their ideas on the use of networks in understanding learning on many levels in a theory called connectivism. Siemens sets a bold research agenda around the sharing of cognitive tasks between people and technology; coping with rapid change in the "information ecology"; and the impact of theories of networks, complexity, and chaos. He defines a network as connections between entities, which he calls nodes; the nodes can be individuals, groups, systems, fields, ideas, or communities. The networks are basically in two forms.

- Internally as neural networks (where knowledge is distributed across our brain, not held in its entirety in one location).
- Externally as networks we actively form (each node represents an element of specialization and the aggregate represent our ability to be aware of, learn, and adapt to the world around).

Downes draws the concept of Connectivism, as it has been used when applying ideas from biological models of the brain to neural networks in machine learning, treating the neural network as part of a whole. The overall view that a strongly interconnected neural network and its firing patterns must be considered as part of a whole became an

important principle of orientation in the study of the nervous system; it is referred to under the name of connectivism. (Gestzi, 1990)

Principles of Connectivism

According to Siemen (2005)

- Knowledge and the learning rests in the diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known.
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

A Comparison

Learning	Behaviourism	Cognitivism	Constructivism	Connectivism
How does learning occur	Observable behaviour main focus	Structured, computational	Social, meaning created by each learner	Distributed within a network, socially, technologically enhanced, recognising and interpreting patterns.
Factors influencing	Nature of Reward, Punishment, Stimuli	Existing Schema, Previous experience	Engagement, participation, social and cultural	Diversity of Network
Role of the memory	Memory is hardwiring of repeated experiences- where reward and punishment are most influential, Drill and practice, repeated experiences	Encoding, storage, Retrieval	Prior Knowledge remixed to current context	Adaptive patterns representative of current state, existing in networks
How does transfer occur	Stimulus Response	Duplicating Knowledge Constructs of "Knower"	Socialization	Connecting to other connections, adding nodes

Type of learning best explained	Task-based learning	Reasoning, Problem Solving	Social, Ill-Defined	Complex learning, diverse expansion of knowledge and knowledge sources.

(Ireland, 2007)

Connectionist Skills

- Interpretation of units
- Activation of the network of units
- Learning Algorithm
- Recurrent Neural Networking
- Evolving continuous, dynamic systems approaches

Illustrations on Connectivism

- Learning Resources Management System
- Time-Space-Personnel Management System
- Consortium of Teacher Education
- Inter University Consortium (IUC)
- Global Educational Research Association (GERA)
- Indian Consortium of Research in Education (ICORE)
- Wholistic Education
- Taxonomy of Educational Skills
- Social Networking
- Management Information System Series
- Reflective dialoguing

Conclusion

In connectionism the starting point is always the individual learner (Siemens, 2005). The path to gaining knowledge comes through an individual, possibly with the assistance of others, establishing their own personal knowledge network of relevant information resources (e.g., valuable web sites, academic or professional journals, conferences, etc.) and information connections. These connections may consist of relationships with knowledgeable co-workers or professional colleagues. Connectivism provides a new way of thinking about knowledge and learning in the context of emerging information technology and rapid change. Knowledge should no longer be considered a stable artefact to be passed from one person to another, but instead should be viewed as a process, always changing and growing. Connectivism provides the pathways for connecting dot to globe and point to morphology.

References

Verhagen, Pløn (2006). *Connectivism: A new learning theory*, University of Twente.

Kop, Rita and Hill, Adrian (2008). Connectivism; Learning theory of the future or vestige of the past. *The International Review of Research in Open and Distance Learning,* 9(3), 1492-3831.

Ireland, T. (2007). *Situating connectivism.* Retrieved November 7, 2008, from http://design.test.olt.ubc.ca/Situating_Connectivism.

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1). Retrieved from: http://www.itdl.org/Journal/Jan_05/article01.htm

Siemens, G., Cormier, D. and Downes, S. (2011). *Change MOOC*. Retrieved from: http://change.mooc.ca/about.htm

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Relationship of Selected Anthropometric and Biomechanical Variables with the Performance in Teguruma

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Abstract: *The purpose of this study was to analyze the relationship of selected anthropometric and biomechanical variables with the performance of subjects in Teguruma. The subjects for this study were 08 (eight) Judokas of Intervarsity level. The selected biomechanical variables were: A) Linear Kinematic variables:(1) Height of Centre of Gravity at selected moments,(2) Height of Centre of Gravity of Attacker, (B) Angular Kinematic variables: (1) Angle at Ankle Joints (both sides),(2) Angle at Knee Joints (both sides),(3) Angle at Shoulder Joints (both sides),(4) Angle at Elbow Joints (both sides), and (5) Angle at Right Hip Joint. The selected anthropometric variables were: (1) Stature,(2) Sitting Height, (3) Leg Length, (4) Arm Length, and (5) Body Weight. The video graphic techniques were employed to register the technique of Teguruma. Panasonic 3500 (video camera) was used for the purpose. For analysis purposes only three moments were selected i.e. moment stance, moment lift and moment throw. The technique was filmed in sagital plane only. The anthropometric variables such as leg length and arm length have significant relationship with the performance of subjects in Teguruma. The anthropometric variables such as stature, sitting height and body weight do not have relationship with performance of subjects in Teguruma. The kinematic variables i.e. angle at shoulder joint, elbow joint, hip joint, knee joint and ankle joint do not possess significant relationship with the performance in subjects in Teguruma. The height of centre of gravity at the moment stance, moment lift and moment throw do not have significant relationship with the performance of subjects in Teguruma.*

Keywords: Anthropometric variables, Biomechanical variables, Teguruma.

Introduction

There is ample evidence to demonstrate that in some sports, the biomechanical demands are such that there are specific prerequisites for physique. Judo is a body contact game where the structural measures of a Judoka play an important role in her/his performance. The main techniques in Judo are throwing, holding, locking and choking. The judoka has required anthropometric measurements, such as, length, girth and various proportions of the body parts compared to this opponent which are supposed to have advantage in executing the above mentioned skills. While performing the sweeping and other major throwing techniques, the Judokas with longer lower limbs can attain a better reach, range of movement, leverage etc. It is same in the case of a Judoka having long upper limbs

and its proportion have better advantage in throwing, holding locking and choking, Similarly, the girth and lean body mass helps to have better control during the ground work over his opponent. The first feature is 'Junosi' i.e. 'Gentleness' one of the most important principle of Judo is softness controls hardness. It means giving way in order to gain final victory over an opponent. Adopting oneself to it and taking advantage of it, to turn it, the one's own advantage at the end. Secondly, it relates to 'seiryokuzenyo nosi' the efficient use of mind and body, which governs all the techniques of Judo. It can be applied to the improvement of human body, making it strong, healthy and graceful. In Judo there are certain techniques which are very important for successful performance and among these Teguruma is such technique. Various techniques and various methods are available in all the games and sports and in order to decide which method is important this information is gathered from various scientific disciplines. It is the science of biomechanics, which gives answer of these questions. Biomechanics is a science of sport techniques.

Method

Sample

Eight (08) male intervarsity Judo players of 18 to 24 years of age, who had participated in All India Intervarsity Judo tournament held at Gwalior, Madhya Pradesh, India were selected as subjects for this study.

Variable

The selected biomechanical variables were:

A) Linear Kinematic variables:

1) Height of Centre of Gravity at selected moments
2) Height of Centre of Gravity of Attacker

B) Angular Kinematic variables:

1) Angle at Ankle Joints (both sides)
2) Angle at Knee Joints (both sides)
3) Angle at Shoulder Joints (both sides)
4) Angle at Elbow Joints (both sides)
4) Angle at Right Hip Joint.

The selected anthropometric variables were:

1) Stature
2) Sitting Height
3) Leg Length
4) Arm Length
5) Body Weight

Criterion Measure

The criterion measure for this study was the performance of the subjects in Teguruma.

Reliability of Data

To obtain reliable measurements standard and calibrated equipments like video camera, stadiometer, weighing machine and steel tape were used. In order to establish the reliability of anthropometric measurements, each measurement was taken three times. Coefficient of correlation of the first and third measurement was calculated. Video camera (Panasonic 3500) was used in order to film the Teguruma technique of subjects. An expert professional photographer operated the camera. Therefore, the various measurements, values obtained for this study were considered as reliable.

Anthropometric Variables

- **Stature** – The height of the subject was taken with the help of stadiometer.
- **Sitting Height** – The subject sits erect on a table with his feet unsupported. The right angle formed at the knee almost but not completely touched the edge of the table was measured and recorded as the sitting height.
- **Leg Length** – Leg length was measured with a flexible steel tape, from the greater trochanter (head of the femur) to the out-side edge of the center of the foot.
- **Arm Length** – Arm length was measured with a flexible steel tape, by subtracting the value of height stylion radial from height acromion.
- **Weight** – Weight was recorded by using a weight machine.

Angular Kinematics Variables

Angular Kinematics variables were obtained by joint point method. The distance of the camera from the subject was 10.50 meters away and fixed at 1.05 meter height.

Statistical Technique

Product moment correlations were calculated in order to ascertain the relationship of selected biomechanical and anthropometric variables with the performance of Judokas in the technique of Teguruma. For testing the hypothesis the level of significance was set at 0.05.

Results

In order to find the relationship of selected biomechanical variables the data of linear kinematic and angular kinematic variables were correlated with the performance of subjects in Teguruma. While calculating the coefficient of correlation between the selected angular kinematic variables i.e. angle at ankle joints (both sides), angle at knee joints (both sides), angle at shoulder joints (both sides), angle at elbow joints (both sides)

and angle at hip joint, the performance of the subject in Teguruma at selected moments i.e. moment stance, moment lift and moment throw.

Table 1: *Relationship of selected angular kinematic variables to the performance of subjects in Teguruma in selected moments*

S. No.	Variables	Coefficient of Correlation		
		Moment Stance	Moment Lift	Moment Throw
1.	Right Shoulder Joint	-0.21	-0.03	-0.22
2.	Left Shoulder Joint	-0.50	0.14	0.22
3.	Right Elbow Joint	-0.22	0.22	0.33
4.	Left Elbow Joint	0.02	0.02	0.29
5.	Hip Joint	0.40	-0.51	-0.58
6.	Right Knee Joint	-0.11	-0.06	-0.51
7.	Left Knee Joint	-0.05	0.03	-0.18
8.	Right Ankle Joint	-0.42	-0.42	-.024
9.	Left Ankle Joint	-0.39	-0.19	0.11

Table 1 shows that coefficient of correlation's insignificant values were obtained when the relationship of selected biomechanical variables with the performance of subjects in Teguruma was computed.

Table 2: *Relationship of selected linear kinematic variables to the performance of subjects in Teguruma in selected moments*

S.No.	Variables	Coefficient of Correlations
1.	Height of Center of Gravity at the Moment Stance	0.52
2.	Height of Center of Gravity at the Moment Left	0.23
3.	Height of Center of Gravity at the Moment Throw	0.14

Table 2 shows that significant values of coefficient of correlations were not found between the selected variables i.e. height of center of gravity at the moment stance, height of center of gravity at the moment left and height of center of gravity at the moment throw with the performance of subjects in Teguruma.

Table 3: *Relationship of selected anthropometric variables to the performance of subjects in Teguruma in selected moments*

S.No.	Variables	Coefficient of Correlations
1.	Stature	0.37
2.	Sitting height	0.08
3.	Leg Length	0.80*
4.	Arm Length	0.77*
5.	Body Weight	0.64*

Table 3 shows that there was significant relationship to the performance of subjects in Teguruma in shown at the leg length and arm length and body weight. No significant relationship was found between the performance in Teguruma and sitting height and performance in Teguruma.

Discussion

In case of selected biomechanical variables none of the variable has exhibited the significant relationship with the performance of subjects in Teguruma. In case of angle at right ankle joint, angle at knee joints (both sides), angle at right shoulder joint, angle at right elbow joint and angle at right hip joint the-value was much lower than the significant value of correlation. This shows that the kinematic variables of right side of the subject (Tori) have lower relationship with the performance. The value of coefficient of correlation with the height of center of gravity at selected moments i.e. height of center of gravity at moment stance, height of center of gravity at moment lift and height of center of gravity at moment throw also did not show significant relationship with the performance of subjects in Teguruma. In case of selected anthropometric measurements, the leg length and arm length have shown significant relationship to the performance of subjects in Teguruma. The two anthropometric variables significantly to the performance of subjects in Teguruma. In application of this technique the arm of Thrower (Tori) plays most prominent role in effective off balancing, holding the leg, lifting the opponent and throwing the opponent in wheel action with speed. This action needs to be performed in quick succession with very fact movement and this aspect is predominantly dependent on arm reach and strength. While the role of execution of technique is predominantly by arm in the preparatory phase, Judoka needs to take quick close stance to opponent. This preliminary stance is depended on how fast an attacker takes close position to opponent to hold the leg. This part is performed by foot side steeping and while lifting a little push action is also provided by knee extension. Hence it is obvious that both arm and legs play very important role while performing Teguruma. Similarly, the body weight plays very important role while performing Teruguma. The values of coefficient of correlation shown by the variables i.e. stature and sitting height have been found to be low with respect to performance of the subjects on Teguruma.

References

Haga, Shukoh et.al. (1984). Muscle Strength, Motion Velocity, Muscle Power and Energy Exertion in Nagewaza of Women Judoists. *Bulletin of the Association for the Scientific Studies on Judo*, Report VI (Tokyo: Kodokan).

Ikai, M. et.al. (1968). Electromyograhic Studies on the Nogewaza (Throwing Techniques) of Judo. *Bulletin of the Association for the Scientific Studies on Judo*, Report 11 (Tokyo: Kodokan): pp.97-106.

Kawamura, Teigo et.al. (1984). The Analysis of Basic Posture in Judo. *Bulletin of the Association for the Scientific Studies on Judo*, Report VI (Tokyo: Kodokan).

Matsumoto, Yoshizo et.al. (1978). "Analysis of Kuzushi in the Nagewaza. *Bulletin of the Association for the Scientific Studies on Judo*, Report V (Tokyo: Kodokan): pp.31-39.

Shaw Dhananjay, et.al. (1988). A Comparative Study of Ippon Sio Nage and Mortoe Sio Nage – A Biomechanical Approach. Abstracts, National Conference on Biomechanics, I.I.T. Delhi (December): p.31.

Shaw, Dhananjay et.al. (1990). A Comparative Study of Ippon Sio Nage and Mortoe Sio Nage – A Biomechanical Approach. N.I.S. Scientific Journal 13 (January), 22-29.

Shaw, Dhananjay (1987). "Importance of the Thrower and the Receiver for Analyzing the Selected Techniques in Combative Sports – A Biomechanical Study". Abstracts of Papers, Asian Conferences on Sports Medicine (November): p.9.

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Mainstreaming of Out-of-School Children with Community Support – A Study

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Abstract: *One of the stumbling blocks on the road to achieve education for all is out of school children in the age group 6 to 14. To address the issue of out of children, the All India Primary Teachers' Federation conducted a study in 2014-15 to bring out of school children in the age-group 6-14 to the mainstream with the support the community. The study was conducted in the states of Tamilnadu and Odisha. Investigators were selected to conduct household survey in the selected villages to identify out of school children.*

In Odisha, the investigators identified 544 (283 boys and 261 girls) out of school children in the age-group 6-14. Out of these 544 children, 325 (175 boys and 150 girls) in the age group 6-14 were mainstreamed into schools in their neighbourhood with the support of community leaders. In Tamilnadu 46 (25 boys and 21 girls) out of school children in the age group 6-14 were identified by the investigators. Of these, 43 (23 boys and 20 girls) were mainstreamed into class appropriate to their age in neighbourhood schools. But for this project, out of school children both in Tamilnadu and Odisha might have remained illiterate throughout their lives.

Keywords: Mainstreaming, Community support, Out of school children.

Introduction

India has made significant strides towards increasing access to education. There has been a manifold increase in the number of schools at different levels over the years. As a consequence, the net enrolment ratio in class-I has risen to about 88 per cent. Only 12 per cent of the children at the age of 6+ are still unreached (NUEPA, 2014). These children primarily belong to disadvantaged sections of society and households of the poorest of the poor.

Though there has been an appreciable improvement in the net enrolment ratio, but the dropout rate of students both at the primary and upper primary level, though declining over the years, is still alarming. At present, it is about 18 per cent at the primary level. This means that of 100 children admitted into class-I, only 82 complete successfully primary education. The rest 18 dropout on the way.

Present Scenario of Elementary Education

Quality of Education

The above situation reflects that high dropout rate at the primary level is a stumbling block towards the achievement of education for all. Not only this of the children who complete primary education, some hardly acquire requisite knowledge and skills to become productive members of the Indian society. This is primarily due to the reason that the quality of education has not kept pace with the quantitative expansion of education. The UNESCO EFA Global Monitoring Report (2014) also highlights that the quality of education is low in India. The report further highlights that even after completing four years of schooling, 90% of children from poorer households remain illiterate. This holds true for around 30% kids from poorer homes despite 5 to 6 years of schooling. There is learning crisis in India. Mostly children from poorer households are worst hit by this low quality of education. The report also warns that the learning crisis would affect generations of kids if no corrective steps are taken.

Out of School Children

There is hardly any exact figure available about the number of out of school children in India in the age group 6-14. There are different estimates in this regard. One estimate is there are about 30 million out of school children in the age group 6-14. A Centre backed recent survey has revealed a disturbing trend that in the six years since the Right to Education Act, around 60 lakh children between ages six and 13 years remain out of school in the country.

While children from Scheduled Castes and Tribes form 49% (29.73 lakh) of the deprived kids, those from other backward classes constitute 36%, which shows that RTE has brought little change in the lives of marginal groups. At 77%, a majority of out of school (OOS) children are in rural areas. Besides, 15.57 lakh Muslim children too are out of school, comprising 25% of unschooled children. In all, around 3% of the total 20.4 crore school-going children are deprived of their right to education. (Times of India dated 27th July, 2015.)

The number of out of school children is however, uneven among states and regions. India has already missed the target of achieving the goal - quality education for all by 2015. The issue of out of school children needs to be addressed appropriately to achieve quality education for all.

Rationale for the Study

The high dropout is eroding the gains being made by increasing access to education. Therefore, there is dire need to check the dropout rate at primary and upper primary education or to eliminate altogether the phenomenon of dropout. This is possible through educating the parents/guardians of children. They need to be sensitized about the importance of education for development of children. Education develops life and livelihood skills.

Poverty impels some parents to withdraw their wards from school when they are in class III or IV and send them for labour to supplement the income of the family. They do so on the premise the income of their ward(s) would reduce their poverty. This is an erroneous notion. The child labour does not mitigate the poverty of the family, it rather perpetuates poverty. This is because children engaged in child labour are deprived of facilities for education. Many of them tend to remain illiterate throughout their lives. Since they are not able to develop proper livelihood skills, they end up as labourers throughout their lives. They suffer immensely for not fault of them. Parents need to be educated properly in this regard.

Further there is a need to identify out of school children in the children in the age-group 6-14 and to admit them into their nearby government primary/upper primary school in class appropriate to their age. It is possible to achieve this goal by educating and persuading parents/guardians of identified out of school children and with the active support of the community. In view of the above, it was decided to launch a study with the following objectives:

Objectives

The objectives of the study were to:

- Identify out of school children between the age-group 6-14 in the selected area, with the support of the community leaders;
- Mainstreaming identified out of school children with the support of community leaders into government schools in their neighbourhood; and
- Orient parents/guardians, social activist, members of SMC, community members etc. with a view to bringing up a change in their mind set regarding importance of quality elementary education for all.

Method

Sample

The study was conducted in the states of Tamilnadu and Odisha. In each of these states, two districts were selected for conducting delineated activities. In each district, two blocks and five villages in each block were selected. The selected districts, and blocks in both the states are mentioned in Tables 1 to 3.

Table 1: *Names of selected blocks in Vellore and Trichirpalli districts*

S. No.	District	Block
1.	Vellore	i) Anaicut, and ii) Katpadi
2.	Trichirapalli	i) Trichy Urban, and ii) Manaparai

Table 2: *Names of selected villages in Anaicut and Katpadi blocks*

S. No.	Villages in Anaicut Block	Block
1.	Vettuvanam	Arimuthumottur
2.	Karungali	Virudhambat
3.	Basuvanayini Kuppam	Sevoor
4.	Kandaneri	Karasamangalam
5.	Thippasamudram	Akkireddy Pudur

Table 3: *Names of selected villages in Manaparai and Trichy urban blocks in Trichirapalli district*

S. No.	Villages in Manaparai Block	Villages in Trichy Urban Block
1.	Maravanur	Kalnayakkan St. Solamanagar Annai Theresa Colony
2.	Kallipatti	Venis street, Antoniyar Kovil St. Gandhi Nagar
3.	Podangupatti	Pudur Puthu St., Agraharam, Nagarathinam Pillai. St. Salai Pillaiar Koil St.
4.	Perumampatti	Sengulam Colony, Palakarai
5.	Servaikaran patti	Thooku Medai, Thillai Nagar

In Odisha, two districts namely Bolangir and Boudh were selected. In each of these districts, two blocks were selected. These blocks are mentioned in Table 4.

Table 4: *Names of selected blocks in Bolangir and Boudh districts*

S. No.	District	Block
1.	Bolangir	i) Turaikela, and ii) Belpada
2.	Boudh	i) Harbhanga, and ii) Boudh

Development of Tools

The following tools were developed for collecting the requisite data for the study:

1. ***Proforma-I:*** Recording Particulars of identified Out of School Children Admitted into Schools in their Neighbourhood.

   Proforma-II: Consolidated Report of out of School Children Admitted into Schools.

2. ***Questionnaires***

Pre-test: Elementary Education
Post-test: Elementary Education

Description of Tools

Proforma-I and II

This tool was developed to record particulars of identified out of school children. These particulars include age in respect of out of school child, gender of the child, name of the child and his/her date of birth, his/her father's name, name of the school and the class into which out of school child was admitted. Performs-II is meant for consolidated picture of out of school children admitted into schools.

Questionnaires – Pre-test and Post-test for Elementary Education

One of the approved activities of the project was to generate awareness among parents/guardians, teachers and members of the PTAs, MTAs, SMC, VEC etc. about the need and importance of education for all. Therefore, two questionnaires - pre-test and post-tests were developed to determine the effectiveness of orientation of the said personnel in changing their perceptions about the importance of elementary education. Pre-test comprised 12 items which were formulated to determine the existing perceptions about need for elementary education for all. The post-test comprised 14 items. These were structured to assess change in their perceptions about the need and importance of education for all as a result of their orientation.

Procedure of Data Collection

- For identifying out of school children, investigators were appointed. They were imparted training with regard to the process of interaction with parents/guardians for identifying out of school children in the age group 6-14. They recorded the requisite information in proforma-I. They also convinced them about the need and importance of education for all. They also had meetings with community leaders and sought their support in persuading parents/guardians to admit their out of school children into school for their better future.

- For determining the impact of orientation programme upon participants' mindset regarding importance of quality education for all, pre-test and post-test were developed and administered to participants. Data resulting from these tests were analysed to gauge the impact.

Household Survey

The investigators went from one household to another in the selected villages in both the states and interacted with parents/guardians to identity out of school children in the age-group 6-14. They later reported that some parents did not cooperate with them. They, on

one pretext or the other did not provide the requisite information. However, most of the parents did provide the requisite information with regard to their out of school children. The entire work in this regard was completed in about two months in both the districts. This uphill task could not have been accomplished without the active support of community leaders.

Mainstreaming of Out of School (OOS) Children

Investigators visited all the 20 villages in all the identified blocks of Vellore and Tricherapallu districts of Tamilnadu state and identified out of school children within the age group 6-14.

Table 5 presented complete picture with regard to number of out of school children (both boys and girls) admitted into their nearby school in class appropriate to their age with the support of parents/guardians, community leaders and social activists.

Table 5 : *Out of school children admitted into schools in four blocks of Tamilnadu state*

Sl. No.	Name of the Block	No of Households visited in the block	No. of Children below 14 years of age in the household		No. of Children below 14 Years not going to school		No. of out of school children in different age groups			No. of out of school children re-admitted in school		No. of the children admitted in different class							
			Boy	Girl	Boy	Girl	6-8	8-10	10-14	Boy	Girl	I	II	III	IV	V	VI	VII	VIII
1.	Anaicut	813	277	267	5	3	2	4	2	5	3	0	1	0	4	1	0	2	0
2.	Katpadi	744	217	194	9	13	8	2	12	9	13	4	3	1	2	0	6	3	3
3.	Manaparai	1137	645	598	2	0	1	1	0	2	0	0	0	0	1	1	0	0	0
4.	Trichy	940	546	541	9	5	3	4	7	7	4	1	0	2	0	2	4	1	1
	Total	**3634**	**1685**	**1600**	**25**	**21**	**14**	**11**	**21**	**23**	**20**	**5**	**4**	**3**	**7**	**4**	**10**	**6**	**4**

Table 5 revealed that the investigators visited 3634 households. Forty three out of school children (23 boys and 20 girls) were admitted into their nearby government schools. The number is very small due to the reason that the dropout rate at the primary and upper primary level is quite low in Tamilnadu. This may also be due to the reason that some parents/guardians might have concealed the fact their ward(s) in the age-group 6-14 was out of school. They might have sent him/her to a household/factory/industry/ eatery for work to supplement the income of their family. Though the number is small, but the outcomes of the project are of quite significance and have far reaching implications. But for this project, most of these children might have remained illiterate throughout their lives. Besides, many of them would have ended-up as labourers throughout their lives. Their education has an implication for their children also. They would see that their children get education to the level higher than their own education. This would reduce illiteracy and poverty in the country.

Mainstreaming of Identified Out of School Children in Odisha State

Investigators identified out of school children from the selected villages in all the blocks – Harbhanga, Boudh, Turiekela and Balpade. The data in this regard is presented in Table 6.

Table 6: *Out of school children admitted into schools in their Neighborhood in Odisha state*

Name of the Block	Number of Children below 14 years in the visited households	No. of Children below 14 years not going to school from the household		No. of the out of school children in different age groups			No. of out of school children who dropout from school		No. of Child/ Children from the household who were readmitted into the schools		Name (s) of the child/ Children, gender, date of birth who were admitted in the school
1	2	3	4	5	6	7	8	9	10	11	12
Harbhanga	456	42	30	42	18	12	00	00	42	30	72
Boudh	1284	98	95	157	16	20	45	77	90	82	172
Tureikela	338	112	102	51	78	85	1	1	28	23	51
Belpada	1127	31	34	30	15	20	02	02	15	15	30
Total	**3205**	**283**	**261**	**280**	**127**	**137**	**48**	**80**	**175**	**150**	**325**

Table 6 reveals that the investigators identified 544 (283 boys and 261 girls) out of school children in the age group 6-14. Out of 544 out of school children, three hundred twenty five (175 boys and 150 girls) were mainstreamed in Odisha state.

Orientation of Parents/Guardians, Community Leaders

One orientation programme was held in each block of the selected districts in the both states. In this programme, members of School Management Committee, parents/ guardians, community leaders, teachers, social activists etc. participated. The objective of all the programme was to generate awareness among participants about the need and importance of elementary education for all and to help them to perceive their role in achieving the goal of quality education for all. Two questionnaires were developed to gauge the change in the perceptions of the participants regarding the importance of education for all. One of these questionnaires was Pre-test and other Post –test. The Pre-test was administered to them before the orientation programme and the Post-test after their orientation. As mentioned above, it was also intended to determine whether the participants perceived any change in their perceptions regarding child labour, need for quality education all.

Findings

The following are the main outcomes of the study:

In the selected four blocks of Odisha – Boudh, Harbhanga, Tureikela and Belpada, investigators identified 544 (283 boys and 261 girls) out of school children in the age-group 6-14. Out of these 544 out of school children, 325 (175 boys and 150 girls) in the age group 6-14 were mainstreamed into schools in their neighbourhood with the support of community leaders. From four blocks of Tamilnadu state, 46 (25 boys and 21 girls) out of school children in the age group 6-14 were identified by the investigators. Of these, 43 (23 boys and 20 girls) were mainstreamed into class appropriate to their age in schools in their neighbourhood. This is remarkable outcome of the project. But for this project, out of school children both in Tamilnadu and Odisha states might have remained illiterate throughout their lives. Many of them would have become victim of child labour due to the poverty of their parents.

Another objective of the project was to bring about a change in the mind set of parents/ guardians, community leaders, villagers, social activists, teachers, students, etc. regarding importance of education for all. This was to be emphasized that elementary education for all is absolutely necessary to develop the human resource and to improve the economic condition of the people. It was thought that the desired change in the mind set of stakeholders would improve enrolment in schools to facilitate the long cherished goal – Quality Education for all.

For this purpose, multi-pronged approach was followed. Orientation programmes and rallies in all the selected blocks were also organised to bring about requisite desirable change in the mind set of all the above stakeholders.

An analysis of data which flowed from administration of pre-test and pro-test revealed that orientation programme impacted the mind-set of parents/guardians, community members, local level political workers with regard to need for elementary education for all. Four orientation programmes- one each in four blocks of Tamilnadu were organised. In these programmes 199 parents, guardians, community members, teachers, students, etc. participated. Of these, 198 participants reported that education for all is necessary. Besides, they perceived that they too have a role in achieving education for all and they would make necessary endeavours in this regard. They also expressed that they would meet parents/guardians and would impress upon them that they should not send any of their children for labour. This is because child labour perpetuates poverty rather than mitigating it. Before to their orientation, only 18 participants have such a perception. This reflects the effectiveness of their orientation in bringing about a desirable change in their mind-set regarding importance of education for all and that the child labour does not mitigate the poverty of the family and rather it perpetuates poverty.

In Odisha state, two hundred thirty five parents/guardians, community members etc. participated. Before their orientation, only 32 participants held the view that education for all is very essential. After orientation of the participants, this figure rose to 210.

Rallies were also organised in all the eight blocks of both the states. In each rally, about three to four hundred persons participated. They were raising slogans regarding importance of education for all. But each rally was witnessed by more than 1000 persons including villagers from the place of its origin to the terminal place. Coverage of the rally was much more than that of an orientation programme. Thus both the orientation programmes and the rallies impacted the mind-set of all the stakeholders.

Conclusions

The issue of out of school children in the age group 6-14 has contributed significantly to the failure of the country in achieving the goal – Education of All by 2015. The study reveals that this issue can be addressed appropriately by seeking support of the community leaders in each village/habitation.

References

National University of Educational Planning and Administration (2014) *Elementary Education in India. Progress towards UEE Flash Statistics*. New Delhi: NUEPA and MHRD.

Times of India (27th July 2015) 50% of children out of school are SC/STs, 25% are Muslims.

UNESCO (2014) *Eleventh Education for All (EFA) Global Monitoring Report*. Paris.

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To Detain Children or Not: Reflections on the Proposed Amendments to the RTE Act

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Abstract: *While there is a proposal for amending the Right to Education (RTE) Act 2009 with respect to the 'no detention policy', there is a need to give due consideration to the different perspectives before any decision in this regard. The article argues that law makers need to consider the unintended repercussions and the possible exclusion of children from certain sections of society, especially girls, from accessing their rights under the RTE Act itself. Ironically, the Act is claimed to have been brought in to address their condition of marginalisation in education. Also, it is not clear that if the 'no detention policy' is to be removed how will the state ensure what it aims to achieve? The moves afoot to bring back promotion on the basis of examination results also raise concerns about reducing education to literacy and numeracy 'outcomes' alone. Both the perspectives need consideration, and assessment if any needs to be designed accordingly.*

Keywords: No detention, RTE Act, Exclusion, Pushed-outs.

Introduction

This short piece is based on the shared reflective account of the authors. The interest in writing this paper was triggered from our experiences and observations of practices at the ground level and the public debates taking place in the public media regarding the proposed amendments to two laws dealing with children – the Juvenile Justice (Care and Protection of Children) Act 2000 and the Child Labour (Prohibition and Regulation) Act 1986. But the government's moves to amend the provisions of another law dealing with children's rights, the Right to Education (RTE) Act 2009, have not attracted similar attention of the media. To put the record straight, it was under the UPA government that a sub-committee was set up to review the no-detention policy. The committee was headed by the then Haryana Education Minister Geeta Bhukkal and it submitted its report to the MHRD in July 2014. The fact that the very first meeting of the Central Advisory Board of Education (CABE) under the present government had the report of 'CABE Committee on Assessment and Implementation of CCE in the context of the No-Detention Provision under the RTE Act' as one of the items on the agenda shows the seriousness with which the provision is being re-considered (The Hindu, 18th August 2015). The authors' own concern regarding the open hints being given by the government as to which way it is going to change the RTE Act 2009 derives not only

from their academic field of work but is also owed to the discussions they have been having with some friends who teach in government schools. Unfortunately, due to colonial-era service rules these teachers are under the impression that they cannot go public with their views on the issue.

Discussion

The RTE Act 2009 itself deserves just criticism as it does nothing to strengthen the public education system and offers a half-hearted promise of a blatantly insufficient eight years of schooling. In fact, as critics have been pointing out, leave alone advancing towards a common school system, it allows the profit-oriented business of private schools to flourish at the expense of public resources by transferring funds under the 25% quota for EWS children – Section 12(1)(c) – to these schools (Sadgopal, 2011). Even the implementation of this provision has been found to be wanting on various counts, including refusal to admit eligible children and failing to provide a non-discriminatory environment to them within schools (Sarin & Gupta, 2014). On the other hand, as the policies and practices of successive governments, regardless of political hue, show, there is a quickening of the withdrawal of the state from its constitutional responsibility to establish an equitable and common public funded system of education (Kumar, 2005). This abdication and sell-out is being couched in terms of the Public Private Partnership (PPP) policy and includes proposing vouchers for individual students, interventions in public education system by various shades of corporate NGOs and outright 'Adoption' of whole schools. All this is taking place in an atmosphere where the 'developed' western countries' model is being held up as an example, conveniently obfuscating the historical experience of the same countries, apart from a range of other, that it has been the public funded and something like a common school system which has worked in and for those nations. Perhaps, the deep sense of caste and class hierarchy pervading our polity and culture militates against that republican sentiment of fraternity which is essential for a commitment to equal citizenship and common schooling.

The specific provision of the RTE Act under which children cannot be detained in a class (till the completion of eighth grade) is section 16. Though this provision is theoretically tied up with the conception of Continuous and Comprehensive Evaluation (CCE), another feature of the Act under scrutiny, we will not go here into the arguments concerning the latter. The popular argument, including among a section of teachers, against the no-detention clause is focused on the claim that children are not learning adequately as they have stopped taking their studies seriously in the absence of any fear of failure. Nevertheless, there are a few more arguments against no-detention which must be considered in this debate before coming to any conclusion. One, it is claimed that compulsory promotion of children absolves teachers and schools from any accountability towards honest work. It is further said that teachers or institutions cannot assume or be empowered with so much autonomy in the name of constructivist pedagogy (upon which CCE is said to be based) that they escape all external supervision. Two, the critics of no-detention allege that in the former system of examinations, children who failed in the earlier classes had time and opportunity to

recover and catch up later, whereas now children receive a shock and fail in large numbers when they come to class nine. By then it is too late for them to cover up their academic lacunae. Finally, the opponents of no-detention remind us that the clause is short-changing the children of the very sections which need more seriousness towards educational attainments. After all, the argument goes, the children of the well-placed sections already enjoy an infrastructural and intellectual resource-based advantage, both at home and in the schools specifically catering to them. Thus, it is the children of the marginalised sections who are in much more need of the toughness entailed in a pass/fail system of exams which will prepare them to compete well in an economic system which ultimately does demand competition for scarce rewards.

Turning to the arguments of the proponents of the no-detention provision, we can begin by identifying the one which can be taken to be positioned specifically against the most popular argument from the other side. It says that fear or threat of failure is not an empirically validated stimulus for learning. More importantly, it adds that even if in certain circumstances it does come out to be a factor enabling learning among children, it is something which needs to be challenged instead of being accepted or reinforced. In short, we cannot build a system of education on the morally bankrupt idea of threat/fear of failure. This logic is similar to the one employed in abolishing corporal punishment in schools even when some 'evidence' may be advanced that its use benefits the maintenance of discipline. Another concern expressed by those worried about the return of detention is the possibility of an increase in drop-out (more correctly termed 'pushed-out') cases in the event of failure among the children of weaker sections, particularly girls. In a society where formal schooling itself does not guarantee equal opportunity or mobility and large number of girls continue to face discrimination and early marriage, the prospect of suffering still higher investment and opportunity costs which repeating a class automatically entails is certain to lead to an increase in the exclusion of children from schools. Then there is the question as to what will happen to the children who fail and are asked to repeat classes. What alternative and remedial arrangements will be made for them? Any honest appraisal of the government's policy for such children till now and the trend of falling education budgets will make it unwise to hope for much in this regard. The next argument draws our attention to the possibility of abuse the detention provision provides in a society beset with caste, class, communal and other such biases. The provision of detention further distorts an already imbalanced relationship between an adult occupying a position of authority and a child. The critics of detention also opine that the facts and experiences of the examination system to which it is sought to return for salvaging education do not themselves inspire confidence. After all, the examination system raises more questions than it answers, particularly in relation to its decorum and fairness. This very system of exams and mandatory uniform requirements for promotion to higher classes has been leading to failure, labelling and ultimately exclusion, especially of the children with special learning needs (CWSN). While the present system itself does no justice to these children, ensuring neither special teachers nor resources and leaving them in the lurch once they have finished class eight, it at least has no excuse to push them out even earlier. Finally, it is said that it is a travesty of education to reduce our schools and children to literacy and numeracy

'outcomes' (Ravitch, 2010). The raison d'etre of teaching, schools and education is also the kind of learning which takes place regarding values like fraternity, equality, justice etc. If it is a legitimate and primary task of schools to initiate their students into a culture of democratic co-operation instead of competitive struggle for market employability, then examination results cannot be their summum bonum. As a friend remarked wistfully, it is unfair and painful to tell a kind, helpful, innocent and loving child that she might be all these things as a person but she will have to stay back in the same class, repeat the year and lose her friends. The sense of tragedy is heightened when the child comes from a deprived background.

Conclusion

We think that at least some of the respective concerns can find resolution and attain common ground. For example, in spite of whatever high ideals we may hold before our schools, nobody can deny that as public-funded institutions they, and their teachers, need to be accountable. Autonomous public bodies with sufficient academic expertise and a robust understanding of education - university departments of education, for example - are much more equipped to supervise/mentor and work with these schools. To whatever extent there is dissatisfaction with an average school, the state bureaucracy and political leadership too needs to be put in the dock. Likewise, there is no necessary contradiction between taking a rigorously academic approach to the needs of the children from deprived backgrounds and providing a relaxed atmosphere of cooperative living and learning. Indeed, the overt emphasis on standards expressed in 'outcomes' and doubtful scores of limited meaning is only likely to reduce the intellectual vitality of our schools by confining them to minimum testable levels (Ravitch, 2010).

In the context of the likelihood that the no-detention clause is going to be removed there are some questions which need to be raised and answered regarding the backtracking on this law. What will then happen to the right of children to get admissions based on their age that is the age-appropriate admission provision (Section 4 of the RTE Act)? What additional resource based allocation will be needed to plan for when a larger number of children stay back due to failure in order to avail their present constitutional right of schooling till class eight? What responsibility will the state take both for providing necessary conditions for ensuring better learning for the detained children and for those who might get pushed out due to failure (including CWSN)?

We should also acknowledge that much of this debate is happening not on the bases of empirical data, but on perception. As analysts commenting on such policy decisions have often pointed out, the performance of a public consultation on these issues is often a charade. Ultimately, it is fait accompli we are going to be served with. Coming to which, one cannot help wondering whether it is mere coincidence that the amendments being made in all three laws dealing with children are reflective of a more traditional, regressive and authoritarian understanding of children, society and the state. This is a perspective in which children are held personally responsible for their alleged failures, whether in academics, before the law or regarding familial economic circumstances.

This condemnation is especially reserved for those whose rights are seen as dispensable and who themselves are considered merely as cheap labour for 'development'. It is also sensible to remind oneself that detention or no-detention, the children of the working masses are not going to get justice in and through the education system so long as we have a multilayered and non-egalitarian system of schools situated within the prevailing economic system. In a way then, in the larger picture and in the longer run, this might turn out to be an irrelevant debate.

References

Kumar, R. (2005). Education, state and class in India: towards a critical framework of praxis. *Mainstream*, XLIII (39), 19-26.

Ravitch, D. (2010). *The death and life of the great American school system: how testing and choice are undermining education*. New York: Basic Books.

Sadgopal, A. (2011). Neoliberal Act. *Frontline*, 28(14), July 2-15.

Sarin, A. and Gupta, S. (2014). Quotas under the Right to Education: Not Leading towards an Egalitarian Education System. *Economic and Political Weekly*, XLIX(38), 65-72.

The Hindu (18 July 2015). Panel for phased implementation of no-detention policy in schools. *The Hindu*, Delhi Edition.

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Teacher Development for Creativity-Centred Classroom: Role of Teacher Education Institutions

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Abstract: *Creativity is the unique gift to mankind. Each individual is endowed with creativity in one way or other. Numerous evidences show that there is huge wastage of creative talents because of many socio-cultural and environmental constraints. For the optimal development of a country or society, unfoldment of creative talents of its people is quite needed. For unfolding the creative talents of the young masses or learners, our classrooms should be creativity centred. If really, we want to make our classrooms creativity centred, then we have to bring a drastic change in our teacher education system, because, the teacher education institutions determine the fate of the prospective teachers and teachers determine the fate of the learners in the classroom. Referring these contexts, present paper broadly highlights the role of teacher education institutions for teacher development for creativity centred classroom.*

Keywords: Teacher, Classroom, Creativity, Teacher Education Institution.

Introduction

Although some individuals are exceptionally creative, but, each individual is creative in one way or other. In the society, the personalities like Thomas Alva Edition, Albert Einstein, Charles Darwin, Sigmund Freud, Pablo Picasso, John Sebastian Bach and some others are treated as exceptionally creative personalities. Thomas Alva Edition still holds record for the most patents awarded to a single person by the U.S. Patent office: 1,093. Edition turned out massive volume of work. Picasso, for instance, created more than 20,000 paintings, drawings and pieces of sculpture in his lifetime (Kellogg, 2003). The great literary works of William Shakespeare are ever memorable to the whole mankind. It is reasonable to assume that most people are creative, but the degree of creativity differs widely. The creativity of, for example, Georgia O' Keeffe, Buckminster Fuller, Wolfgang Mozart, or Thomas Jefferson not only is a manifestation of great talent but also is well known. Other creative geniuses surely exist but go unrecognized (Solso, 2001). This creative ability is not the property of the exceptional people, rather, exceptional property of all the people. Although few humans are creative in the historical sense, all of us are creative in process sense. Indeed, all mental acts can be viewed as creative if one begins with the observation that a person never perceives,

recalls or imagines in precisely the same way twice; or as expressed by Heraclitus of ancient Greece, we never enter the same stream twice. Creativity is a universal trait or ability. This ability is found in each and every individual in more or less degree. A number of studies reported that creativity is normally distributed like other psychological constructs. Jain (2000) stated that like intelligence, creativity is also a normally distributed attribute in a population. Cameron (1995, p.3) argued that all individuals are creative and creativity is a natural part of life. Kirton (1989) defined creativity by coming down to the common level of individual's behaviour and told that each individual is capable of being creative. By focusing on talented youth, we do not wish to endorse an elitist view of education. We believe that all children are talented in one way or another, even though their gifts may not be once formally recognized by teachers or school curricula (Csikszentmihalyi, Rathunde and Whalen, 1993). The creative disposition is inherent in all human beings. Creativity has a strong impact on our lives and society. Creativity is the unique gift to mankind which has not only created culture, aesthetics and values, but also acted as the seeds for all the multi polar development of the society: technological, scientific, spiritual and artistic. The unfolding of creativity affects all our developmental areas: spatial, logical, kinesthetic, philosophical and spiritual. Creativity helps for emotional, moral, intellectual and social literacy of an individual. Our position is that helping talents develop will result in long-term benefits both at the individual and at the societal level (Csikszentmihalyi, Rathunde and Whalen, 1993). At the individual level, it is difficult to argue that a person will be better off not developing her or his potentials to the fullest. It is true that a person with a great artistic talent may lead a quieter and more contended life as an average person than if he or she went on to develop those artistic skills and competed for scarce recognition (p. 27). At the societal level, the benefits of nurturing talent are even more evident. Occasionally the entire nation becomes aware of this (p. 27). There are personal as well as societal needs for the development of powers of creative expression (McKim, Hansen and Carter, 1959). Further, they mentioned, "whether we as a nation or as a world, move forward to higher levels of civilization, stagnate, or eventually destroy ourselves depends upon the quality of our original thinking. Creativity is important not only in scientific endeavors, but perhaps even more in social living and international relations – in fact, in all aspects of human activity (p. 339)". In fact, the future of any country rests upon the creative talents of its people. Unfoldment of the creative talents produces creative excellence and in tern, the individual and society reach at the excellent level of achievement.

Wastage of Creative Talents

Numerous evidences show that there is huge wastage of creative talents because of many socio-cultural and environmental constraints. Under achievement, or dropping out, on the part of talented youth has been described in the fields as different as athletics (Klint and Weiss, 1986), art (Getzels and Csikszentmihalyi, 1976), science (Hansen and Neujahr, 1976), mathematics (Stanley, Keating and Fox, 1974), mathematics and science (O'Donnell and Andersen, 1977) and music (Bamberger, 1982). Hudson (1966, p.133) suggested that 'conventional education is hostile to creativity, progressive education is

not'. It is a generalized practice that existing schools put more emphasis on rigid scheduling, which in many cases hamper the creative ability. Bloom (1958) opined that there is some reason to believe that the education system can reduce originality and creativity. This negative effect on creativity is most marked when examinations, instructional materials and processes all emphasize learning by rote and the goal is centred on getting through examinations. Now it is a fact that much of school learning calls for practice absorption, reception, passivity (Cole and Bruce, 1958, p.524). The scope for developing the creative talents and abilities are hardly emphasized there. Presently practicing school tasks follow the routine quality: memorize the table, reproduce the dates and years of the event, pronounce exactly what the teacher pronounced, present the formula as exactly taught etc. In an existing school system, the child's freedom is restricted and the unfoldment of his/her creative abilities remains at a great risk. In many cases the-then classrooms act as the graveyard where the creative talents of the children are buried in the many extent.

Many People believe that "talent will out" regardless of external circumstances. We can find examples where the individuals struggled successfully to unfold their potentials in spite of great odds. When John Biard (the inventor of Television) was experimenting in a rented house, because of the mismanagement of electricity, the house was burnt and he was physically insulted and thrown out by the house owner. Likewise, Biard faced thousands of consequences and at last reached at the goal. Manfred Eigen (Who won Nobel Prize in Chemistry in 1967) left school at 15 when he was drafted to serve in a German antiaircraft battery. Soviet troops captured him 3years later, but he escaped and walked across Germany to enroll at the University of Gottingen. Even though he had never finished high school, Eigen obtained his Ph.D. at age of 22. Thomas Edition, the great scientist of our age, was expelled from first grade because his teacher thought he was retarded.

But, the principle, "talent will out" may not be a universally acceptable principle. Environment and opportunities have a lot of sayings in reflection of talents. The enormous waste of creative talent due to lack of opportunities has been discussed by many authors (Alencar, 1995,1996; and Montuory and Purser, 1995). The numerous obstacles that hinder the expression of the creative potential have been largely discussed in the literature in creativity (Alencar, Fleith and Martinez, 2003). Many blocks to creativity development have been identified by several authors (Shallcross, 1981; Adams, 1986; Von Oech, 1988; and Lubart, 1999). Rousseau (1962) vehemently commented that, "In every under developed country, potential Einstein and Fords are herding cattle or breaking stones". In fact, it is very difficult to say how many geniuses are never recognized because of their talents are blighted before they have a chance to be expressed. Although we are in doubt, the most reasonable assumption seems to be that talent is much more widely distributed than its manifestation would suggest. The proportion of gifted children appears to be much greater than that of gifted adults; what happens to those children during the hazardous passage through adolescence (Csikszentmihalyi, Rathunde and Whalen, 1993). Further, a question arise: how many individuals become committed to the development of their talent? Just in opposite side

another question may be put: why some people become disengaged from the development of their talents. The answer to this question may be like this: the home, school and other environmental factors may press the individual to be away from talent development. After all, unusual talent is a potential benefit for society as a whole; and its loss is a loss for everyone.

Teachers' Role in Facilitating Creative Talents

In the whole educational system, the teacher is the main role player for the learning of the learners. The teacher is the sole agent who helps the learners to unfold their creative talents. The teacher creates a congenial atmosphere in which the young masses (learners) can get appropriate feedback for their self-expression. Beetle stone (1998, p.34) remarked: "In considering creativity, it is important to establish that all children have equal rights to be creative and to have full access to opportunities within the creative areas of the curriculum". In this liberal democratic social set up, every child has the right to express his/her creative urges and a talent to a sustainable degree; and the chief task of our school and its curriculum and teacher is to facilitate the same. Beetle stone (1998) states, "Teachers can adopt approaches to teaching which will encourage problem solving and investigation, drawing upon children's natural curiosity and desire to learn. Problem solving allows children to use their imagination to try out their ideas and to think about variety of possibilities. Because problem solving uses these elements of creativity, it allows children some degree of self-direction (p.17)". We generally believe that all children are creative or talented in one way or other, even though their creativeness or talents are not always recognized by the teachers or school curricula. As Haward Gardner has convincingly argued, the dimensions of giftedness include body movement, empathy, visual acuity, and so forth (1983). Alexander, Rose and Wood head (1992, p.35) encourage teachers to 'provide learning tasks which will enable children to engage in creative and imaginative thinking and action'. The ultimate endeavor is for teachers to be able to 'set the creative pattern in which the creativity can flow' (Sisk, 1981). The role of the mentor in fostering creativity has been documented by many in the literature (Bettlestone, 1998; Craft 2000; Fryer 1996; and Shagoury-Hubbard, 1996). The mentor may be a teacher or another pupil or any other person beyond the school. But the teacher can be the best mentor, since, s/he is the role model in front of the pupil from numerous point of view. As teachers we need to be involved in 'observing, initiating, participating, encouraging, maintaining, extending' (Moyles 1989, p.76) – a role that clearly means being aware of the nature of creativity and how to develop it in ourselves. We should see teaching as involving a change from 'a passive acquisition of knowledge' towards activities which help children 'to discover and develop their creative abilities by doing, making and organizing' (Kyriacou 1986, p.182).

Teachers must be made aware about what creativity is and why creativity needs to be nurtured among the young masses. A teacher needs to be well equipped about the teaching learning objectives relating to creativity development. Much energy in classroom is directed to providing what Fryer (1996, p.88) describes as a 'supportive climate in which creativity can happen or on teaching (creative arts) skills'. Teachers

need to be aware equally of the necessity to teach problem solving and thinking skills, which are vital to creative development (p.88). Alencar, Fleith and Martinez (2003) remarked, "In general, teachers are not well equipped to meet the creativity needs of students. The emphasis has been on knowledge acquisition, with a lack of opportunities for the students to discover the new, to explore the unknown, and to express their creative abilities. This has an influence on motivation and commitment". In many circumstances the teachers fail to develop the creative abilities among the learners. A teacher who is under equipped about his/her tasks, makes compromise in different situations. Woods and Jeffrey (1996) in their study of creativity across the primary classrooms describe how the teachers negotiate knowledge which is relevant and meaningful to the children, attempting to negotiate the gap between the public knowledge of the National Curriculum and the personal knowledge of each child. Many teachers feel disheartened in practical classroom setting because of any socio-psychological reasons, and this ultimately affect the creativity nourishment of the learners. Some teachers feel, with some reason, that schools are not places where creativity can be encouraged. Perhaps many teachers feel, too, that since their own individuality and creativity is suppressed in some ways with in the school setting, it is difficult for them to feel wholehearted in their attempts to foster these in others (Craft, 2000: p.135).

Defining Role of Teacher Education Institution for Teacher Development

For the professional development of teachers, the teacher education institutions play the key roles. Teacher education institutions take the responsibilities to prepare the teachers as per the professional needs and requirements of the teachers. Therefore, the teacher education institutions must find the way to accept the accountability for teacher preparation according to some guided directions. Students' learning is given high priority in whole educational scenario; and teacher educators are the persons who can do a lot to safeguard the interests of the students. Berry (2005) remarked that teaching will not be a profession and teacher education will not earn its rightful status in the university until practitioners link teacher learning to student learning. Teacher educators must take lead in this regard. Further, he mentioned that the vision of the future of teacher education will be dependent on the ability and capacity of the teacher education community to build and leverage public support and political will for supporting a true teaching profession whose actions focus primarily on serving the academic and developmental needs of all students- including our nation's most disadvantaged learners (p.272). Remarking on reformative aspect of teacher preparation, Stott and Bowman (1996) mentioned that, a second approach to reforming the teacher preparation curriculum has been to incorporate more contemporary knowledge and research, along with other disciplinary insights on children's learning. The vital role of a teacher education institution is to cater the diversified needs of the teachers.

Are Teacher Education Institutions Well Equipped for Teacher Development for Creativity Centred Classroom?

For the optimal development of a country or society, unfoldment of creative talents of its people is quite essential. Educational institutions are the sole agencies for nurturing creative talents of the young masses or learners. And, the teachers working in the educational institutions need to be fully aware about and well equipped for the creativity development of the learners learning in the educational institution. For making a creativity centred classroom in our educational institutions, the role of the teacher is second to none. Many cited evidences of earlier sections of this paper clearly state that our teachers are not properly equipped to meet the creativity needs of the students.

A question may be asked as – why our teachers are not equipped properly to meet the creativity needs of the learners? or in another way, the same question may be put as- why our teachers feel difficult to make a creativity centred classroom? One of the better ways of answering this question is – our teacher education institutions are ill equipped to train the teachers in such a way that they can cater the creativity needs of the learners. Many teacher educators teaching in teacher education institutions are hardly aware about content and processes of creativity and the significance of giving training to the teachers regarding the meeting of creativity needs of the learners. Neglect of creative talent in educational institutions is quite understandable whenever teacher educators themselves are little aware of the nature of creativity (Raina 1970). Realizing the shortcoming of existing teacher education system in respect of fulfilling the training needs of teachers in the field of creativity, Chakrabarti (1994, p.126) remarked, "Teacher education too, necessitates a redirection in teacher education and teacher orientation programmes to facilitates in-service teachers and freshers to be acquainted with creativity in children both in theory and in practice. This would encompass the different avenues of creativity in children with special reference to their exposures in interest, aptitude, attitude, skill, and appreciation".

Defining the Role of Teacher Education Institutions for Teacher Development for Creativity Centred Classroom

If really we want to make our classrooms creativity centred, then we have to bring a drastic change in our teacher education system, because, the teacher education institutions determine the fate of the teachers and teachers determine the fate of the students in the general classroom. If any change we have to bring at the student level, accordingly change is needed at the teacher level, and ultimately it demands reform at teacher education institution level. The well-equipped teacher education institutions with competent and dedicated teacher educators can take the challenge for developing the teachers in appropriate direction. The strategies given in following points may be helpful for equipping and defining the role of teacher education institutions for fulfilling the creativity training needs of teachers or preparing the teachers for creativity centred classrooms.

1. **Assessing the existing knowledge of trainee teachers in creativity area:** Teacher education institutions are the places where the training needs of the teachers are taken care. Before providing the training to the trainee teachers about 'fostering creativity in the classroom', the teacher educators, at first, should assess, how far they (trainee teachers) are well aware about the concept of creativity, its importance and techniques to be followed to achieve creativity among the student. The teacher education institutions must use different types of formal and informal techniques to assess the background level knowledge of trainee teachers on creativity development process.

2. **Practicing a Creativity Centred atmosphere in Teacher Education Institution:** The whole scenario of teacher education institution should be creativity centred. The teacher educators in their practice, behaviour, attitude, outlook etc. should be creative. The environment of the institution needs to be congenial, flexible, problem centric, heuristic and free in nature. The trainee teachers must get a lot of exposures in the environment of the institution to be aware about creativity development process and its importance.

3. **Offering Course Contents relating to Creativity:** The course contents relating to creativity should be significant part of the curriculum of teacher education institutions. In order to acquaint the trainee teachers about the creativity development of students the following brief outlined course contents may be offered by the teacher education institution.

   Outlined Course Contents

   The outlined course contents which may be offered by the teacher education institution are given under the following sections/heads and subsections/subheads.

   A) Conceptual Issues of Creativity

   - Meaning and definition of creativity
   - Theories of creativity
   - Types of creativity
   - Stages of creativity development
   - Levels of creativity
   - Approaches to creative activity
   - Creativity development in different stages of life
   - Sources of creative activity

B) Psycho-social Issues Relating to Creativity

- Factors influencing creativity
- Relation of creativity with convergent and divergent thinking, Intelligence, Non-intellectual factors, Problem solving, Heredity, Environment, Culture, Cognitive style, Age, Sex, Socio-economic status, Formal education, Achievement, Virtue/humanity etc.

C) Recognizing Creative Talents

- Needs and Importance of Recognising creative talent
- Indicators of Creativity Development
- Index of Measuring Creativity
- Precautions to be Followed in the Process of Recognition
- Complexity nature of Creativity and its Recognition
- Difference in Assessing Creative Ability and Other Abilities
- Testing and Non-testing Techniques used for Assessing Creative Ability
- Assessing Creativity in Different Subject Areas: Art, Science, Math, Social Science, Language etc.

D) Nurturing Creativity through Education

- Significance of Nurturing Creativity
- Conventional Educational Practices and Creativity
- Barriers to Creativity Unfoldment
- Issues Relating to Creativity Development through Education
- Facilitating Creativity through Education:
    - Orienting Institutional Climate for Creativity Development
    - Designing institutional Curriculum for Facilitating Creativity
    - Designing Learning Activities for Creativity Development
    - Teaching Learning Methods/ Strategies and Creativity Development
    - Preparing Teachers and Other Resource Persons for Creative activity in Classroom

All the inputs in creativity need be amalgamated in perspective, pedagogy and internship courses of teacher education programmes Special in-service teacher

education programmes may be organized for professional development of teachers in teacher education institution.

4. **Organizing Professional Development Programmes in Creativity Area:** The teacher education institutions should organize various professional development programmes like orientation courses, refresher courses, seminars, symposium, discussions etc. in the area of creativity for both in-service as well as pre-service teachers. This will enhance the knowledge skills and competencies of the teachers, which would ultimately be helpful to make their classrooms (teachings) creativity centred. In pre-service teacher education school internship course may be used very effectively for organizing such activities.

5. **Developing and disseminating Taxonomy of Creative Ability:** Teacher Education Institutions should take the challenge to develop comprehensive taxonomy (classification scheme) of creative ability. Such taxonomy should be developed and with the joint efforts of teacher educators, teachers, experts, researchers and other stakeholders and disseminated among the teachers and other beneficiaries for their professional and the related use.

6. **Developing and disseminating the enriched materials and activities for meeting the creativity needs of the students:** Teacher education institutions should develop some enriched materials and activities for meeting the different types of creativity needs of the learners. Such materials and activities must be disseminated to the teachers, mentors and other stakeholders of schools and educational institution for their practical use.

7. **Providing extension services to the teachers on the area of creativity:** The teacher education institutions should provide the extension services to the teachers when they find any doubts and difficulties referring to making the school/educational institution creativity centred. Teacher education institutions should try their best to provide the extension services as and when required by the teachers.

8. **Improving Internal efficiency of the teacher education institution:** In order to provide the teachers quality training/education relating creativity development process of the school and/or making the classrooms creativity centred, the teacher education institutions must be internally fit and well equipped. These strategies may be helpful in improving the internal efficiency of the teacher education institutions for meeting the creativity based training needs of the teachers:

   a) Conducting researches and action researches in the field of creativity

   b) Following the method of self-introspection for devising new strategies for meeting the creativity based needs of the clients

c) Keeping constant touch with past and latest developments in the field of creativity

d) Equipping the institution with teaching learning materials relating to the field of creativity

e) Keeping constant professional touch with the resource persons, scholars, experts and other intelligentsias working in the field of creativity

f) Performing self-study in the field of creativity

g) Using distance learning materials/information and communication technology for enhancement of knowledge in the field of creativity

h) Following peer group discussion, argumentation and analysis method for enhancing knowledge on creativity.

Such activities discussed here may be helpful to nurture creative ability in learners. Present scenario in classroom usually make learners passive listeners and the persist times with them throughout their life. Rarely the learners raise questions in classroom situations. Hence, the initiation must take place starting from the teacher education institutions which in turn will be in instrumental for a different classroom scenario than the present ones. Learners curiosity, anxiety and enquiry ability may be maintained by the prospective teachers by going due weightage to creative activities in classroom situations.

References

Adams, J.L. (1986). *Conceptual Blockbusting*. New York, Addison-Wesley.

Alencar, E.M.L.S. (1995). *Criatividade (Creativity)*. Editora da Unversidade de Brasilia, Brazil, Brasilia.

Alencar, E.M.L.S. (1996). *A gerência da criatividade (Managing creativity)*. Brazil, Makron, Sao Paulo.

Alencar, E.M.L.S., Fleith, D.S. and Martinez, A.M. (2003). Obstacles to Personal Creativity between Brazilian and Mexican University students: A Comparative Study. *The Journal of Creative Behaviour,* 37(3), 179-192.

Alexander, R., Rose, J. and Woodhead, C. (1992). *Curriculum Organization and Classroom Practice – A Discussion Paper*. London: DES.

Bamberger, J. (1982). Growing up Prodigies: The Midlife Crisis. In Feldman D.H. (ed.) *New Directions of Child Development: Developmental Approaches to Giftedness and Creativity*. San Francisco: Jossey-Bass

Beetlestone, F. (1998). *Creative Children, Imaginative Teaching*. Buckingham, Philadelphia: Open University Press.

Berry, B. (2005). The Future of Teacher Education. *Journal of Teacher Education,* 56(3), 272-278.

Bloom, B.S. (ed.) (1958). Some Effects of Cultural, Social and Educational Conditions on Creativity. In Tylor C.W. (ed.) *The Second (1957) University of Utah Research Conference on the Identification of Creative Scientific Talent*. 55-66. University of Utah Press.

Cameron, J. (1995). *The Artist's Way: A Spiritual Path to Higher Creativity*. London: Pan.

Chakrabarti, M. (1994). *Child Education and Creativity*. Delhi: Daya Publishing House.

Cole, L.E. and Bruce, W.F. (1958). *Educational Psychology*. New York, World Book Company.
Craft, A. (2000). *Creativity across the Primary Curriculum.* Routledge, London.
Csikszentmihalyi, M., Rathunde, K. and Whalen, S. (1993). *Talented Teenagers*. Cambridge University Press, New York.
Fryer, M. (1996). *Creative Teaching and Learning*. Paul Chapman Publishing Ltd, London.
Gardner, H. (1983). *Frames of Mind: The Theory of Multiple Intelligences*. Basic, New York.
Getzels, J.W. and Csikszentmihalyi, M. (1976). *The Creative Vision: A longitudinal study of Problem-finding in Art*. Wiley Inter-science, New York.
Hansen, R.A. and Neujahr, J. (1976). Career Development of High School Students Talented in Science. *Science Education,* 60, 453-462.
Hudson, L. (1966). *Contrary Imaginations.* Methuen, London.
Jain, N.D. (2000). Promoting Divergent Thinking in Class-X Students through Classroom Questions. *Journal of Indian Education,* 26(3), 76-80.
Kellogg, R.T. (2003). *Cognitive Psychology*. Sage Publications, Thousand Oaks-London-New Delhi.
Kirton, M. (ed.) (1989). (2nd edition). *Adopters and Innovators: Style of Creativity and Problem Solving*. Routledge, London.
Klint, K.A. and Weiss, M.R. (1986). Dropping in and Dropping Out: Participation Motives of Current and Former Youth Gymnasts. *Canadian Journal of Applied Sport Sciences,* 11, 106-114.
Kyriacou, C. (1986). *Effective Teaching in Schools*. Simon and Schuster, Hemel Hempstead.
Lubart, T.I. (1999). Creativity across Cultures. In Sternberg R.J. (ed.) *Handbook of Creativity.* 339-350. Cambridge University Press, New York.
McKim, M.G., Hansen, C.W. and Carter, W.L. (1959). *Learning to Teach in the Elementary School*. The Macmillan Company, New York.
Montuory, A. and Purser, R.E. (1995). Deconstructing the Lone Genius Myth: Towards a Contextual View of Creativity. *Journal of Humanistic Psychology,* 35, 69-112.
Moyles, J. (1989). *Just Playing? The Role and Status of Play in Early Childhood Education.* Open University Press, Buckingham.
O' Donnell, J. and Andersen, D.G. (1977). Decision Factors among Women Talented in Math and Science. *College Student Journal,* 11, 165-168.
Raina, M.K. (1970). Ideational Fluency and Motivation of Teachers under Training. *Indian Journal of Psychology*.
Rousseau, H.J. (1962). Ability in a Multi-cultural Community: Rhodesia and Nyasaland. In Bereday G.Z. and Lauwera J.A. (eds.) *The Yearbook of Education*. Evan Brothers, London.
Shagoury-Hubbard, R. (1996). *Workshop of the Possible: Nurturing Children's Creative Development.* Stenhouse Publishers, York, Maine.
Shallcross, D.J. (1981). *Teaching Creative Behaviour*. Prentice Hall, Englewood Cliffs, N.J.
Sisk, D. (1981). Foreword. In Shallcross D. (ed.) *Teaching Creative Behaviour*. Prentice Hall, Buffalo, NY.
Solso, R.L. (2001). *Cognitive Psychology*. Pearson Education, New Delhi.
Stanley, J.C., Keating, D.P. and Fox, L.H. (eds.) (1974). *Mathematical Talent: Discovery, Description and Development.* John Hopkins University Press, Baltimore.
Stott, F. and Bowman, B. (1996) Child Development Knowledge: A Slippery Base for Practice. *Early Childhood Research Quarterly,* 11, 169-183.
Von Oech, R. (1988) *Um Toc nacuca (A whack on the side of the head)*. Livraria Cultura Editora, Sao Paulo, Brazil.

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अनुसूचित जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक वातावरण के प्रभाव का अध्ययन

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सारांश: *प्रस्तुत शोध अध्ययन में देश के आदिवासी जो दूरस्थ क्षेत्रों, जंगलों व निर्जन स्थानों पर निवास करते है इनके विकास व समाजीकरण करने व विकास की मुख्य धारा में जोड़ने हेतु प्राथमिक कक्षा 5वीं में अध्ययनरत 278 छात्र–छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक नियंत्रण, संरचना, अनुपालना, विलगन, दण्ड, पुरस्कार, विशेषाधिकार, पालन–पोषण, अनुमति, नामंजूरी व उपस्थिति के प्रभाव का अध्ययन किया गया। जिसके लिये डॉ. करूणा सागर मिश्र द्वारा निर्मित 'पारिवारिक वातावरण परिसूची' का उपयोग किया गया तथा निष्कर्षो व परिणामों वैध रूप से प्रस्तुत करने के लिए प्रसरण विश्लेषण, टी–मान परीक्षण सांख्यिकीय प्रविधियों का प्रयोग किया गया।*

अध्ययन के प्रारंभ में की गई परिकल्पनाओं का परीक्षण कर इस निष्कर्ष पर पहुँचे कि अनूसूचित जनजाति के विद्यार्थियों की शैक्षिक उपलब्धि पर पारिवारिक संरचना या नियंत्रण, अनुपालना या विलगन, दण्ड या पुरस्कार, विशेषाधिकार या पालन–पोषण, अनुमति या नामंजूरी का कोई सार्थक प्रभाव नहीं पड़ता है।

मुख्य शब्द: अनुसूचित जनजाति, शैक्षिक उपलब्धि, पारिवारिक वातावरण

प्रस्तावना

आदिवासी भारत के मूल निवासी है। ये प्रारंभ से ही दूरस्थ एवं निर्जन स्थानों पर निवास करते हैं। परिणाम स्वरूप आदिवासियों पर शहरी सभ्यता एवं विकास का बहुत कम सार्थक प्रभाव पडा है, इसी कारण यह सदैव प्रगति के नवीन साधनों के अभाव से ग्रस्त रहे हैं, इसलिए आदिवासियों को सैकडों वर्ष पूर्व की सभ्यता में जीवन यापन करते हुए देखा जा सकता है। अण्डमान निकोबार द्वीप समूहों के कुछ क्षेत्र में आज भी मानव को नग्न विचरण करते हुए देखा जा सकता है, जो इसके अविकसित होने का प्रत्यक्ष प्रमाण हैं। दूरस्थ क्षेत्रों में निवास करने तथा आवागमन के साधनों का अभाव होने के कारण आज भी शहरी सभ्यता से कटे हुए हैं। इसी प्रकार आदिवासी प्रारंभ से ही उपेक्षित एवं शोषित रहे हैं। अलग–अलग रहने के कारण प्रशासन का ध्यान भी इनके विकास की ओर आकर्षित नहीं हुआ। स्वतंत्रता प्राप्ति के पश्चात् जब केन्द्र सरकार ने इनकी परिस्थिति एवं अलगाव की ओर विशेष ध्यान देना प्रारंभ किया, तभी राज्य सरकारों एवं अन्य संस्थाओं में इनके विकास एवं समाजीकरण के लिए जागरूकता हुई एवं इन्हें मुख्यधारा से जोड़ने के लिए प्रयत्न प्रारंभ किये जाने लगे ताकि आदिवासी देश की मुख्यधारा से जुड़ सके और अपनी प्राचीन सांस्कृतिक धरोहर को भी सुरक्षित रख सके। इतिहास बताता है कि यहां की जनजातियाँ शैक्षिक दृष्टि से पिछड़ी ही नहीं अपितु वंचित रही है। प्राचीन काल में आदिवासी समाज का अधिकांश भाग भी अशिक्षित रहा, क्योंकि स्वयं हिन्दु समाज में शूद्रों, पिछड़ों और स्त्रियों को शिक्षा पाने के अधिकार प्राप्त नहीं थे। महाभारत में 'एकलव्य' की कथा यह बताती है कि हिन्दु समाज में जनजातियों के सदस्यों को शिक्षा पाने का अधिकार नहीं था।

शोध कार्य की आवश्यकता एवं महत्व

शिक्षा ऐसा बहुआयामी तथ्य है, जिसके माध्यम से व्यक्ति नर से नारायण तथा रंक से राजा बन सकता है। ये इतिहास साक्षी है कि भारत में जब मुगल मराठाओं की सत्ता थी उसके पहले की बात है, गुजरात के प्रवर्तमान अहमदाबाद को राजा अहमद के पहले "आशा" नामक भील राजवी ने बसाया था। जो अभी मेट्रो सिटी बन गया है। "आशा" अनुसूचित जनजाति से का था जिसने सिर्फ अनौपचारिक शिक्षा प्राप्त की थी।

अतः उपयुक्त प्रसंग से हमें पता चलता है, अगर एक छोटे से छोटे और वंचित इंसान को भी अच्छी शिक्षा से अवगत कराया जाये तो वह अपने जीवन और राष्ट्र को उज्जवलित कर सकता है।

मध्यप्रदेश में अनुसूचित जनजाति 14 प्रतिशत है वे राज्य के पिछड़े क्षेत्र में निवास करते है। जैसे कि –

- भील
- भीलाला
- मीणा
- कोष्ठी आदि।

स्वतंत्र चर

साधारणतः प्रयोगकर्ता जिस कारण के प्रभाव का अध्ययन करना चाहता है, और प्रयोग में जिस पर उसका नियंत्रण रहता है उसे स्वतंत्र चर कहते हैं। प्रस्तुत अध्ययन में निम्नलिखित स्वतंत्र चर है –

पारिवारिक वातावरणः पारिवारिक वातावरण से तात्पर्य माता–पिता का बच्चों के प्रति व्यवहार से हैं ।

आश्रित चर

स्वतंत्र चर के प्रभाव के कारण जो व्यवहार परिवर्तन होता है और जिसका अध्ययन तथा मापन किया जाता है उसे आश्रित चर कहते हैं। प्रस्तुत अध्ययन में निम्नलिखित आश्रित चर है –

शैक्षिक उपस्थितिः उपस्थिति का आशय वर्ष में विद्यार्थी द्वारा विद्यालय में उपस्थित दिनों की संख्या से हैं।
शैक्षिक उपलब्धिः छात्रों की शैक्षिक उपलब्धि का मुख्य उद्देश्य छात्रों की शैक्षिक उद्देश्य का मापन है।

शोध के उद्देश्य

1. अनु. जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक नियंत्रण के प्रभाव का अध्ययन करना।
2. अनु. जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक संरचना के प्रभाव का अध्ययन करना।
3. अनु. जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक दंड के प्रभाव का अध्ययन करना।
4. अनु. जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक अनुपालन के प्रभाव का अध्ययन करना।
5. अनु. जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक विलगन के प्रभाव का अध्ययन करना।
6. अनु. जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक पुरस्कार के प्रभाव का अध्ययन करना।
7. अनु. जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक विशेषाधिकार से वंचित रहने के प्रभाव का अध्ययन करना।
8. अनु. जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक पालन पोषण के प्रभाव का अध्ययन करना।
9. अनु. जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक नामंजूरी के प्रभाव का अध्ययन करना।
10. अनु. जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक अनुमत के प्रभाव का अध्ययन करना।
11. अनु. जनजाति के बच्चों की शैक्षिक उपलब्धि पर पारिवारिक उपस्थिति के प्रभाव का अध्ययन करना।

शोध संबंधी परिकल्पनाएँ

1. अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक नियंत्रण के प्रभाव का सार्थक अंतर नहीं हैं।
2. अनुसूचित जनजाति छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक संरक्षण के प्रभाव का सार्थक अंतर नहीं हैं।
3. अनुसूचित जनजाति छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक दंड के प्रभाव का सार्थक अंतर नहीं हैं।

4. अनुसूचित जनजाति छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक अनुपालन के प्रभाव का सार्थक अंतर नहीं हैं।
5. अनुसूचित जनजाति छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक विलगन के प्रभाव का सार्थक अंतर नहीं हैं।
6. अनुसूचित जनजाति छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक पुरस्कार के प्रभाव का सार्थक अंतर नहीं हैं।
7. अनुसूचित जनजाति छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक विशेषाधिकार वंचितता के प्रभाव का सार्थक अंतर नहीं हैं।
8. अनुसूचित जनजाति छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक पालन पोषण के प्रभाव का सार्थक अंतर नहीं हैं।
9. अनुसूचित जनजाति छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक नामंजूरी के प्रभाव का सार्थक अंतर नहीं हैं।
10. अनुसूचित जनजाति छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक उन्मुक्तता के प्रभाव का सार्थक अंतर नहीं हैं।
11. अनुसूचित जनजाति छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक उपस्थिति के प्रभाव का सार्थक अंतर नहीं हैं।

शोध कार्य का सीमांकन

1. प्रस्तुत शोधकार्य में अनुसूचित जन जाति के छात्र एवं छात्राओं को लिया गया है।
2. प्रस्तुत शोधकार्य कक्षा 5वीं में अध्ययनरत छात्र एवं छात्राओं पर किया गया है।
3. इस शोधकार्य में महेश्वर की चौदह प्राथमिक विद्यालयों में 279 बच्चों का चयन किया गया है।
4. अध्ययन के लिये अनुसूचित जनजाति के बच्चों का चयन किया गया है।

न्यादर्श का चयन

प्रस्तुत अध्ययन में मध्यप्रदेश राज्य के महेष्वर विस्तार के प्राथमिक विद्यालयों में कक्षा पांचवीं में अध्ययनरत् अनुसूचित जनजाति के 279 बच्चों का चयन यादृच्छिक विधि से किय गया है। जिसमें 169 छात्र तथा 110 छात्राओं को शामिल किया गया और पिछड़ा वर्ग के छात्रों के अध्ययन के लिए भोपाल शहर में डॉ. करूणा शंकर मिश्र द्वारा निर्मित पारिवारिक वातावरण परिसूची का उपयोग किया गया ।

शोध कार्य में प्रयुक्त सांख्यिकीय सूत्र

लघुशोध कार्य के लिए शोधकर्ता ने डॉ. करूणा शंकर मिश्र द्वारा निर्मित पारिवारिक वातावरण सूची का उपयोग किया गया है। इसमें 100 कथन है, वह 10 घटकों में दिये गये है। सभी कथन माता–पिता के बच्चों के प्रति व्यवहार के लिए गए है। प्रत्येक कथन पांच बिन्दु अधिकतर, प्रायः कभी–कभी बहुत कम, कभी नहीं पर अंकित है। प्रत्येक अधिकतर कथन के लिये 4 अंक, प्रायः के लिए 3 अंक कभी–कभी के लिए 2 अंक बहुत कम के लिए 1 अंक तथा कभी 6 ही के लिए 0 अंक दिये गये है। प्रस्तुत अध्ययन में प्रसरण विश्लेषण 'एफ' मान परीक्षण एक अनुमान सांख्यिकीय प्रविधियों का प्रयोग किया गया।

परिकल्पनाओं का सत्यापन

इस शोधकार्य की प्रथम परिकल्पना यह है कि **"अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक नियंत्रण के प्रभाव का सार्थक अंतर नहीं है।"** इसका अर्थ यह होता है कि पारिवारिक नियत्रंण का अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर कोई सार्थक प्रभाव नहीं पड़ता हैं। तालिका 1 में 'ए' मूल्य दर्शाया गया हैं।

तालिका 1: *पारिवारिक नियंत्रण के प्रभाव से छात्र एवं छात्राओं की शैक्षिक उपलब्धि को दर्शाने वाली 'एफ' मूल्य की सार्थकता*

अ.क.	प्रसरण स्त्रोत	वर्गों का योग	मुफ्तांश	मध्यमान वर्ग	एफ - अनुमान	सार्थकता स्तर
1.	समूह के मध्य समूह के अंतर्गत	3125.814 239316.494	5 273	625.163 876.617	.713	614
	योग	242442.308	278			

परीक्षण

तालिका 1 से ज्ञात होता है कि पारिवारिक नियंत्रण के प्रभाव के लिये 'एफ' का मान .713 है, जो 0.05 स्तर पर सार्थक नहीं है। इसलिए परिकल्पना स्वीकृत की जाती है। इसका अर्थ यह है कि अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक नियंत्रण के प्रभाव का कोई सार्थक प्रभाव नहीं पाया गया है।

संरक्षण के परिपेक्ष्य में परिकल्पना का परीक्षण

इस शोधकार्य की प्रथम परिकल्पना यह है कि **"अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक संरक्षण के प्रभाव का सार्थक अंतर नहीं है।"** इसका अर्थ यह होता है कि पारिवारिक संरक्षण के प्रभाव का अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर सार्थक प्रभाव नहीं पड़ता। इसका परीक्षण करने के लिए निम्न तालिका 2 में 'एफ' मूल्य दर्शाया गया हैं।

तालिका 2: *पारिवारिक संरक्षण के प्रभाव से छात्र एवं छात्राओं की शैक्षिक उपलब्धि को दर्शाने वाली 'एफ' मूल्य की सार्थकता*

अ.क.	प्रसरण स्त्रोत	वर्गों का योग	मुफ्तांश	मध्यमान वर्ग	एफ - अनुमान	सार्थकता स्तर
1.	समूह के मध्य समूह के अंतर्गत	3373.910 239068.398	5 273	674.782 875.708	.771	.572
	योग	242442.308	278			

परीक्षण

तालिका 2 से ज्ञात होता है कि पारिवारिक संरक्षण के प्रभाव के लिये 'एफ' का मान .771 है, जो 0.05 स्तर पर सार्थक नहीं है। इसलिए परिकल्पना स्वीकृत की जाती है। इसका अर्थ यह है कि अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक संरक्षण के प्रभाव का कोई सार्थक प्रभाव नहीं पाया गया है।

दंड के परिपेक्ष्य में परिकल्पना का परीक्षण

इस शोधकार्य की प्रथम परिकल्पना यह है कि **"अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक दंड के प्रभाव का सार्थक अंतर नहीं है।"**

तालिका 3: *पारिवारिक दंड के प्रभाव से छात्र एवं छात्राओं की शैक्षिक उपलब्धि को दर्शाने वाली 'एफ' मूल्य की सार्थकता*

अ.क.	प्रसरण स्त्रोत	वर्गों का योग	मुफ्तांश	मध्यमान वर्ग	एफ - अनुमान	सार्थकता स्तर
1.	समूह के मध्य समूह के अंतर्गत	8144.643 234297.665	5 273	1628.929 858.233	1.898	.095
	योग	242442.308	278			

परीक्षण

तालिका 3 से ज्ञात होता है कि पारिवारिक दंड के प्रभाव के लिये 'एफ' का मान 1.898 है, जो 0.05 स्तर पर सार्थक नहीं है। इसलिए परिकल्पना स्वीकृत की जाती है। इसका अर्थ यह है कि अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक दंड के प्रभाव का कोई सार्थक प्रभाव नहीं पाया गया है।

अनुपालन के परिपेक्ष्य में परिकल्पना का परीक्षण

इस शोधकार्य की प्रथम परिकल्पना यह है कि **"अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक अनुपालन के प्रभाव का सार्थक अंतर नहीं है।"**

तालिका 4: *पारिवारिक अनुपालन के प्रभाव से छात्र एवं छात्राओं की शैक्षिक उपलब्धि को दर्शाने वाली 'एफ' मूल्य की सार्थकता*

अ.क.	प्रसरण स्त्रोत	वर्गों का योग	मुफ्तांश	मध्यमान वर्ग	एफ-अनुमान	सार्थकता स्तर
1.	समूह के मध्य समूह के अंतर्गत	6373.554 236068.754	5 273	1274.711 864.721	1.474	.198
	योग	**242442.308**	**278**			

परीक्षण

तालिका 4 से ज्ञात होता है कि पारिवारिक अनुपालन के प्रभाव के लिये 'एफ' का मान 1.474 है, जो 0.05 स्तर पर सार्थक नहीं है। इसलिए परिकल्पना स्वीकृत की जाती है। इसका अर्थ यह है कि अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक अनुपालन के प्रभाव का कोई सार्थक प्रभाव नहीं पाया गया है।

सामाजिक विलगन के परिपेक्ष्य में परिकल्पना का परीक्षण

इस शोधकार्य की प्रथम परिकल्पना यह है कि **"अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक सामाजिक विलगन के प्रभाव का सार्थक अंतर नहीं है।"**

तालिका 5: *पारिवारिक अनुपालन के प्रभाव से छात्र एवं छात्राओं की शैक्षिक उपलब्धि को दर्शाने वाली 'एफ' मूल्य की सार्थकता*

अ.क.	प्रसरण स्त्रोत	वर्गों का योग	मुफ्तांश	मध्यमान वर्ग	एफ–अनुमान	सार्थकता स्तर
1.	समूह के मध्य समूह के अंतर्गत	1171.402 241270.906	3 275	390.467 877.349	.445	.721
	योग	242442.308	278			

परीक्षण

तालिका 5 से ज्ञात होता है कि पारिवारिक पुरस्कार के प्रभाव के लिये 'एफ' का मान .445 है, जो 0.05 स्तर पर सार्थक नहीं है। इसलिए परिकल्पना स्वीकृत की जाती है। इसका अर्थ यह है कि अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक सामाजिक विलगन का कोई सार्थक प्रभाव नहीं पाया गया है।

पुरस्कार के परिपेक्ष्य में परिकल्पना का परीक्षण

इस शोधकार्य की प्रथम परिकल्पना यह है कि **"अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक पुरस्कार के प्रभाव का सार्थक अंतर नहीं है।"**

तालिका 6: *पारिवारिक अनुपालन के प्रभाव से छात्र एवं छात्राओं की षैक्षिक उपलब्धि को दर्शाने वाली 'एफ' मूल्य की सार्थकता*

अ.क.	प्रसरण स्त्रोत	वर्गों का योग	मुफ्तांश	मध्यमान वर्ग	एफ - अनुमान	सार्थकता स्तर
1.	समूह के मध्य समूह के अंतर्गत	7875.383 234566.925	3 275	1575.077 859.220	1.833	107
	योग		278			

परीक्षण

तालिका 6 से ज्ञात होता है कि पारिवारिक पुरस्कार के प्रभाव के लिये 'एफ' का मान 1.833 है, जो 0.05 स्तर पर सार्थक नहीं है। इसलिए परिकल्पना स्वीकृत की जाती है। इसका अर्थ यह है कि अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक सामाजिक विलगन का कोई सार्थक प्रभाव नहीं पाया गया है।

पालन पोषण के परिपेक्ष्य में परिकल्पना का परीक्षण

इस शोधकार्य की प्रथम परिकल्पना यह है कि **"अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक पालन पोषण के प्रभाव का सार्थक अंतर नहीं है।"**

तालिका 7: *पारिवारिक अनुपालन के प्रभाव से छात्र एवं छात्राओं की शैक्षिक उपलब्धि को दर्शाने वाली 'एफ' मूल्य की सार्थकता*

अ.क.	प्रसरण स्त्रोत	वर्गों का योग	मुफ्तांश	मध्यमान वर्ग	एफ - अनुमान	सार्थकता स्तर
1.	समूह के मध्य समूह के अंतर्गत	2735.103 239707.205	4 274	683.776 874.844	.782	.538
	योग	242442.308	278			

परीक्षण

तालिका 7 से ज्ञात होता है कि पारिवारिक पालन पोषण के प्रभाव के लिये 'एफ' का मान .782 है, जो 0.05 स्तर पर सार्थक नहीं है। इसलिए परिकल्पना स्वीकृत की जाती है। इसका अर्थ यह है कि अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक पालन पोषणका कोई सार्थक प्रभाव नहीं पाया गया है।

विशेषाधिकार के परिपेक्ष्य में परिकल्पना का परीक्षण

इस शोधकार्य की प्रथम परिकल्पना यह है कि **"अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक विशेषाधिकार के प्रभाव का सार्थक अंतर नहीं है।"**

तालिका 8: *पारिवारिक अनुपालन के प्रभाव से छात्र एवं छात्राओं की शैक्षिक उपलब्धि को दर्शाने वाली 'एफ' मूल्य की सार्थकता*

अ.क.	प्रसरण स्त्रोत	वर्गों का योग	मुफ्तांश	मध्यमान वर्ग	टी अनुमान	सार्थकता स्तर
1.	समूह के मध्य समूह के अंतर्गत	1330.605 241111.703	3 275	443.535 876.770	.506	.679
	योग	242442.308	278			

परीक्षण

तालिका 8 से ज्ञात होता है कि पारिवारिक विशेषाधिकार के प्रभाव के लिये 'एफ' का मान .506 है, जो 0.05 स्तर पर सार्थक नहीं है। इसलिए परिकल्पना स्वीकृत की जाती है। इसका अर्थ यह है कि अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक विशेषाधिकार से पंविलता का कोई सार्थक प्रभाव नहीं पाया गया है।

नामंजूरी के परिपेक्ष्य में परिकल्पना का परीक्षण

इस शोधकार्य की प्रथम परिकल्पना यह है कि **"अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक नामंजूरी के प्रभाव का सार्थक अंतर नहीं है।"**

तालिका 9: *पारिवारिक अनुपालन के प्रभाव से छात्र एवं छात्राओं की शैक्षिक उपलब्धि को दर्शाने वाली 'एफ' मूल्य की सार्थकता*

अ.क.	प्रसरण स्त्रोत	वर्गों का योग	मुफ्तांश	मध्यमान वर्ग	एफ - अनुमान	सार्थकता स्तर
1.	समूह के मध्य समूह के अंतर्गत	6085.767 236356.542	4 274	1521.442 862.615	1.764	.136
	योग	242442.308	278			

परीक्षण

तालिका 9 से ज्ञात होता है कि पारिवारिक नामंजूरी के प्रभाव के लिये 'एफ' का मान 1.764 है, जो 0.05 स्तर पर सार्थक नहीं है। इसलिए परिकल्पना स्वीकृत की जाती है। इसका अर्थ यह है कि अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक नामंजूरी का कोई सार्थक प्रभाव नहीं पाया गया है।

उन्मुक्तता के परिपेक्ष्य में परिकल्पना का परीक्षण

इस शोधकार्य की प्रथम परिकल्पना यह है कि **"अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक उन्मुक्तता के प्रभाव का सार्थक अंतर नहीं है।"**

तालिका 10: *पारिवारिक अनुपालन के प्रभाव से छात्र एवं छात्राओं की शैक्षिक उपलब्धि को दर्शाने वाली 'एफ' मूल्य की सार्थकता*

अ.क.	प्रसरण स्त्रोत	वर्गों का योग	मुफ्तांश	मध्यमान वर्ग	एफ - अनुमान	सार्थकता स्तर
1.	समूह के मध्य समूह के अंतर्गत	2892.563 239549.745	5 273	578.513 877.472	.659	.655
	योग	242442.308	278			

परीक्षण

तालिका 10 से ज्ञात होता है कि पारिवारिक नामंजूरी के प्रभाव के लिये 'एफ' का मान .659 है, जो 0.05 स्तर पर सार्थक नहीं है। इसलिए परिकल्पना स्वीकृत की जाती है। इसका अर्थ यह है कि अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक उन्मुक्तता का कोई सार्थक प्रभाव नहीं पाया गया है।

उपस्थिति के परिपेक्ष्य में परिकल्पना का परीक्षण

इस शोधकार्य की प्रथम परिकल्पना यह है कि **"अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक उपस्थिति के प्रभाव का सार्थक अंतर नहीं है।"**

तालिका 11: *पारिवारिक अनुपालन के प्रभाव से छात्र एवं छात्राओं की शैक्षिक उपलब्धि को दर्शाने वाली 'एफ' मूल्य की सार्थकता*

अ.क.	उपस्थिति	संख्या	मध्यमान विचलन	मध्यमान वर्ग	एफ - अनुमान	मुक्तांश स्तर	सार्थकता स्तर
1	<90	166	244.75	31.01	.264	.277	.792
	<90	133	223.62	27.34			

परीक्षण

तालिका 11 से ज्ञात होता है कि पारिवारिक नामंजूरी के प्रभाव के लिये 'एफ' का मान .264 है, जो 0.05 स्तर पर सार्थक नहीं है। इसलिए परिकल्पना स्वीकृत की जाती है। इसका अर्थ यह है कि अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिक उपलब्धि पर पारिवारिक उपस्थिति का कोई सार्थक प्रभाव नहीं पाया गया है।

निष्कर्ष

1) अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिण उपलब्धि पर **पारिवारिक नियंत्रण** का कोई सार्थक प्रभाव नहीं पाया गया।

2) अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिण उपलब्धि पर **पारिवारिक दण्ड** का कोई सार्थक प्रभाव नहीं पाया गया।

3) अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिण उपलब्धि पर **पारिवारिक संरक्षण** का कोई सार्थक प्रभाव नहीं पाया गया।

4) अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिण उपलब्धि पर **पारिवारिक अनुपालन** का कोई सार्थक प्रभाव नहीं पाया गया।

5) अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिण उपलब्धि पर **पारिवारिक सामाजिक** विलगन का कोई सार्थक प्रभाव नहीं पाया गया।

6) अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिण उपलब्धि पर **पारिवारिक पुरस्कार** का कोई सार्थक प्रभाव नहीं पाया गया।

7) अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिण उपलब्धि पर **पारिवारिक पालन–पोषण** का कोई सार्थक प्रभाव नहीं पाया गया।

8) अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिण उपलब्धि पर **पारिवारिक विशेषाधिकार** का कोई सार्थक प्रभाव नहीं पाया गया।

9) अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिण उपलब्धि पर **पारिवारिक नामंजूरी** का कोई सार्थक प्रभाव नहीं पाया गया।

10) अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिण उपलब्धि पर **पारिवारिक उन्मुक्तता** का कोई सार्थक प्रभाव नहीं पाया गया।

11) अनुसूचित जनजाति के छात्र एवं छात्राओं की शैक्षिण उपलब्धि पर **पारिवारिक उपस्थिति** का कोई सार्थक प्रभाव नहीं पाया गया।

सन्दर्भ सूची

डॉ. जी.सी. भट्टनागर (2006–07). अध्यापक शिक्षा, विनोद पुस्तक मंदिर, आगरा।
सक्सेना, मिश्रा मोहन्ती (2007). अध्यापक शिक्षा, आर.लाल, बुक डिपो, मेरठ।
आर.ए. शर्मा (2006). शिक्षा अनुसंधान, आर.लाल. बुक डिपो, मेरठ।
डॉ. रामपाल सिंह (2005). शैक्षिक अनुसंधान एवं सांख्यिकी विनोद पुस्तक मंदिर, आगरा।
पारसनाथ राय (2006). अनुसंधान परिचय, लक्ष्मी नारायण अग्रवाल, आगरा।
सरीन एवं सरीनः शैक्षिक अनुसंधान विधियां, विनोद पुस्तक मंदिर, आगरा।
कपिल एवं हंसकुमारः अनुसंधान की विधियां, हरप्रसाद भार्गव पुस्तक प्रकाशन, आगरा।
सच्चिदानंद, ठोढेपाल अरविन्द फाटकः शैक्षिक अनुसंधान का विधिशास्त्र, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर।
डॉ पारसनाथ राय भट्टनागरः अनुसंधान परिचय, विनोद पुस्तक मंदिर, आगरा।
सक्सेना चतुर्वेदी (2007). उदीयमान भारतीय समाज में शिक्षा, आर.लाल. बुक डिपो, मेरठ।
रामशकल पाण्डे (2006). उदीयमान भारतीय समाज में शिक्षक, विनोद पुस्तक मंदिर, आगरा।
डी.एल.शर्मा (2007). उदीयमान भारतीय समाज में शिक्षक, आर.लाल. बुक डिपो, मेरठ।
20 प्रश्न संपुट (2006). उदीयमान भारतीय समाज में शिक्षक, विश्वविद्यालय प्रकाशन (रजि.) ग्वालियर।
सत्यपाल रूहेला (1989). भारतीय शिक्षा का समाजशास्त्र, राजस्थान हिन्दी ग्रंथ अकादमी, जयपुर।
एन.आर. स्वरूप सक्सेना (2007). शिक्षा के दार्शनिक एवं समाजशास्त्रीय सिद्धान्त, आर.लाल. बुक डिपो, मेरठ।
सच्चिदानन्द ठोढिपाल अरविन्द पाठकः शैक्षिक अनुसंधान का विधिशास्त्र, राजस्थान हिन्दी ग्रन्थ अकादमी, जयपुर।
बुच.एम.बी. (1998). फोर्थ सर्वे ऑफ रिसर्च इन एज्युकेशन वाल्युम–2, राष्ट्रीय शैक्षिक अनुसंधान परिषद्, नई दिल्ली।
बुच.एम.बी. (1978–83). थर्ड सर्वे ऑफ रिसर्च इन एज्युकेशन, बड़ौदा।

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Book Review

Berlinghoff, William P. and Gouvéa, Fernando Q. (2004). *Math through the Ages: A Gentle History for Teachers and Others*. Mathematical Association of America Textbooks.

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> *"Learning about math is like getting to know another person. The more you know of someone's past, the better able you are to understand and interact with him or her now and in future".*
>
> - Berlinghoff & Gouvéa

Try asking a mathematics teacher about her views on including history of mathematics or mathematical concepts in her classroom, and I am certain that you will be reciprocated with looks of bewilderment and confusion. Reasons of dissuasion are many - for some history of mathematics is a waste of time, some just shy away due to a lack of knowledge and, for most, talking about history of mathematics (HOM) or mathematicians in mathematics classrooms is boring, redundant and of no use. Of the very rare species of mathematics teachers who express their inkling, but also regret their inability to imbibe history of mathematics in their classrooms, attribute their failure on scarcity of good pedagogic resource material to refer to for guidance. Inundated by voluminous books on this topic, coupled with spurious and fragmented information from the internet, often give them a feeling of helplessness. Teachers fraught not only with non-availability of good, authentic material but also with a lack of acumen for using HOM as a pedagogic resource in their classrooms. In short, mathematics teachers do not perceive any connection between mathematics and its history. The book under review, *Math through Ages. A Gentle History for Teachers and Others*, can, to some extent, ease out such apprehensions.

William P. Berlinghoff and Fernando Q. Gouvea, in their introductory chapter, quote that their predilection for writing this piece of work can be credited to their long experience of teaching History of Mathematics (HOM) and to the 'casual hallway conversations'. After years of cogitation, the authors realized a need to offer a pedagogic resource that can readily be referred by teachers or by any general audience who wish to have a first glimpse on the evolution of mathematical concepts, processes and ideas

through ages. They wished to share the battles, conflicts, contradictions, and the ever-evolving character of mathematics as an enterprise of human mind. Well acquainted with the appalling ignorance of teachers towards HOM and the scarcity of pedagogic resources in this area, the authors have tried to bring out a reference material that not only provides snapshots of historical journey of mathematical concepts and processes but also aims to help teachers design thought-provoking projects and research work for their students.

Knowing history gives a pretext and a context. Portraying mathematics as a cultural product, created by people, at a particular time, attributed to the then existing needs – academic, commercial or personal, the book brings to the fore many stories related to the development and dissemination of mathematical concepts, processes and innovations; ideas that flourished and how; backgrounds behind the ideas; people who were involved; and challenges that were faced in launching a concept. While traversing through the history we happen to meet the social-cultural backgrounds and the conditions that regulated or promoted the growth of an idea.

School mathematics often portrays mathematical ideas as being distinct entities, emerging in isolation. This book challenges this commonly held belief and provides evidence to show that ideas in mathematics are not a random collection of unrelated bits of information. When one studies the growth of an idea one gets to appreciate how it emerged from a cross-generational, cross-conceptual confluence. For example, through *Chapter 8: The Cossi Art. Writing algebra with symbols*, the authors have shown how the Hindu-Arabic numeration system contributed in the advent of symbols in algebra. In its early years, algebra was done rhetorically. There was no concept of symbols at that time. Since in the Roman and Greek systems literals were used to represent numerals, these could not be used for 'the unknowns'. Algebraic representation was a highly complicated task. The move towards symbolism was only possible when the Hindu-Arabic system became widely accepted for representing numbers. In the Hindu-Arabic numeration system numbers were represented distinctly, a new world of symbolism could then be created. This system of numeration gave freedom for distinguishing unknowns from the coefficients. 'The thing' or 'the unknown' could now be substituted with symbols or literals and numerals could now be used exclusively as coefficients. This distinction eased the process of writing algebraic expressions, contributing, in-turn, to its popularity and expansion.

Well acquitted with the needs of teachers, the authors have tried to help them by not only giving historical anecdotes but also by providing ideas for meaningful assignments, projects and activities for students. Each chapter is supplemented with a set of questions and projects that can be used to encourage students to explore and appreciate the real essence of doing mathematics. Being open-ended such activities encourage research-based learning, giving a mathematical ownership, helping students benefit mathematically and in celebrating the subjectivity aspect of mathematics. Activities, such as reconstructing a mathematical idea position students amid the then existing debates and challenges, helping them to question and check their mathematical

understandings. Assignments have been designed to meet the varied intellectual demands. Thus, while some projects/ activities may be easy for some, others may find them equally challenging. Whatever the level be, they are worth a try as they are indeed engrossing.

The narrative style of writing sweeps across the deep thoughts, navigating the reader through most abstract ideas, linking challenges and the cultural milieu that prevailed. As a student of mathematics it is critical to know that many concepts in mathematics have non-anglophobic roots and that there could be many perspectives of looking at the same thing. What is important for a structure to thrive is its logical rigour. One of the significant aspects of the book is the way authors have tried to help the reader build a critical understanding of the ways in which one form of mathematics got legitimized over others. For example, in *Chapter 19, Strange New Worlds. The Non-Euclidean Geometries,* the authors have elicited the conflicts between the three geometries (Euclidean, Elliptical and Hyperbolic). Each is built on a strong mathematical structure and are widely used, yet only one has been handpicked and studied in a traditional school curriculum. Non-Euclidean geometries, despite being widely used in astronomy and in theoretical physics, are lesser known. The chapter highlights the fact that there cannot be one geometry for all. As students it is important to understand that geometry should be studied as a tool that is chosen by the worker, and not as a fixed feature of the job site.

Chapters – The Sketches

Just a glance over the Table of Content (TOC) will tell you about the passion with which the authors have written this book. The TOC is like a menu card, offering a scrumptious meal of mathematical ideas. Walking through this mathematical gallery, one appreciates the creativity with which the authors have titled their chapters. Each nomenclature is attention-catching and fascinating: *Nothing Becomes a Number – The Story of Zero; Broken Numbers – Writing Fractions; In the Eye of Beholder – Projective Geometry; The Cossic Art – Writing Algebra with Symbols; Impossible, Imaginary, Useful – Complex Numbers.*

The book is divided in two sections. The first section, comprising of two chapters sets the stage for the subsequent twenty five chapters. Chapter 1, *History in the Mathematics Classroom*, urges teachers to the need of imbibing history in mathematics classrooms. "Stories serve as pegs on which a mathematical idea can hang". The second introductory chapter called *History of Mathematics in a Nutshell* provides a panoramic view of how mathematics flourished in different civilisations. This chapter is like a feeder for the rest of the chapters as it familiarizes reader to some of the significant landmarks in the development of the subject.

Section two comprises of twenty-five chapters (authors call them Sketches). Each sketch, written in 6-8 pages is a nugget of a mathematical idea. The sketches give only an introduction of the evolution of a concept or an idea. The text is written in a lucid fashion and delimits on giving depth of any topic in particular. Thus the book can prove

to be a handy resource for teachers, who either do not have time or access or inclination to do elaborate search. These snippets give a flavor of HOM, without going into too much of details. The book only scratches the surface of a vast body of mathematics.

However, there could be times when any engrossed reader would expect more on a topic. To satisfy the intellectual curiosity of such readers, the authors have provided bibliographical remarks, giving a vast array of resources for further reference. At the end of each chapter short annotations on 'For a Closer look' has been given for such avid readers who wish to know. The book ends with a 'What to read next' in which authors have recommended a list of books, internet sites and other media resources that one ought to read to know more about a topic.

An End Note

It is hoped that discussing such anecdotes in classrooms should provide scope for a deeper, richer understanding of the subject. As quoted by the authors –"often in the absence of any primary evidence, history emerges from 'folklore' and these anecdotes carry values of interest in holding students to the not-so-complete nature of mathematics". Such historical anecdotes will also help people sense mathematics in a new way, as an evolving subject.

The sketches connect many ideas together and thus, at times the text may seem repetitive. However, if one wishes to read a sketch standalone, this repetitiveness is well needed. It would help the reader to appreciate that concepts are not isolated, distinct and disjoint. Ideas generate concomitantly, not only within the subject but also draw from the social dynamics of the society. In the development of mathematics each previous concept, each contributor and each person of past had a point of view that made a significant ingredient in its development. All these patterns have been knit together to give a coherent view. The book highlights this aspect harmoniously.

Throughout the book the authors give a very readable account, indulging in details only to give a glimpse of a broad spectrum that contributed in the journey of evolution. The level of sophistication is varied, so virtually everyone who wishes to do something will definitely find something interesting to do. The book can thus serve as a major ingredient in any school course or classroom discussions.

In a nutshell, the book illuminates the prowess of imbibing history of mathematics in promoting critical understanding of mathematics and mathematical thinking. If you are looking for a crisp, yet rigorous material on history of mathematics then this book could, in-a-way, end your search. It can serve as a first source but with a line of suggestion – it only provides a glimpse of the ideas, only a brief snapshot of the history of mathematical concepts. Remember, there is much more to the story.