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About the Journal

The journal 'Voices of Teachers and Teacher Educators', an initiative of the Ministry of Human Resource Development (MHRD), is now being co-ordinated by the NCERT. The Journal highlights the vital role of teacher education in India, as the country is poised to provide quality education to all its children, irrespective of gender, caste, creed, religion and geography. The National Curriculum Framework (NCF)-2005, the National Curriculum Framework for Teacher Education (NCFTE)-2009 and the Right of Children to Free and Compulsory Education Act (RTE)-2009 all reflect this commitment and underline the principles that make such an effort necessary and also spell out the strategies for it. The challenge is to augment the role of teachers in shaping the social transformation that India is witnessing, have a long lasting impact on the quality of education, and making education equitable. Teachers and all those concerned with education need to recognize that their ownership and voices are important and that they can and do learn not only from their own experiences but also from each other through collective reflection and analysis. The Journal attempts to lend voice to teachers, teacher educators, researchers, administrators and policy makers in varied institutions such as schools, Cluster Resource Centres (CRCs), Block Resource Centres (BRCs), District Institutes of Education and Training (DIETs), Institutes of Advanced Studies in Education (IASEs), Colleges of Teacher Education (CTEs), State Councils of Educational Research and Training (SCERTs), etc., and make their engagement visible in accomplishing extraordinarily complex and diverse tasks that they are expected to perform. Contributions to the Journal are welcome both in English and Hindi. Voices is an e-Journal and we hope to circulate it widely. We also look forward to suggestions and comments on the articles published. The views expressed and the information given are that of the authors and may not reflect the views of the NCERT.

Call for Contributions

This biannual publication is for all of us: teachers, teacher educators, administrators, researchers and policy makers. It seeks to provide a platform and build a network for our voices, ideas and reflections. To enable this journal to reflect all voices, we must contribute to it in as many ways as we can. We look forward to many contributing with different experiences, questions, suggestions, perspectives as well as critical comments on different aspects of teacher education and schooling. The contributions could be in the form of articles, reports, documents, pictures, cartoons or any other forms of presentation amenable for print. We also seek comments and reflections on the current issue to improve publication and make it a participative endeavour. We must together make this journal truly reflective of our voices. We look forward to receive your contributions for the next issue by 31st December 2019. We also look forward to your comments and suggestions. The contributions can be sent to the following:
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Editorial

This is the first issue of the eighth volume of the VOICES of Teachers and Teacher Educators. This comes at a time when the draft National Education Policy 2019 has been put in to the public domain. The policy has been in the making for some time and the first attempt in the direction was the earlier draft National Education Policy prepared in 2016. The preamble states quite candidly that while this draft of 2019 has considered the earlier draft of 2016, it has substantially gone beyond that draft and has many 'out of the box' ideas included. As many immediate responses to it coming from scholars show that it is indeed out of the box and the policy has made some far reaching suggestions.

These initial responses have highlighted the important principles reasserted or new affirmations that underline the vision of education as a way towards a equitable and inclusive society. There are many important articulations about education, its purpose and nature. The policy covers early childhood care and education as well as higher education in its sweep and has many new formulations about systems and their functioning. The policy for example points out that we must look at education as a public good rather than a commodity. It also recognises the need to restore autonomy and agency in the educational system and heighten the awareness and appreciation of diversity. It argues for continued allocation of public funds for education and suggests that public expenditure to be substantial for vitalizing and expanding the public education system. The policy says it is building on the earlier policy and the global consensus on education and the public responsibility for the education of the people. It underscores the cultural diversity of the Indian heritage and the need to take from all the sources including those that came from outside to strengthen the knowledge resident in the people.

The policy argues for sustainable development and avers the need for alignment with goals of sustainable development. It argues that educational system has to be reconfigure for this so that there is opportunity for students and teachers to engage in purposeful learning experiences. For this an effective system to support learning is required. It says reform in education is not about only pedagogical innovations. The draft policy 2019 emphasises need for a new curricular structure for education so that the needs and stages of development of students can be recognised and focused on more clearly. The policy argues for a flexible and open structure at all levels. It suggests that students have the options of a flexible set of courses at the senior school level with a leveling of the importance of the different kind of curricular areas and subjects. Similarly for higher education it suggests the need for greater shift to liberal education with a wide coverage of liberal arts and science courses cutting across boundaries. Besides the choice of courses and combinations it argues for the need for flexible exit and entry options for students at various stages.

It has laid a lot of emphasis on teachers and their preparation. This can be seen in continuation of the importance paid to the teacher, her preparation in line with the previous policy and the subsequent program of action and missions. While the policy reiterates the central role of the teacher and the need to have a system that gives the teacher a reasonable career path, it adds an important element on the preparation and advocates constructing it like a professional choice with a rigorous preparation. In its backdrop to the policy it is confronted by the same concern about the status of teachers and the way the system manages and governs them, but fails to add any significant step except to say that the teachers would be involved more in the processes and would have a greater occasion and opportunity for peer interaction and learning. It rejects the idea of cascade training and centralised curricula, but it is not quite clear how the decentralised programmes would come

about and be put in place. The structure for decentralisation suggested in the policy is the old structure of the school complex, but the policy does not point out that this would require both resources and space for teachers to engage in such conversations and discussions. It would also require additional resources, capability and temperament in the leadership at the school complex expected to govern and ensure improved educational processes in the cluster of schools in the complex.

Apart from laying welcome emphasis on the early childhood care and education and the need for paying greater attention to it, the policy makes two significant suggestions that need to be examined carefully. One is about restructuring of the entire pre-school to secondary divisions in school and the other is bringing the pre-school in to the primary school. The merits of these suggestions need to be discussed, but more crucial is the concern about the present state of the primary school and the possible impact it may have on even the pre-school. We also have to fight a tougher battle to insist that pre-school is not about bringing the curriculum of beginning of primary in to the earlier classes. The recognition of the need for quality early childhood care and education for all children is an important commitment. This linked with the commitment to foundational literacy and numeracy emphasises the commitment to ensure that citizens of the country are able to interact with the world with a greater confidence and capability to be aware of the norm and ways.

The policy apart from making a commitment of providing education to all between the age 3 to 18, that is between the pre-primary to senior secondary also departs from the practice so far and makes a detailed statement about the curriculum and pedagogical structure and suggests a different stage-wise break up from pre-school to senior secondary and argues that it has a closer alignment to the cognitive and socio-emotional needs of the students. It is not clear however, what this would mean in practice to the way schools are divided in to groups of classes and the impact this would have on the physical structures and their governance and management. The policy also makes a welcome commitment to a flexible and more integrated curriculum with no hard separation between curricular and co-curricular areas. It suggests an integration of the vocational stream with the academic and equal status to all.

The policy pays a significant attention to higher education and makes major suggestions for change and improvement. It speak of an alternative architecture to ensure quality and excellence and also recommends focus on high-quality liberal education including a rigorous exposure to science, arts, humanities, mathematics and professional fields with flexible curricular structures. Combinations of study that are different and have combinations of disciplines of study currently unavailable as well as multiple exit and entry points. In the same spirit as for school program, it argues for integration of professional education in to higher education. This would necessitate changes in engineering and medical colleges and expecting them to also offer other academic courses. The policy also recommends autonomy for institutions academically, administrative and financial. There are proposals for a Rashtriya Shiksha Aayog and a National Research Foundation to make a coherent vision possible.

We have in this brief summary pointed out some of the points in the Draft National Education Policy 2019. These are not exhaustive and many more need to be added and discussed. Some of these points are already in discussion. While we carry a few articles that have been immediately received on the policy the next issue of the Voices of Teachers and Teacher Educators (VTTE) is directed towards a discussion on the policy. The policy has been placed on mygov.in for comments and suggestions. This report is proposed for strengthening, reforming and transforming the education of the country. We would like you to write about the report based on your experience analysing the report and making suggestions for change or for its implementation. You could choose specific sections for discussion and analysis. We would also like to inform you that the December issue of VTTE

will be focused on Mathematics Education and the next issue 2020 on Language Education. We look forward to your articles and also your feedback on the issues of VTTE.

Now about the articles in this issue

This issue of voices has twenty articles in all. These articles address a wide variety of issues. We present below a brief over-view of the articles in the issue but not in the order they are placed. Out of the 20 articles 4 articles deal with the discussion on the Draft of the New Education Policy of 2019. The remaining 16 articles are from various streams of educators and covers diverse and important concerns.

The paper by **Gurumurthy Kasinathan** has raised the issue of privatisation of education and points out the non- or mis-implementation of the Right to Education in the private schools. While contending strongly the importance of sustaining and strengthening the public education system, he further emphasises the need to strengthen the ordinary Govt. schools. He suggests that these schools should actually be provided with a higher per child expenditure than even the central schools, while at present it is by far the opposite of this. He argues for strengthening the idea of RTE and implementing it in the spirit it was formulated with adequate resources. These aspects are also important in the context of the Draft National Education Policy, 2019.

The paper by **Richa Goswami** is based on the study she has carried out on the parental perceptions of desirable education. The paper talks about the methodological challenges in this and through her experiences points out the methods she used in her study. She underlines the awareness of the ambience and culture of the interviewee and the need for being able to make the person comfortable and respond to questions in a natural manner so as to be able to hear the authentic voice.

The article by **H K Dewan** is about the preparation of a teacher for her role in working with children. The paper points out the axes and dimensions of requirements of the preparation and analyses those in the current context in particular of the nature of the current social understanding and the understanding about the purpose of the school and the expectation from education. It argues that the current self-image and the social-status of the teacher make it impossible to fulfil this role. It also asks the question whether the construction of the preparation program as a teacher training institution based 'front loaded' program is the best option.

Swati Sidhu and **Geetha Ramaswami** in their article share the endeavour of 'Season Watch'. They report about the effort that involves students making regular careful observation of specific chosen aspects of flora around them. Recording these and sharing these carefully gathered specific information on a global network. This effort to observe change in the trees around them through the year develops not only the attitude to understand data and its interpretation, but also sensitises them to the neighbourhood floral environment. Being a part of this effort helps them to also recognise the importance of large data and its analysis and analyse the impact of human intervention on plants and environment to some extent.

Rekha Pappu discusses some key features of the social reform period of the 19th century in relation to the education of women. She discusses the reform movements and their key goals and assumptions for both the Hindu and the Muslim communities. She points out that both the communities show a lot of similarity in the manner the issue was presented and understood. The reform movements stayed within not only the economic and social boundaries. The women were to be educated and yet expected to be subservient to the males and be sharp thinker yet keep their views to themselves. Be educated but continue to be a supportive 'angel' at home. They paid no special attention to the caste and creed and were content in having the women from the upper caste and economic purse holder families.

The article written by **Preeti Manani** sharply draws attention to the shameful practice of ragging in institutions. Her paper is based on a research study on ragging in higher education

institutions with special reference to a medical college in Agra. Though the site is specific it shows the inter-sectionalities between social variables such as caste, class, gender, etc. and frequency and nature of ragging. It also highlights different aspects of ragging such as its origins, causes and implications, thereby offering rich insights. A few cases of ragging highlighted by media are also listed. After discussing suggestions to curb it by several committees set up for the same are discussed and limitations are pointed out.

Jagdish Defauti, a teacher from Uttarakhand brings out from his experience many critical issues in his paper on Democratic processes in the school. He says that while we talk about values development such as that of democratic process we do not work towards them in practice. The students are expected to help in the physical maintenance of the school, but the teachers do not. Students are supposed to be criticised by the teachers and often quite rudely, but students cannot point out the difficulties with their teachers. He argues that teachers need to self-reflect about these issues and function so as to make them possible as a reality in the classroom.

This issue carries five papers related to the teaching of science and mathematics. The first paper by **David Devraj Kumar & Ronald Persin** discusses problem solving, the ways to support its learning and the possible path. They argue that allowing children to use their own strategy and making them aware of multiple strategies allows them to develop their own style. This leads to the students gradually being able to identify the way to solve any problem that they may be required to solve.

Another paper, in this category is by **K V Sridevi,** she suggests the need to integrate learning of how to use technology in the classroom with the content and pedagogy orientation. She argues that during pre-service and in-service orientation technological knowledge remains as separate from the main content of the other parts of the course. Because of this both pre-service and in-service teacher education fail to develop a nuanced and meaningful understanding of the applications of technology and how to link it with content or pedagogy. Through a study with the student teachers she argues that pre-service teachers are not confident of using technology in the classroom. Any effort towards integration should be strongly connected with other basic knowledge domains of teachers' i.e. content knowledge and pedagogy knowledge.

The next paper in this section is by **Dhanya Krishnan** in which she reports the study conducted on the nature of Pedagogical Processes in Science. This was done at some Government Secondary Schools of Odisha. The sample was a stratified random sample and the data was collected through classroom observation schedule, interview with some teachers, focus group discussion, and observations of the teaching-learning process in some classes. They also studied the infrastructure available for experiments and the condition of the Science kit(s) in school. They found that most teachers do not perform any experiments and discourage dialogue.

In his paper, **R.R. Koireng**, discusses the idea of learning outcomes through an example of some parts of the Science curriculum at the upper primary stage. He argues that the learning outcomes must be aligned and correlated with the curriculum expectations. In fact they need to be derived from the curricular choices and curricular expectations. Using a fairly detailed example he suggests that learning outcomes are interdisciplinary in nature and involve cross-cutting concepts and hence the need for parallel development in many cases.

An article of this issue contributed by **Pooja Keshavan Singh** and **Haneet Gandhi** talks about their experience of using stories and other such devices as mediums for teaching

Mathematics. They conclude from their experiment with a group of class II children that such an engagement gives the children excitement and a great connect with the topic at hand. They participate better, are engaged and can appreciate the repeated patterns embedded in the story. Creating stories and makes children put in greater effort, as they feel that their work and their answers would have some purpose.

Neha Kashyap in her paper emphasises the need for the teacher to be aware of and be able to recognise the need and the way to consider and analyse student's work. She argues that this will help the teacher appreciate the way children build their ideas and therefore be able to follow their trajectories of learning. She does this through the example of integers and their operations. She points out how understanding of operations on integers also affects ability to engage with algebra including working with polynomials and equations.

The paper by **Kewlanand Kandpal** focuses on the objectives of science teaching in class VII and while experiments are meant to be included they do not be performed in classrooms. From a study over 3 secondary schools of 3 blocks in Uttarakhand he brings out the reasons for this. He draws attention to multi-faceted action that is required to enable this. The gaps that he points out include those of resources and awareness about the meaning and importance of experiments. He also points out that the books of science need to be also reviewed as they contain too many facts. He suggests some ways in which both these can begin to be addressed.

In their article, **Madhuri Hooda** and **Karuna Bhardwaj** point out the need for an online system to cater to the need of the growing numbers that should be provided higher education to ensure that a reasonable proportion of the population can be enrolled into higher education. They argue that the Indian education system faces major challenges in making good quality higher education equitably available. They discuss the benefits and the limitations of MOOCs and suggest that it could be a useful way forward.

The paper by **Shireesh Singh** and **Sumit Gangwar** uses the census figures of 2011 to assess the situation of education for the differently abled. Through interviews with special teachers deputed for scaffolding learning of differently abled children they bring out the challenges and difficulties in the current context. The aspects they flag include attitudes of the teachers, educational administrators, policy makers, learning environment of the school, the lack of support from peers and the general society as well as the lack of parental awareness. They suggest major efforts to make educational situation for differently abled children better.

We have begun the discussion on the draft of the New Education Policy 2019 from this issue of the journal. The four articles in this issue are just to initiate the conversation. There are many articles being written about it elsewhere too and many seminars and conferences organised for this. We would have the next issue focus on more detailed analysis and response to the draft of the policy, but have included some articles in this issue. These articles are spread over the publication. One of the papers on Draft New Education Policy, 2019 is by **Nimrat Kaur,** which introduces the draft document including a part of the process followed in making the draft and highlights the salient features and the key points addresses. In another paper by **Vimala Ramachandran** points out that while the policy shows recognition of many key challenges it has not adequately flagged the issue of private schools and coaching. She points out that the policy has highlighted the need for decentralisation and autonomy and the idea of early education and its importance, but suggests that a rigorous assessment of why things have not happened has not been done. This leaves gaps and ideas about the way forward unclear. We also have a view of a school teacher on the draft policy as

well. In his paper **Dinesh Kumar Yadav** has critically examined the recommendations of the policy on some specific aspects that include role of the teacher, recruitment principles and procedures, professional and career development, their governance and management by the administration, etc. The paper suggests that the drafting committee has not taken in to consideration the past proclamations and the failure to implement them and the document does not reflect pragmatism. He argues that the ideas in the policy are neither well thought through, nor backed by pragmatic actions steps and at many places are not specific enough to lay out a path ahead for the implementers. **Vandana Kapoor** appreciates the importance given to Early Child Care and Education, her paper lauds the emphasis laid on it and the point that it is not been considered as a mini version of class I even though it could include foundational literacy and numeracy. She seems to appreciate the direction of the policy but is also worried about its implementability.

We look forward to your views on this issue and hope that you would also write for the next issue.

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विज्ञान विषय की पाठ्यचर्या के लक्ष्य : कक्षा 8 की विज्ञान की पाठ्य पुस्तक

सार

उच्च प्राथमिक स्तर पर बच्चों का विज्ञान विषय से पहली बार परिचय होता है। इसलिए यही समय है जब उन्हें जानना चाहिए कि विज्ञान विषय को एक अलग विषय के रूप में पढ़ने का मतलब क्या है? इस स्तर पर पढ़ाने के लिए चुनी गयी विषय वस्तु बच्चों के अनुभव जगत से सम्बंधित होनी चाहिए? यह कैसे हो कि प्रयोगों/कार्यकलापों के माध्यम से ही वैज्ञानिक धारणाएं या सिद्धांत बच्चों के सामने प्रस्तुत किए जाएँ? ऐसे प्रयोग/कार्यकलाप हो सकते हैं जो ज्यादा खर्चीले नहीं हों और तत्काल उपलब्ध वस्तुओं के माध्यम से उन्हें करना कठिन नहीं हो तभी विज्ञान की पाठ्यचर्या में प्रयोग जैसे मुख्य व केन्द्रीय अवयव को सभी स्कूलों के लिए अनिवार्य किया जा सकता है। हमारा मानना है कि विज्ञान शिक्षण अपेक्षाकृत विपरीत परिस्थितियों में भी संभव है और इसके लिए ज्यादा बाहरी संसाधनों की जरुरत नहीं पड़ती। राज्य एवं राष्ट्रीय स्तर के अचीवमेंट सर्वेक्षणों में विज्ञान में विद्यार्थियों की संप्राप्ति का स्तर उत्तराखंड राज्य के शिक्षा प्रशासकों के लिए चिंता का विषय बना हुआ है। जनपद बागेश्वर का प्रदर्शन भी राज्य के अन्य जनपदों से कुछ बेहतर होने के बावजूद चिंताजनक है। इसलिए यह बहुत जरुरी हो जाता है कि इसके कारणों की शोध आधारित जांच-पड़ताल की जाए। विज्ञान की पाठ्यचर्या के उद्देश्यों की प्राप्ति के लिए चुनौतियों का पता लगाया जाए, एक समस्या तो यह है कि उत्तराखंड राज्य के बागेश्वर जनपद के विद्यालयों में विज्ञान किट एवं विज्ञान विषय की प्रयोगशाला की संकल्पना का अभाव, पाठ्यपुस्तक को ही पाठ्यचर्या के संचालन का एकमात्र आधार बना देता है। अत: इस अध्ययन में हमने अध्यापकों, प्रधानाध्यापकों एवं प्रारम्भिक शिक्षा के शासन एवं प्रबंधन के लिए जिम्मेदार अधिकारियों के अभिमत को जानने-समझने का प्रयास किया है। अध्ययन में सबसे महत्वपूर्ण जो बात उभरकर सामने आयी वह यह थी कि अध्यापक विज्ञान की हालाकि पाठ्य पुस्तक को विज्ञान विषय की पाठ्यचर्या के लक्ष्यों को प्राप्त करने का एकमात्र साधन नहीं मानते और विज्ञान प्रयोगशाला/किट की जरूरत महसूस करते हैं, परन्तु इसके स्वरुप एवं परिकल्पना के बारे में स्पष्टता की कमी नजर आती है। पाठ्य पुस्तक के विश्लेषण से जानकारी की बहुलता कम कर कुछ मूलभूत अवधारणाओं पर काम करने की जरूरत लगती है।

मुख्य शब्द (Keywords): पाठ्यचर्या, लर्निंग आउटकम, दक्षताएं, अधिगम, शिक्षण व्यवहार।

प्रस्तावना

69 वें गणतंत्र दिवस के अवसर पर राष्ट्र को संबोधित करते हुए भारत के महामहिम राष्ट्रपति ने शिक्षा प्रक्रिया के बारे में महत्वपूर्ण बात रेखांकित करते हुए कहा कि शिक्षा की प्रक्रिया ऐसी होनी चाहिए जो विद्यार्थियों को रटने के लिए प्रोत्साहित न करे वरन् सोचने, समझने, करने एवं प्रयोग करने के अवसर दे। इस पर सोचना महत्वपूर्ण है क्योंकि आज भी अधिकांश प्रारम्भिक विद्यालयों में विज्ञान विषय को भाषा की तरह ही पढ़ाने का अभ्यास जारी है। विज्ञान की पाठ्य पुस्तक एकमात्र आधार है, और उसके उपयोग के ढंग से, बच्चों के लिए सोचने, समझने, करने एवं प्रयोग करने के अवसर बहुत सीमित रह जाते हैं।

भारतीय संविधान के भाग 4 के अनुच्छेद 51 क में, मौलिक कर्तव्यों में क्रमांक 8 में उल्लिखित है कि 'प्रत्येक भारतीय नागरिक वैज्ञानिक दृष्टिकोण, मानववाद और खोजबीन की भावना तथा सुधार की भावना का विकास करे।[1] यह तभी संभव है, जब बच्चों में एकदम शुरूआती स्तर से वैज्ञानिक दृष्टिकोण हेतु उपयुक्त मूल्यों का समुचित रूप से बीजारोपण किया जाए।

वर्ष 2015-16 में उत्तराखंड के राज्य शैक्षिक अनुसन्धान एवं प्रशिक्षण परिषद् द्वारा कराये गए राज्य उपलब्धि सर्वेक्षण[2] में विज्ञान विषय में संप्राप्ति स्तर शहरी क्षेत्र में 60 प्रतिशत तथा ग्रामीण क्षेत्र में 59.55 प्रतिशत रहा। बागेश्वर जनपद के लिए यह प्रतिशत क्रमश: 66.64 प्रतिशत एवं 61.54 प्रतिशत रहा।

यह राज्य के औसत प्रदर्शन से तो बेहतर कहा जा सकता है परन्तु संतोष का विषय तो नहीं ही है। इधर हाल ही में (वर्ष 2017) राष्ट्रीय शैक्षिक अनुसंधान एवं प्रशिक्षण परिषद द्वारा कक्षा 3, 5 एवं 8 के अधिगम संप्राप्ति सर्वेक्षण में उत्तराखण्ड राज्य का प्रदर्शन संतोषजनक नहीं रहा है। इसी सर्वेक्षण के बाद जारी डिस्ट्रिक्ट रिपोर्ट कार्ड 2017 (District Report Card 2017) में जनपद बागेश्वर के बारे में बताया गया है कि विज्ञान विषय में पूछे गए प्रश्नों में से 50 प्रतिशत या उससे भी कम प्रश्नों के सही उत्तर देने वाले छात्रों का प्रतिशत 58.76 है, इसमें भी 30 प्रतिशत से कम सही उत्तर देने वाले छात्रों का प्रतिशत 24.12 है। जनपद बागेश्वर में कक्षा 8 के छात्रों में विज्ञान विषय में कुछ दक्षताओं में न्यूनतम अधिगम संप्राप्ति पायी गयी (NCERT, 2013), यह कुछ इस प्रकार थी :

- ❖ अपनी जिज्ञासाओं का उत्तर खोजने के लिए सामान्य अन्वेषण करना – 23 प्रतिशत।
- ❖ सामग्री एवं जीवों को गुण/विशेषता के आधार पर वग. ीकृत करना – 46 प्रतिशत।
- ❖ अपने परिवेश की सामग्री से मॉडल बनाना और उनके कार्य की व्याख्या करना – 40 प्रतिशत।
- ❖ प्रक्रियाओं एवं घटनाओं का कारणों से सम्बन्ध बताना – 42 प्रतिशत।
- ❖ प्रक्रियाओं एवं घटनाओं की व्याख्या करना – 35 प्रतिशत।

राज्य के प्रयास

हाल के विगत वर्षों में राज्य द्वारा प्रारंभिक स्तर पर छात्रों की विभिन्न विषयों में अधिगम संप्राप्ति स्तर को बढ़ाने के लिए कई उपक्रम किये गए हैं, जिनमें से दो का उल्लेख करना उपयुक्त होगा–

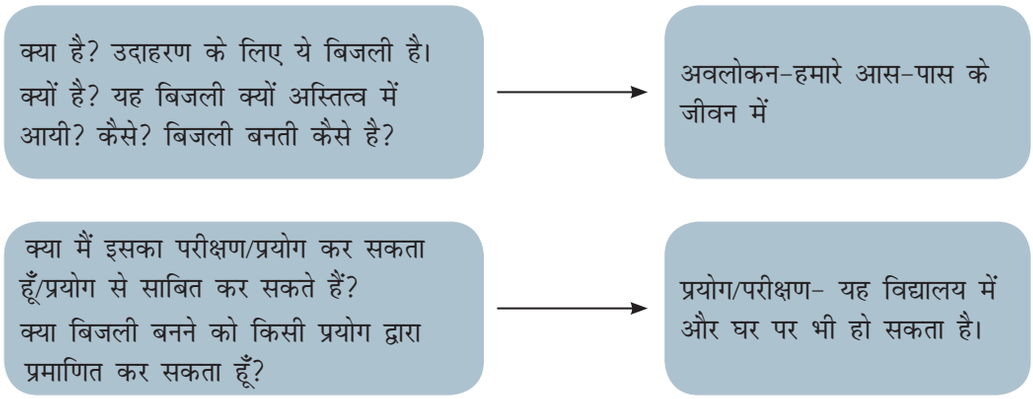
1. वर्ष 2015 से शासकीय आदेश के द्वारा अध्यापकों के लिए प्रदर्शन मानक (Performance Indicators) की व्यवस्था। राष्ट्रीय शैक्षिक अनुसन्धान एवं प्रशिक्षण परिषद् द्वारा वर्ष 2013 में तैयार दस्तावेज 'Performance Indicators (PINDICS) for Elementary School Teachers' के मानकों को इस उद्देश्य के लिए अपनाया गया कि इससे छात्रों के विषयगत अधिगम में सुधार होगा। इन मानकों में बच्चों के लिए अधिगम अनुभव डिजायन करना, विषय वस्तु का ज्ञान एवं समझ, बच्चों के सीखने को सुगम (Facilitating Learning) बनाने के लिए रणनीतियां बनाना आदि प्रमुख हैं।
2. वर्ष 2017 से शासकीय आदेश के द्वारा प्रारंभिक शिक्षा में सतत् एवं व्यापक मूल्यांकन के लिए अधिगम संप्राप्ति प्रक्रिया अपनायी गयी। इसके लिए भी एनसीईआरटी के दस्तावेज 'प्रारंभिक स्तर पर सीखने के प्रतिफल' (Learning Outcomes At the Elementary Stage) को मूल रूप में लागू किया गया। इन प्रयासों के बावजूद अधिगम संप्राप्ति सर्वेक्षण (National Achievement Survey) का परिणाम उत्साहित करने वाला नहीं है।

पाठ्यचर्या एवं पाठ्य पुस्तकः

पाठ्यचर्या विद्यार्थियों के सीखने को सुगम बनाने की योजना है, उसे वहां से शुरु होना चाहिए, जहां पर बच्चे हैं। इसमें सीखने के सभी आयाम, जो उस विषय मे हैं और जो शिक्षा के उद्देश्यों के लिए महत्वपूर्ण हैं, शामिल होने चाहिए। पाठ्यचर्या यह भी बताती है कि इस प्रकार से सीखना क्यों जरुरी है और यह विषय अध्ययन के किन उद्देश्यों की पूर्ति करेगा। विस्तृत पाठ्यचर्या मे निर्धारित पाठ्य क्रम, पाठ्य सहगामी गतिविधियों, निर्धारित पाठ्य पुस्तक आदि का विवरण होता है।

इस संदर्भ में एनसीईआरटी का पाठ्यचर्या और पाठ्यपुस्तक स्थिति पत्रक यह स्पष्ट रूप में कहता है कि ज्ञान व सीखने पर मनन जरूरी हैं। ज्ञान का अर्थ दुनिया से जुड़ना ही है। बच्चे जब तक पाठ्य पुस्तक से प्राप्त ज्ञान को अपने नित्य-प्रतिदिन के जीवन में व्यावहारिक रूप से लागू नहीं कर पाते/अनुभव नहीं कर पाते, तब तक ऐसा ज्ञान मात्र किताबी ज्ञान बनकर रह जाता है। ऐसा ज्ञान मात्र सूचनाओं के संग्रहण तक सीमित रह जाता है। अपने परिवेश से अंत:क्रिया करके ही बच्चा अपने ज्ञान का सृजन करता है। बच्चों के चारों ओर फैले संसार में अनेकों ऐसे पहलू हैं, जो विज्ञान शिक्षण को अधिक समृद्ध बना सकते हैं। एसे पहलू जिनमे बच्चों को अवलोकन, विश्लेषण, वर्गीकरण, अनुमान, चिंतन, कल्पना, तर्क और अभिव्यक्ति के अवसर हों।

जहाँ पाठ्य-पुस्तकें कक्षा विमर्श और अभ्यास की प्रकृति को तय करती है, वहीं ये केवल 'वस्तुनिष्ठ सत्य को प्रस्तुत करने वाले तटस्थ लिखित माध्यम नहीं होतीं। एप्पल, 1993 के लेख के अनुसार यह एक सशक्त सांस्कृतिक माध्यम भी होती हैं और ज्ञान, विचार, मूल्य और अभिवृत्ति आदि से युक्त होती हैं और तत्संबंधी संदेशों को भी संप्रेषित करती हैं। कुछ ऐसी ही बात इसिट 2004 कहते हैं। वे कहते हैं 'पाठ्य-पुस्तकें एक तरह से पाठ्यचर्या के समरूप मानी जाती हैं, शिक्षण का आधार तथा मूल्यांकन का स्रोत बन जाती हैं।



इस प्रकार ये पाठ्य पुस्तकें शिक्षकों के पढ़ाने और बच्चों के सीखने की संस्कृति को निर्धारित करती हैं। विषय के चुनाव, प्रस्तुतीकरण के तरीकों, सीखने में शिक्षार्थी और शिक्षक की भूमिका, सीखने के अभ्यासों, गतिविधियों, सभी पर पुस्तक का प्रभाव देखा जाता है (इसिट, 2004)। कुल मिला के पाठयचर्या का स्वरुप व पाठ्य-पुस्तक की रचना विज्ञान कक्षा को गहरे रूप से प्रभावित करती हैं। अगले हिस्से में हम पाठ्यचर्या व पाठ्य-पुस्तक पर कुछ बात करेंगे।

विज्ञान की पाठ्यचर्या

विज्ञान अपने आसपास की दुनिया को अर्थपूर्ण ढंग से समझने के प्रयासों में से एक है। अत: इसमें -

- ❖ विज्ञान से सम्बंधित विभिन्न दावों और सिद्धांतों को जांचने-परखने व उन पर सवाल करने के अवसर उपल. ब्ध हों।
- ❖ अपने अवलोकनों, प्रयोगों, परीक्षणों एवं निष्कर्ष को बताने के अवसर मिलें।
- ❖ विज्ञान से सम्बंधित विभिन्न दावों और सिद्धांतों की जांच करने के बाद, यह बताने के अवसर मिलें कि उनको क्या-क्या तथ्य एवं साक्ष्य मिले हैं ?

प्रारम्भिक स्तर पर यदि हम बिजली के बारे में देखें:

NCERT के विज्ञान शिक्षा को स्थिति पत्र के अनुसार प्रारंभिक स्तर पर विज्ञान शिक्षा विद्यार्थी को इस लायक बना दे कि वह:

- ❖ अपने संज्ञानात्मक स्तर के अनुरूप विज्ञान के तथ्यों व धारणाओं को समझने एवं प्रयुक्त करने के काबिल हो जाए।
- ❖ उन तरीकों एवं प्रक्रियाओं को समझ सके जिनसे वैज्ञा. निक ज्ञान का सृजन किया जा सकें तथा इसका वैधी. करण भी किया जा सकें।
- ❖ अपनी स्वाभाविक जिज्ञासा, सौन्दर्यबोध और रचनात्मकता से विज्ञान व प्रौद्योगिकी को परिभाषित कर सकें।
- ❖ 'वैज्ञानिक स्वभाव' विकसित करना सीख जाएँ, जिससे हमारा मतलब है- वस्तुनिष्ठता, आलोचनात्मक सोच और भय एवं अन्धविश्वास से मुक्ति।

स्थितिपत्र यह भी कहता है कि प्रारंभिक स्तर पर विज्ञान विषय को विशेषज्ञता के दृष्टिगत बरतने के बजाय अपने आस-पास के परिवेश में जीवन, जैविकी क्रिया-कलापों, गतिविधियों, स्थानीय तकनीकों (चाहे बहुत छोटे स्तर की ही क्यों ना हों) के अवलोकन, सर्वेक्षण एवं प्रयोग पर आधारित है। इनके आधार पर विज्ञान के सिद्धान्तों व नियमों तक या उनके करीब पहुँचने का लक्ष्य होना चाहिए।

1. **उत्तराखंड राज्य के विशेष सन्दर्भों में विज्ञान पा. ठ्यचर्या के उद्देश्य:** उत्तराखंड में उच्च प्राथमिक कक्षाओं हेतु विज्ञान की पाठ्यचर्या में निर्धारित उद्देश्य NCF-2005 व स्थिति पत्रक के आधार पर ही तय किए गए हैं। इसमें विद्यार्थियों में वैज्ञानिक स्वाभाव (वस्तु. निष्ठता, आलोचनात्मक सोच, भय और अन्धविश्वास से मुक्ति) विकसित करने के अलावा जो शामिल वह हैं कि विज्ञान को दैनिक जीवन में प्रयुक्त कर पाना
   - ❖ वैज्ञानिक ज्ञान का सृजन करने योग्य समझ बनाना उसके ऐतिहासिक और विकास सम्बन्धी परिप्रेक्ष्यों के संदर्भ में समझना एक सामाजिक उद्यम की तरह देख कर स्थानीय तथा वैश्विक परिवेश से जोड़ना व पर्यावरण सुरक्षा की समझ बनाना।

इन उद्देश्यों को प्राप्त करने के लिए एक ऐसी शिक्षण प्रक्रिया एवं शिक्षण व्यवहार की जरुरत है जिसमें 'सरल प्रयोग और स्वयं करके सीखने के अनुभव हों। इसमें बच्चों को (समूह में) अर्थपूर्ण या सोद्देश्य अनुसन्धान में लगाना, खासकर ऐसी समस्याओं के लिए जो उनके द्वारा सार्थक और महत्वपूर्ण समझी जाएँ, उपयोगी होगा।

राज्य शैक्षिक अनुसन्धान एवं प्रशिक्षण परिषद्, उत्तराखंड ने उच्च प्राथमिक कक्षाओं हेतु विज्ञान के उद्देश्यों की प्राप्ति के लिए - बच्चो को कई तरह की विधियों व कार्यों में जोड़ने की बात की हैं। इसमें आगमन विधि, ह्यूरिस्टिक विधि, भ्रमण विधि, प्रयोगशाला विधि, प्रयोग-प्रदर्शन विधि, क्रियाकलाप आधारित शिक्षण शामिल हैं। इसके अलावा इसमें परिचर्चा, लघु समूह में कार्य, प्रोजेक्ट, प्रकृति भ्रमण, कम खर्चीले प्रयोग, आदि शामिल हैं। इसमें यह भी है कि शिक्षक फ़ैसिलिटेटर का काम करे और वह स्थानीय विशेषज्ञों से बातचीत, समाचार पत्र-पत्रिकाओं से सूचनाएँ एकत्रित करना साधारण अन्वेषण आदि कार्य बच्चों से करवाए।

उत्तराखंड राज्य की कक्षा 8 की विज्ञान की पाठ्य पुस्तक: वर्ष 2009 में एन. सी. एफ. 2005 के आलोक में प्रारंभिक स्तर की कक्षाओं के लिए राज्य शैक्षिक अनुसंधान एवं प्रशिक्षण परिषद द्वारा पाठ्य पुस्तकें तैयार की गयीं। जनपद के प्रारंभिक शिक्षा के प्रशासन एवं प्रबंधन के लिए जवाबदेह अधिकारियों से बातचीत में उन्होंने कहा कि हमारी पाठ्य पुस्तकें स्वयं में अपने विषय की पाठ्यचर्या को स्पष्ट करने में सक्षम हैं।

इसी बात के आधार पर इस अध्ययन में उत्तराखंड के सरकारी उच्च प्राथमिक विद्यालयों में लागू कक्षा 8 की विज्ञान की पाठ्य पुस्तक का विश्लेषण किया गया है। विज्ञान विषय की दक्षताएं कक्षा 6 से कक्षा 8 तक संचयी प्रकृति की हैं। पाठ्यक्रम मुख्यत: 7 प्रसंगों/थीम पर आधारित है, 1. भोजन, 2. पदार्थ, 3. सजीवों का संसार (जीव-जगत), 4. गतिशील वस्तुएं, व्यक्ति एवं विचार, 5. वस्तुएं कैसे कार्य करती हैं, 6. प्राकृतिक घटनाएँ, 7. प्राकृतिक संसाधन। अत: कक्षा 8 तक इन दक्षताओं को प्राप्त करना निहायत जरुरी है।

अध्ययन की शुरूआत में ही जनपद की प्रारंभिक विज्ञान शिक्षकों से बातचीत एवं कई उच्च प्राथमिक विद्यालयों के अवलोकन से कुछ महत्वपूर्ण बातें सामने आईं:

- ❖ जनपद के उच्च प्राथमिक विद्यालयों में शिक्षकों की नियुक्ति में प्राय: इस बात का ध्यान नहीं रखा जाता कि विषय पढ़ाने वाला उस विषय का ही हो जो उसे पढ़ाना है। यह पूरे राज्य के बारे में भी कमोबेश सही है।
- ❖ जनपद के 113 उच्च प्राथमिक विद्यालयों में से केवल 90 विद्यालयों में ही विज्ञान विषय में स्नातक अध्यापक काम कर रहे हैं।
- ❖ विज्ञान पढ़ाने वाले शिक्षकों के पास पाठ्य पुस्तक के अलावा अन्य कोई सहायक सामग्री उपलब्ध नहीं है, कोई शिक्षक संदर्शिका, एक्टिविटी बुक भी नहीं हैं।
- ❖ उच्च प्राथमिक विद्यालयों में विज्ञान विषय की प्रयोगशाला/समेकित प्रयोगशाला अथवा संसाधनों की कोई व्यवस्था नहीं है।

2. **शोध प्रश्न:** इस शोध अध्ययन में निम्न प्रश्नों पर समझ बनाने का प्रयास किया गया है-

1. क्या कक्षा 8 की विज्ञान पाठ्य पुस्तक विषय के उद्देश्यों को प्राप्त करने में समर्थ है?
2. कक्षा-कक्ष में विज्ञान के शिक्षण में पाठ्य पुस्तक के अतिरिक्त शिक्षक किस प्रकार के अन्य संसाधनों की जरुरत महसूस करते हैं?
3. विद्यालय में विज्ञान प्रयोगशाला की आवश्यकता एवं इसके प्रारूप के बारे में शिक्षकों, विद्यालय प्रमुख एवं शिक्षा अधिकारियों का क्या मंतव्य एवं विज़न है?

3. **शोध प्रविधि:** यह अध्ययन अन्वेष्णात्मक अध्ययन है, और इसमें गुणात्मक समंकों को उपयोग किया गया है। ये गुणात्मक समंक अर्द्ध-संरचनात्मक साक्षात्कार, फोकस ग्रुप डिस्कशन (Focus Group Discussion) एवं अवलोकन के माध्यम से प्राप्त किये गए हैं।

3.1. **प्रतिदर्श चयन:** जनपद के तीनों विकास खण्डों में उच्च प्राथमिक विद्यालयों में कार्यरत विज्ञान शिक्षकों की संख्या निम्न तालिका में दी गयी है-

तालिका 1: जनपद बागेश्वर में राजकीय उच्च प्राथमिक विद्यालय एवं कार्यरत विज्ञान शिक्षकों की संख्या

क्र.स.	विकास खंड	उच्च प्राथमिक विद्यालयों की संख्या	कार्यरत विज्ञान शिक्षकों की संख्या	ऐसे विद्यालयों की संख्या जहाँ विज्ञान शिक्षक नियुक्त नहीं हैं
01	कपकोट	36	28	08
02	बागेश्वर	47	37	10
03	गरुड़	30	25	05
कुल योग	113	90	23	

स्रोत-जिला बेसिक शिक्षा अधिकारी कार्यालय, जनपद बागेश्वर

जनपद के 113 उच्च प्राथमिक विद्यालयों में से 90 विद्यालयों में विज्ञान विषय पढ़ाने वाले विषय-शिक्षक नियुक्त हैं, इनकी नियुक्ति सहायक अध्यापक विज्ञान/गणित के रूप में हुई है और इनसे अपेक्षा की गयी है कि ये कक्षा 6 से कक्षा 8 तक विज्ञान एवं गणित दोनों विषयों का शिक्षण करेंगे। शेष 23 उच्च प्राथमिक विद्यालयों में या तो ये पद रिक्त हैं या फिर अन्य विषयों के अध्यापक नियुक्त हैं। जहाँ विज्ञान में विषय शिक्षक हैं उन 90 उच्च प्राथमिक विद्यालयों में से, प्रत्येक विकासखंड से 10 विद्यालयों का यादृच्छिक

आधार पर, (कुल 30 विद्यालयों का) चयन किया गया। इन विद्यालयों का अवलोकन, इनके प्रधानाध्यापकों एवं कार्यरत विज्ञान शिक्षकों के अर्द्ध-संरचनात्मक प्रश्नावली के आधार पर साक्षात्कार किए गए। विज्ञान शिक्षकों की गोपनीयता बरकरार रखते हुए कोडिंग की गयी है। अलग-अलग विकास खंड के लिए अलग-अलग 'ब', 'ग', 'क' कोड का प्रयोग किया गया है।

3.2. **शोध प्रक्रिया:** कक्षा 8 की विज्ञान पाठ्य पुस्तक के विश्लेषण में इसके विज्ञान पाठ्यचर्या के उद्देश्यों की पूर्ति में संभव योगदान का अध्ययन किया गया। इसमें पुस्तक की विषय सामग्री, गतिविधियों, क्रियाकलापों उसके क्रियान्वयन के लिए आवश्यक उपकरण एवं सामग्री का विश्लेषण किया गया। इसके लिए कक्षा 8 में विज्ञान शिक्षण हेतु उन आवश्यक उपकरणों एवं सामग्री की सूची तैयार की गयी, जो पुस्तक के क्रियाकलापों एवं गतिविधियों में लिए न्यूनतम रूप से चाहिए। इसकी तुलना स्कूल के उपलब्ध सामग्री से की गई।

हर स्कूल में अवलोकन व साक्षात्कार के लिए कम से कम 2 दिन रखे गए। और इसमें व अधिकारियों के साक्षात्कार में नवम्बर 2017 से मार्च 2018 के बीच 90 दिन का समय लगा।

4. **अध्ययन से प्राप्त समझ:** 'एक आदर्श शिक्षा व्यवस्था में पाठ्य पुस्तकें पाठ्यचर्या के कार्यान्वयन के लिए जरुरी संसाधनों में से एक होती हैं। भारत में अधिकांश विद्यार्थी और शिक्षकों के लिए पाठ्य पुस्तकें एकमात्र उपलब्ध व कम खर्चीले संसाधन हैं। इसलिए देश भर में अच्छी विज्ञान शिक्षा के एक समान प्रसार के लिए जरुरी है कि हम पाठ्य पुस्तकों को प्राथमिक संसाधनों के रूप में लें।' अध्ययन में कक्षा 8 की विज्ञान की पाठ्य पुस्तक के विश्लेषण में निम्न महत्वपूर्ण बातें सामने आईं-

204 पृष्ठों की इस पुस्तक में 16 अध्याय हैं, और 5 स्वाधिगम तथा 1 विशेष स्वधिगम नाम से पाठ हैं। पुस्तक की शुरुआत में शिक्षकों के लिए निर्देश हैं, जिसमें विज्ञान को बच्चों द्वारा 'करके सीखने' के बारे में बातें की गई हैं। प्रत्येक पाठ के अंत में प्रमुख शब्द, हमने सीखा, कितना समझा, इन्हें भी कीजिये/प्रोजेक्ट कार्य तथा मेरा प्रश्न के समाधान दिए गए हैं। 'हमारे प्रमुख शब्द' में, पाठ में आये शब्दों का अर्थ तो है परन्तु इन के अर्थ की बेहतर समझ के लिए खोजबीन करने को नहीं कहा गया है। 'हमने सीखा' के अंतर्गत बच्चों ने पाठ से जो भी सीखा वह 'कितना समझा' के अंतर्गत प्रश्न दिए गए हैं, जिसमें अधिकाँश प्रश्न स्मृति आधारित हैं। 'इन्हें भी कीजिए/प्रोजेक्ट कार्य' में बच्चों को विज्ञान सम्बन्धी गतिविधियों को करने या ऐसे ही कुछ क्रिया-कलाप करने का निर्देश दिया गया है। परन्तु इसके लिए घर पर बच्चों के पास ऐसे उपकरण होंगे या नहीं, इस बात का कोई संज्ञान नहीं लिया गया है। 'मेरा प्रश्न हमारा समाधान' शीर्षक के अंतर्गत बच्चों को प्रश्न बनाने के निर्देश हैं और मिल-जुल कर इनका समाधान ढूंढने के निर्देश हैं। ये सभी गतिविधियाँ पाठ के अंत में होने के कारण इन्हें बच्चों के गृह कार्य का एक हिस्सा मान लिया जाता है। 30 शिक्षकों में से 18 शिक्षकों ने इसे गृह कार्य का हिस्सा बताया, 06 शिक्षकों ने कहा इसे कक्षा में ही हल करवा लिया जाता हैं तथा केवल 06 शिक्षकों ने बताया कि ये सभी कक्षा शिक्षण प्रक्रिया का हिस्सा हैं।

विज्ञान विषय की पाठ्यचर्या के उद्देश्यों को प्राप्त करने के लिए दी गयी गतिविधियाँ एवं क्रियाकलाप संगति में प्रतीत नहीं होती हैं। पुस्तक की कल्पना अनुसार, दिए गए चित्रों को देखकर ही बच्चे अवधारणा एवं समझ विकसित कर लेंगे, यह मानना कठिन है। जैसे पृष्ठ 16 में प्याज की झिल्ली की संरचना को हैण्ड लैंस या सूक्ष्मदर्शी की सहायता से समझने के लिए कहा गया है, ऐसे ही कई अन्य जगहों पर भी कहा गया है। विद्यालय अवलोकन के दौरान पता लगा कि उच्च प्राथमिक स्तर पर विज्ञान प्रयोगशाला जैसी कोई परिकल्पना ही नहीं है। इसलिए ऐसे मूलभूत एवं जरुरी उपकरणों एवं सामग्री की सूची बना कर स्कूलों की उपलब्ध करवाने की जरूरत है जो दी गयी गतिविधियों एवं क्रियाकलापों के संपादन के लिए ज़रुरी हैं।

पाठों में वैज्ञानिक सिद्धान्त एवं अवधारणाओं के साथ ही बहुत सारी सूचनाएं दी गयी हैं, जिससे पाठ का मूल फोकस पृष्ठभूमि में चला गया है। उदाहरण के लिए पाठ 14, 'बिजली और मेरा घर', में घर में प्रयोग होने वाले बहुत सारे उपकरणों पर संक्षिप्त बात की गयी है। इसके बजाय किन्ही दो या तीन उपकरणों पर गहन समझ विकसित करना अधिक उपयोगी साबित हो सकता है। यही प्रवृत्ति अन्य पाठों में भी नजर आती है। इस सबसे यह विज्ञान पुस्तक अभी सूचना पुस्तिका सी नजर आती है। हमारे अनुसार विज्ञान विषय में दिन-प्रतिदिन के सिद्धांतों को संबोधित करने का प्रथम सिद्धांत है कि छोटी-छोटी समस्याओं पर काम किया जाए न कि वृहत समस्याओं पर।

प्रधानाध्यापकों से चर्चा में यह बात सामने आयी कि उच्च प्राथमिक स्तर पर विज्ञान विषय की प्रयोगशाला की परिकल्पना ही नहीं है और विज्ञान किट उपलब्ध नहीं हैं। विज्ञान की गतिविधियों एवं प्रयोगों के लिए न तो पृथक कक्ष की व्यवस्था है और न ही शासकीय स्तर पर किसी भी प्रकार का बजटीय प्रावधान है। कुछ विद्यायलयों में स्थानीय संसाधनों से कुछ सामग्री जुटाई गयी है परन्तु इन्हें प्रयोगशाला

कहना उचित नहीं होगा और ना ही इससे वैसे प्रयोग संभव हैं जो पाठ्य पुस्तक में सुझाए गए हैं। कुछ वर्ष पहले तक सर्व शिक्षा अभियान के तहत टी.एल.एम. मद में 500 रुपये प्राप्त होते थे, विगत कुछ सालों से यह धनराशि मिलनी भी बंद हो गयी है। आवश्यक उपकरण एवं सामग्री जुटाने के संदर्भ में प्रधानाध्यापकों एवं विज्ञान शिक्षकों ने कोई उत्साह नहीं दिखाया। जब उन्हें बताया गया कि एक संस्था बहुत कम कीमत पर विज्ञान किट उपलब्ध कराती है तो 6 शिक्षकों को छोड़कर बाकियों में कोई ख़ास प्रतिक्रिया नहीं दिखी।

30 विज्ञान शिक्षकों में से 19 शिक्षकों को उच्च प्राथमिक स्तर पर विज्ञान पाठ्यचर्या में दिए उद्देश्यों के बारे में जानकारी थी। 10 शिक्षकों ने बताया कि उन्होंने इसके बारे में कहीं लिखा देखा था। एक शिक्षक ने ही इन उद्देश्यों को स्पष्टता से बताया और ये उसकी शिक्षक डायरी में लिखे भी हुए थे।

30 में से 18 शिक्षकों का यह भी अभिमत था कि कक्षा 8 की विज्ञान पुस्तक पाठ्यचर्या में निहित विज्ञान के उद्देश्यों को प्राप्त करने में समर्थ है। किन्तु वे यह नहीं बता पाये कि यह इसमें क्यों समर्थ है। 10 शिक्षकों ने पाठ्य पुस्तक के अतिरिक्त सामग्री की आवश्यकता भी बतलाई। दो शिक्षकों ने कहा कि पाठ्य पुस्तक में बहुत अधिक सूचनाएं दी गयी हैं, इसके बजाय क्रियाकलापों एवं गतिविधियों को तरजीह दी जानी चाहिए। 6 शिक्षकों ने पाठ्यचर्या के उद्देश्यों को प्राप्त करने में पाठ्य पुस्तक की सीमा को रेखांकित किया। 19 शिक्षकों ने लर्निंग आउटकम दस्तावेज के बारे में सुना तो था, किन्तु उसके संभव उपयोग के बारे में नहीं बता पाए।

17 शिक्षकों ने पाठ्य पुस्तक में दी गयी गतिविधियों एवं क्रियाकलापों को पर्याप्त बताया व कहा उसके उपयोग में किसी भी प्रकार की चुनौती महसूस नहीं होती। 10 शिक्षक चुनौती तो महसूस करते हैं परन्तु पाठ्य पुस्तक पर ही निर्भर रहते हैं। केवल 03 शिक्षक पाठ्य पुस्तक से अलग सामग्री के उपयोग का प्रयास करते हैं।

किसी भी विद्यालय में विज्ञान किट उपलब्ध नहीं है। केवल 05 शिक्षकों ने विज्ञान शिक्षण के लिए आवश्यक सामग्री एकत्रित करने का प्रयास किया है। और किसी भी विद्यालय में विज्ञान प्रयोगशाला कक्ष उपलब्ध नहीं है। 3 शिक्षकों ने कक्षा- कक्ष के एक कोने को इसके लिए कुछ हद तक विकसित करने का प्रयास किया है। 28 शिक्षकों ने ऐसी प्रयोगशाला को जरुरी बतलाया। दो ही शिक्षक यह स्पष्ट रूप से कह पाए कि ऐसी प्रयोगशाला में कौन-कौन से उपकरण एवं सामग्री उपलब्ध होनी चाहिए। 17 शिक्षकों को इस बारे में जानकारी नहीं थी और 11 शिक्षकों ने बताया की जरुरत पड़ने पर पाठ्य पुस्तक से इसकी सूची तैयार कर लेंगे।

आकलन का प्रश्न हमेशा मुश्किल रहता है। काफी चर्चा हुई है कि आकलन शिक्षण के को साथ-साथ चलना चाहिए, फिर भी 25 शिक्षकों ने बताया की परीक्षा के माध्यम से बच्चों की समझ की जांच की जाती है। दो शिक्षकों का कहना था कि यदि प्रयोग करना संभव होता तो इसको जांचना आसान हो जाता। दो अन्य का अभिमत था कि बच्चे की बातचीत एवं व्यवहार में अंतर से इसे हम भली-भांति जांच सकते हैं।

आकलन की स्त्रोत पुस्तक के बारे में आठ शिक्षकों ने बताया कि यह बच्चों की अधिगम संप्राप्ति हेतु शिक्षण-अधिगम प्रक्रिया के बारे में है, परन्तु यह उनके पास उपलब्ध नहीं है। दो ने कहा कि उनके पास यह अभिलेख उपलब्ध है और वे इसका उपयोग शिक्षण योजना बनाने और मूल्यांकन में करते हैं।

23 शिक्षकों को PINDICS (Performance Indicators for Teachers) के बारे में कोई जानकारी नहीं थी, वे इसे जरुरत पड़ने पर भरने वाला कोई फॉर्मेट बता रहे थे। 04 शिक्षकों को इसके बारे में पता था और उन्होंने बताया कि उच्च स्तर से इसकी मांग होने पर वे इसको भरकर भेजते हैं।

इसी तरह 05 प्रधानाध्यापकों को ही विज्ञान पाठ्यचर्या के उद्देश्यों की जानकारी थी। 14 प्रधानाध्यापकों का यह मत था कि ये उद्देश्य विषय अध्यापकों को मालूम होने चाहिएँ। 11 प्रधानाध्यापकों ने बताया की विज्ञान की पाठ्य पुस्तक में ही पाठ्यचर्या के उद्देश्य लिखे होंगे। वैसे केवल 03 उच्च प्राथमिक विद्यालयों में पाठ्यचर्या सम्बन्धी दस्तावेज उपलब्ध था। इसी तरह 03 उप शिक्षा अधिकारियों में से केवल एक विज्ञान के उद्देश्यों को बता सके।

11 प्रधानाध्यापकों ने विज्ञान पाठ्यचर्या के उद्देश्यों की प्राप्ती के लिए पाठ्य पुस्तक को पर्याप्त बताया; 16 प्रधानाध्यापकों का मत था कि इसके लिए पाठ्य पुस्तक के बाहर से भी सामग्री की आवश्यकता है। 03 प्रधानाध्यापकों का कहना था कि पाठ्य पुस्तक में सूचनाओं की अधिकता है और जब पाठ्य पुस्तक में दी गयी गतिविधियों को स्वयं करने के अवसर बच्चों को मिलेंगे तभी पुस्तक पाठ्यचर्या के उद्देश्यों को प्राप्त करने में सफल होंगी। सभी अधिकारियों ने कक्षा 8 की पाठ्य पुस्तक को पाठ्यचर्या के लक्ष्यों को पाने में उपयोगी बताया और किसी सुधार या हस्तक्षेप की जरुरत से इनकार किया।

9 प्रधानाध्यापकों को PINDICS की जानकारी थी, 04 विद्यालयों में यह पुस्तिका उपलब्ध थी, 07 प्रधानाध्यापकों ने

ऐसे किसी दस्तावेज के बारे में सुना तो था परन्तु यह किस बारे में है वे बता नहीं पाए। 04 प्रधानाध्यापकों को इस बारे में कोई जानकारी नहीं थी। 03 प्रधानाध्यापकों ने बताया कि इस दस्तावेज में सीखने-सिखाने की प्रक्रियाओं के बारे में बताया गया है, इससे अध्यापक को अपनी शिक्षण विधियों को पुनर्व्यवस्थित करने में मदद मिल सकती है।

04 उच्च प्राथमिक विद्यालयों में यह दस्तावेज उपलब्ध था। इन विद्यालयों के प्रधानाध्यापकों का कहना था कि अध्यापक की कक्षाओं का निरीक्षण करते समय वे इसके संकेतकों की मदद लेते हैं और अध्यापक की गोपनीय आख्या लिखते समय इसका संज्ञान लेते हैं। 15 प्रधानाध्यापकों ने इसके बारे में सुना तो था परन्तु यह किस बारे में है, इसकी उनको जानकारी नहीं थी। 11 प्रधानाध्यापकों को इसकी जानकारी ही नहीं थी।

जिला शिक्षा अधिकारी (प्रारम्भिक शिक्षा) कार्यालय में हालांकि दस्तावेज उपलब्ध थे परन्तु वे इसकी विषय सामग्री से विज्ञ नहीं थे, उनका यही कहना था कि इसकी जानकारी शिक्षकों को होना जरुरी है। विकास खण्डों के स्तर पर जिन दस्तावेजों की उपलब्धता थी उनके बारे में भी उपशिक्षा अधिकारियों को उनकी विषय वस्तु की कोई जानकारी नहीं थी।

केवल 03 विद्यालयों में कक्षा-कक्ष के कोने को प्रयोगशाला के रूप में व्यवस्थित कर कुछ अन्य सामग्री इकट्ठी की गयी थी। इनमें थोड़ी बहुत सामग्री जैसे चुम्बक के टुकडे, हैण्ड लैंस आदि अति सीमित मात्रा में उपलब्ध थे। हालांकि 16 प्रधानाध्यापकों ने विज्ञान प्रयोगशाला की जरुरत बतलाई और 10 प्रधानाध्यापकों ने कहा कि विज्ञान किट नहीं हो तो भी प्रयोग करने का काम चलाया जा सकता है। इन 26 प्रधानाध्यापकों का अभिमत था कि विज्ञान किट एवं विज्ञान प्रयोगशाला के लिए बजट संसाधनों की आवश्यकता है और 04 प्रधानाध्यापकों का कहना था कि इसकी व्यवस्था विज्ञान शिक्षक को करनी चाहिए। इसके लिए और किसी बजट संसाधन की ज़रुरत नहीं है।

जिला शिक्षा अधिकारी (प्रारम्भिक शिक्षा) ने विद्यालय में विज्ञान किट/प्रयोगशाला की जरुरत स्वीकारी और इसके लिए आवश्यक कदम उठाने की बात तो की परन्तु अभी तक कुछ न हो पाने के बारे में कुछ नही कह पाए। तीनों उप शिक्षा अधिकारी विज्ञान किट तैयार करना/प्रयोगशाला विकसित करना विद्यालय की जिम्मेदारी मानते हैं, और विज्ञान शिक्षक को निर्देश जारी करने की बात कहते हैं। किन्तु संसाधनों के अभाव में विद्यालय के लिए यह किस प्रकार से संभव है, इस सवाल का कोई संतोषजनक जवाब नहीं दे पाए।

सीखें : विज्ञान शिक्षण के उद्देश्यों, गतिविधियों, शिक्षण-विधियों एवं मूल्यांकन के तौर-तरीकों के बारे में शिक्षक ही नहीं बल्कि अधिकारीगण भी स्पष्ट नहीं हैं। इस पर चिंतन व कार्यवाही की जरूरत है:

कक्षा 8 की विज्ञान की पाठ्य पुस्तक में सूचनाओं की बहुलता को कम करने की ज़रुरत है। बहुत सारी अवधारणाओं को एक साथ देने के बजाय कुछ मूलभूत अवधारणाओं पर गहनता से काम करने की आवश्यकता है। विज्ञान शिक्षकों के प्रशिक्षण की आवश्यकता है। जिसमें पाठ्य पुस्तकों को कक्षा-कक्ष प्रक्रियाओं में किस प्रकार से उपयोग में लाया जाए/बरता जाए पर भी चर्चा हो।

नीति दस्तावेज़ों की उपलब्धता व उसके उपयोग को प्रोत्साहन देने का प्रयास होना चाहिए। जैसे लर्निंग आउटकम (Learning Outcome) दस्तावेज़ सभी उच्च प्राथमिक विद्यालयों में प्रधानाध्यापकों एवं विषयाध्यापकों के सन्दर्भ के लिए उपलब्ध होना चाहिए। इस दस्तावेज़ में दी गयी शिक्षण-अधिगम प्रक्रियाओं व उनके कक्षा में उपयोग पर प्रधानाध्यापकों सहित सभी विषय अध्यापकों का अभिमुखीकरण प्रशिक्षण होना चाहिए। इसी तरह PINDICS (Performance Indicators), जिसे शिक्षकों द्वारा स्वमूल्यांकन के रूप में भरा जाना है, के बारे में भी बेहतर समझ व उन्मुखीकरण की ज़रूरत होगी।

उच्च प्राथमिक विद्यालयों में एक समेकित प्रयोगशाला की व्यवस्था हेतु नीतिगत निर्णय हो। प्रयोगशाला हेतु अतिरिक्त कक्ष, उपकरण एवं सामग्री, फ़र्नीचर आदि के लिए बजट संसाधन उपलब्ध कराये जाने चाहिए। शुरूआती चरण में प्रत्येक उच्च प्राथमिक विद्यालय को अनिवार्य रूप से विज्ञान किट उपलब्ध कराया जाए। होशंगाबाद (म.प्र.) में स्थित 'एकलव्य' संस्था उचित दरों पर विज्ञान किट उपलब्ध कराती है। इसको प्रत्येक विद्यालय में उपलब्ध करने का निर्णय, प्राथमिकता के आधार पर लेने की जरुरत है। अन्य विषयों के लिए भी ऐसे ही अन्य स्रोतों की तलाश करने एवं निर्णय लेने की आवश्यकता है।

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Listening to Parents' Voices: Methodological Concerns

Abstract

This article documents the challenges experienced in exploring the perceptions of quality education held by parents from different backgrounds. My respondents were parents (mostly mothers) of children studying in very different kinds of schools, namely a state government school, a central government school, a low fee charging private school and a high fee charging private school. The process of conducting interviews made me aware of some important considerations that make the voices of the parents from different backgrounds more accessible. I also realised the importance of language, transcription and translation in research methodologies and how these decisions taken in context of this specific research helped in bringing out authentic voices.

Introduction

Children are the most important stakeholders of their education in school as it is their future that is at stake. However, it is their parents who take one of the most important decisions i.e. school selection. This selection has far-reaching implications, especially in a country which offers a variety of public and private stratified schools to choose from. In India, the type of school a child is able to access is dependent on her/his socio-economic background. The poorest go to government schools providing free education and the economically well off to high fee-charging private schools. Even within government and private schools there are various layers of hierarchy. Though there are wide variety of schools available the parents often have a very limited number of schools to choose from as their choice is constrained by their socio-economic stares. Thus, even though school selection is indicative of their perception of quality education, it may not be directly related to it, as their perception would not be constrained by the same factors that work upon the actual choice. In this research study, an attempt has been made to bring out parents' voices on the burning question of what is quality education.

This paper is based on the research work undertaken towards the completion of my doctoral thesis. The paper has been divided into four sections. The first section talks about the research study; its objectives and methodological framework. The second section describes the site and process of sample selection. The third section talks about the process of data collection and the fourth section about the challenges faced and how they were resolved.

Section I

Research Objectives and the Methodological Framework

Objectives of the Study

With parents situated in multiple social locations and schools offering differential services, the notion of quality education is equally varied. Thus, the research was

undertaken with the objective to understand parental perceptions of desirable education for their children. The specific objectives of the doctoral research are:

- To unfold the meaning of quality as understood in different policy documents and academic discourse and the way it has evolved especially in the Indian context.
- To understand the perceptions of parents situated in different socio economic contexts and availing different types of schools, about quality in education
- To examine the elements, which constitute quality education according to stakeholders other than the parents i.e., school principal, management and teachers in those schools.
- To examine the relationship between parental perceptions of quality and its meaning as reflected in the educational discourse.

The objectives and data sources of the study are much wider than the scope of this paper. However, this paper is drawn from the research segment focussing on parents.

Methodological Framework

This is a qualitative study undertaken within the interpretative tradition. Interpretative studies attempt to seek the subjective meaning that people create of things, ideas and phenomenon like in this case quality education (Orlikowski and Baroudi, 1991). It is this meaning of quality education for the parents that the study attempts to unearth. The topic of research required explicitly asking parents their perceptions of quality education, the reasons for the school selected and whether their expectations were being fulfilled. The responses from parents then had to be situated and interpreted in the light of their socio-economic background and life experiences - their aspirations, education, occupational choices and expectations from school for their children.

In the Indian context, there are very few studies on parental perceptions and none that try to understand what is desirable in education for the parents and whether 'quality' is a concern for them while selecting a school. This study thus tries to examine the hitherto unexplored area. To explain the notion of quality education from the data, the 'grounded theory' was applied and it offered useful insights.

Grounded theory is a methodological strategy to formulate a theory that can explain a phenomenon. In this study, the phenomenon under investigation is parental perception of quality education, the process of school selection and how they are related. The demands of the study required navigating through qualitative data and culling out themes and categories, which would help formulate a theory to explain this phenomenon. (Glaser and Strauss, 1967)

The study, as the title indicates, is about listening to the parents and making sense of their perceptions. Rather than framing a specific hypothesis the study commenced with some broad questions:

- What are the concerns of parents while selecting a school?
- Is quality education among these concerns?
- What do parents of school-going children, understand by quality?

Selection of Tools

The study required seeking parental opinion and thus the available choices for tools for data collection were questionnaires and interviews (structured, semi-structured and unstructured). Semi-structured interview was considered the most appropriate for the following reasons:

1. The sample of the study included parents from diverse backgrounds. For parents from very poor backgrounds, the literacy levels were likely to be low, and thus a questionnaire would not be suitable.
2. Given my own nature and disposition, I find it easy to establish rapport with people and in this case, I used it to my advantage, i.e. to solicit responses from

parents.

3. Semi-structured interview provides freedom to pursue unanticipated strands in contrast to a more structured interview format and yet helps maintain a fluid structure or focus during the interaction.
4. I was interviewing parents who had made the decision of school selection 5-8 years back. The conversation was aimed at invoking their memory. This would have been only possible in a conversation carried on for some sustained period of time. A very short and rigidly structured interaction would not have been able to achieve this as parents initially put forward socially desirable responses. As more time was spent with them, their level of comfort increased and a more complex picture emerged. Relaxed environment also revived buried memories, in many cases adding to the richness of the data.

Semi-structured interview however posed its own challenges. They were time-consuming and the responses, being free-floating and unstructured in nature, were difficult to collate. However, since the advantages outweighed the disadvantages, semi-structured interview was chosen.

To ensure authenticity of response it was important that the interaction 'encourage respondents to develop their own ideas, feelings, insights, expectations or attitudes and express these with greater richness and spontaneity' (Oppenheim, 1992:81 quoted from Opie, 2004).

The schedule used to guide the interviews with parents had four parts. The first part explored the educational background and experiences of the parents, the second part was about the reasons and process of school selection, the third part was largely about their ideas of quality education and the fourth part tried to understand their perceptions of the school that they had chosen. The schedule was informed by the literature review and prior knowledge about quality education and aspects that could influence parental perceptions. Parents' life experiences, their aspirations and dreams for themselves and their children, conversations with near and dear ones, with teachers, media, etc. are some of the factors that may influence their perceptions about quality education. Similarly the factors that were included to understand their notions of quality education were textbooks, exam results, infrastructure, medium of instruction, teachers, inclusion, leadership, extra curricular activities etc.

It was decided to audio-record the interview with the permission of the parent so that no details of the interaction were missed. After considering both the advantages (objectivity, preserving the natural language, avoiding loss of data during note taking and having access to original data later on) and the disadvantages (too much data, time-consuming transcription and recorder effect) (Opie, 2004, pp:121), I realised that for this study the advantages of audio-recording outweighed the disadvantages.

It is important to mention here that the presence of the recorder during the interview initially made the respondents uncomfortable. All the respondents were assured that the audio recording was only for the research study and would not be shared with the school, government or the media, as these were the common concerns. Most parents, after some time, became sufficiently comfortable with the recorder for the interview to progress.

In addition to the interviews; a field diary was maintained. Every day after the field visit, notes of the observations from the field were written down. This would help build the rich context of the school and home setting and situate the interviews in the context. The fact that the field diary was written after many hours needs to be acknowledged here.

Section II

Selection of Site and Sample

The site for data collection was Udaipur city, in the state of Rajasthan, India. Udaipur is a small city in southwest Rajasthan.

The selection of Udaipur was a pragmatic decision as I am based in Udaipur and have

spent many years working with schools and education departments in the city.

Selection of Schools

To make the sample diverse and bring in different perspectives, schools catering to populations from varied socio-economic background were selected i.e. a government school run by the state of Rajasthan, a government school run by the central government, a low fee-charging private school and a high fee-charging private school.

To select the private schools (both low and high fee charging) basic data was sought from four low fee charging and six high fee-charging schools.[1] It was as follows:

- Fee charged from a Class 5 student
- Total number of students in the school
- Whether the school had a nursery section
- Infrastructure: whether playground and library were available in the school?
- Total number of teachers in the school
- The senior most class in the school

There was a lot of variation in the schools on these parameters. The low fee charging school, which was selected on the basis of this data charged the lowest fees amongst these. The total number of students and teachers in it were less than only one school. Besides this was the only school, which went up to Class X whereas all the others were only till VIII. Like most other low fee charging schools this school also did not have a library or a playground. It was built on a residential plot and the residence of the director was also in the same building. The school was selected as even in such a constrained set-up the school attracts around 400 students, making it look like a popular choice among parents.

In the high fee-charging category, all the schools had the basic infrastructural requirements (like nursery, playground, library, etc.). Here also, there was high variation in other parameters like the number of students, teachers, fees, etc.

In choosing the high fee charging school, I had to make a compromise; the school initially chosen had the highest fees, highest number of teachers, second highest number of students, the best infrastructure amongst the schools and had a perceptible 'brand value' in the city. Gaining permission or even getting to meet the principal proved to be a difficult task. Even after many phone calls and visits to the school, I could not meet the principal and after two months of struggle, I decided to look for other schools. The second school I approached had equally impressive infrastructure and the fee was almost as high as the first school. In this school, an acquaintance was able to refer me to the principal and eased the initial interaction process. The principal here was very receptive and also introduced me to the other staff members who could help if needed.

State government schools and low fee charging schools both cater to poor children who live in the vicinity of the school[2]. Therefore, if the government school and low fee charging schools are in the same neighbourhood they compete for children from the same population. And strategically it seemed to be a good idea to select these two schools in the same locality. There was only one government school available in this *basti*[3], which was selected by default.[4]

There are only two Central Schools

1 These parameters helped in understanding the character of the school. It is often seen that low fee charging schools compromise on teachers and infrastructure to make education affordable, so this was considered an important parameter to look for. Number of students enrolled in the school was also considered important as schools with very few students often become more like tuition centres and do not function in a school like manner.

2 Many low fee charging schools provide transport and are thus able to attract children from other near-by bastis too. For example the selected school had two vans, which ply more than once in the morning and afternoon to collect and drop children. This is a chargeable service to the parents.

3 Basti: a slum like settlement

4 Fortunately, I knew the school heads of both the government and a private school in this basti. This was important as often getting permission to collect data poses a serious challenge.

(Kendriya Vidyalaya) in the city of Udaipur and both cater to children from all over the city. Thus, one of these two schools was selected on a random basis.

Selection of Parents

A total of 57 children's (23 girls, 34 boys) parents were interviewed across all schools. It was decided to include parents of children from Classes 1 and 5. Class 1 is the entry-level class in government schools but not in private schools. For consistency class 1 was included from all the four schools. Class 5 marks the end of primary school. At this point parents consider whether to continue or change the school. Therefore, this milestone class acts as a point of transition. It seemed appropriate to interact with parents of children from both these classes about how they select schools and what is it they are looking for. To select the parents, each school was contacted and the list of all the students in Classes 1 and 5 taken from them. Then, from each class, 10 students were randomly selected using the website www.random.org. The website explains that they use atmospheric noise instead of a mathematical formula to get the random numbers. Therefore, they claim that the numbers are generated in an unpredictable fashion and are really random. It was verified later that this random selection gave a more or less representative sample.

Section III

Process of Data Collection

Data collection requires both consent and co-operation from the respondents. Several factors contribute towards initiating and maintaining this co-operation. This includes how the researcher presents herself, how the context of the research, relevant details and process of data collection is communicated to the participants so that they can decide whether to participate or not. Keeping this in mind all the interactions were initiated by explaining the purpose of the research and informing them that the interview would be audio-recorded.

Another important aspect of obtaining consent and establishing rapport is to build confidence in the participants that the information provided by them will not be misused. The research involved personal questions about them and their families. It also included questions probing the extent of their schooling and the reasons for not being able to continue which could make the respondent feel small or uncomfortable. Thus, building confidence and a relation of mutual respect was important.

Personal Journey of Conducting Interviews

Interviewing is rather like marriage: everybody knows what it is, an awful lot of people do it and yet behind each closed door there is a world of secret.

Ann Oakley, 1981

In an interview set-up both sides assess and affect each other. Since interview is an intense face-to-face interaction between an interviewer and interviewee the emotional impact both have on each other is also profound. It is often pointed out how the interviewer may affect the interviewee and thus what the researcher should say or not say, how they should behave etc. However the analysis of how the interviewer is affected is not there to the same extent. Glass and Frankiel (1968) talk about the other side of the story i.e. influences that the subjects have on the researcher, their involvement in the situation, emotional engagement, etc. Another aspect of it is how the field situation affects the researcher. As a human being one is liable to get affected by the prevalent value systems. One such example was noticed when the prevalent stereotypical image of the kalbeliya[5] community influenced me and I started acting in accordance to the bias and fear that was shared by the other residents of the *basti*. The other common phenomenon is the bond of emotion or frame of mind formed

5 Kalbeliya: a tribal community

between the interviewer and the interviewee. For example when a child's father said in a very desperate manner that there is 'some paranormal influence here and as a result no child of mine is able to study'. The researcher was able to empathise with this and felt a tug of extreme emotion and in such moments detached interest is not possible.

Almost all the interviews were conducted at the respondents' residence. This gave me an opportunity to understand the context of the respondent and make sense of the responses embedded in the context.

However, residential setting also implied that other people could join the interviews and if the interview happened to be in the open space outside the home then the possible participants in the interview increased even more. The students themselves, their siblings, neighbours, friends and extended family members all became part of the interaction. This led to some interviews becoming very long, with conversations on topics very far from the present concern and sometimes like group discussions. For example, interview of an aunt (who is the primary caregiver for her sister's children) also included her parents. Both the grandparents were happy to have a sympathetic and patient listener and kept on diverting the interview to discuss their current concerns, stories of olden times and political commentaries. While these other voices have made the data richer but polite management was essential as it sometimes led to the parents being unable to voice their opinion.This was done by bringing the focus back gently to the topic and by ensuring that the parent or the guardian got enough scope to articulate.

Each interview is a site where a unique relationship is formed. It is difficult to pinpoint what leads to this but as I reflect back some important factors were, the personalities of interviewer and interviewee, presence of other people, scope to take interest in other aspects of life (like their children, imminent delivery, an interest or hobby, etc.) and not being limited to the research area, possibility of finding some commonality (being a migrant, parent to a young child, living with in-laws, etc.) Some of these factors are perhaps fixed and nothing can be done about them but for the others it is possible to take some time, make some effort and form a bond as one goes through the task at hand i.e. collect data.

While conducting the interviews an 'Informal conversational approach' (Thapar-Bjorket, 1999) or a 'conversation with a purpose approach' (Gopal, 1958) was used. The operational word here is conversation, which is as free flowing as conversations are, yet the researcher is aware of the particular purpose and can steer the conversation gradually. Interview setting, where the interviewer asks questions and the interviewee responds, promotes an unequal relationship between them. Being mindful of this, it was decided to entertain the questions from parents whenever they were raised, even during the interview and answer them truthfully. Only those questions were postponed which were directly related to the topic at hand i.e. school selection and quality education. Many parents asked questions during the interview both about the study and me. And I always responded to them (Oakley, 1981). It helped in forming a rapport with the parents and helped them be at ease. Many mothers in the beginning expressed a lack of confidence as they were not sure what they could say that would be useful to a researcher. Thus, as the questions were posed to them in a conversational manner, it helped in eliciting natural responses. As a result often the parents shared a lot of extra information, which has made the data much richer.

The rapport established during the interview ensured that it was possible to go back to the respondents to seek more clarification. Sometimes the parents themselves offered that if they were to recall anything that they felt was related to the questions being discussed then they would get in touch.

In both the private schools, access to the homes of the children was facilitated directly

by the schools[6] and in government schools this was facilitated in an indirect manner[7]. The director in the low fee charging school also felt that it was unnecessary and probably socially inappropriate to go to their houses instead the parents were called to school. After my insistence to go to the house, as the need was mine and not to cause the parents any inconvenience, he reluctantly agreed. This incident was indicative of how the school treats the parents i.e the school and the researcher, for the director, were above the parents who were expected to come to the school when called.

In the state government school in my early visits itself, two sisters (class 3 and 5) who knew almost all the children's houses, were assigned to me as 'guide'. They accompanied me to the house where I intended to conduct the interview and often as both the parents were out for work, we used to go to many houses before finding a place where it was possible to conduct an interview.

Often many other children accompanied me in spite of my repeated requests and threats to dissuade them. This was an ethical concern for me as I was disrupting the school time for many children. The parents also wanted the children to go back as their presence meant noise. Because of my two 'guides', I was not dependent on the school to reach the houses and so could continue visiting the houses during vacation.

In both the government schools I was relatively independent of the school after the initial support and thus could continue the interviews during school vacations. In state government schools I was only dependent on my two 'guides' who were available in the *basti* during vacations. In the central government school, after the permission from the regional office was obtained, they were willing to co-operate and gave a detailed list of the parents with phone numbers and addresses. As a result I could independently contact the parents and conduct the interviews.

6 Private schools provided me with the list of children, called the parents on my behalf, sent a child to accompany me, gave space to conduct interview etc.

7 Government schools provided the list and sometimes sent children to accompany me.

Section IV
Challenges

This section will talk about the methodological challenges encountered in the study and learning emerging from them.

1. **Explaining the purpose of my research and the issue of informed consent:** A researcher is required to inform the respondents about the research and gain consent to participate in the study. When I started interviewing parents, on being asked the purpose of my visit, I told them about the research. However, I realised that not all parents across the schools understood the meaning of research. Most parents did not understand the academic frame of a research being situated in an institutional context. So, they continued to try and place me in roles that they were familiar with such as a teacher, school inspector, journalist etc. and speculate about whom the report will be submitted to. It was then that I decided to explain my role as a researcher in greater detail. And addressed their concerns by responding to all their questions pertaining to my research such as topic of the research, purpose of interaction, how I would conduct the interview, the fact that it would be long and that it would be audio-recorded etc. After this I asked them if they had any questions. While the parents asked most of the questions as the interview commenced but a few kept filtering in as the interview progressed. In this way, I feel that the formal consent gained in the beginning gradually became informed consent, as the interaction proceeded.
2. **Access to Schools:** Research studies often focus on presenting data and findings. To my knowledge, very few discuss the problems encountered in accessing sites of data collection (barring

few researchers like Chawla-Duggan, 2007, Miller et al., 1969).

Among the four schools approached I faced difficulty in accessing two of them. The school selected in the high fee charging category did not allow me to meet the principal despite numerous phone calls and school visits.[8] This seemed like a shut door and after a struggle of two months I gave this up and had to select another school in this category.

A similar trying situation was presented in gaining permission from the central government school. Here the challenge arose from lack of clarity about who was authorised to give permission on requests of this nature; whether the principal or the regional office. The regional office gave the permission after six months of follow up. The interaction and support in the school changed drastically after the permission letter was presented.

The experience in the government school is perhaps indicative of the fear of criticism that the public education system is experiencing. Increasingly, researchers, academicians and media are criticising the state of affairs in government schools and belittling their efforts.

Owing to the nature of the obstructions in each school, different strategies had to be employed to resolve the access related challenge.

1. **Acknowledging Co-operation:** Another dilemma was faced in deciding how to acknowledge and reciprocate the support extended by individuals and institutions towards the completion of the research study. The time and co-operation extended by the parents and the school was immense without which it would be impossible to complete this study. It is possible to be content with the consideration that I was working towards knowledge generation, but this would not be of any immediate benefit to the parents. I asked all the schools if there was anything that I could do to contribute to the school. Only the low fee charging school took up this offer and asked me to teach English.

   As I was involved in part time teaching in the school it presented the pragmatic dilemma of being considered a teacher instead of a researcher. This was acutely experienced when a parent-teacher meeting was organised during the period when I was visiting the school. I wanted to attend the meeting to understand the relationship between the parents and the teachers, kind of issues being discussed, the general format of such an event and to meet the parents whom I wanted to interview. But the director insisted that I also share my inputs in this meeting with the parents as I was teaching English to the children and the parents were very interested in the English learning of their children. This was a tricky situation, as I did not want my identity as a part-time teacher to overshadow my identity of a researcher. But it was important to respect the school's wish so I sat with the Class 5 teacher, talked to some parents and avoided talking to those parents who were part of the selected sample.

2. **School's desire to control the research:** The private schools I worked with try to manage communication with the parents and their perceptions about the school. They were wary about who I would talk to, what questions would be asked and how this may impact the parent-school relationship. Thus there were attempts at managing the parent-researcher interface in various ways:
   - Influencing sample selection
   - Overseeing interaction with the parents
   - Not sharing contact details
   - Looking through the interview schedule
   - Managing researcher identity

   Not all the above-mentioned approaches were visible in each school. I confronted

8 Elite schools are often cagey, take pride in their exclusivity and are brand conscious. Thus they do not easily let a researcher inside for the fear of any critical reporting.

a dilemma when the school heads (with the intention to help) made suggestions, which would dilute the methodological rigour. In one school, the head suggested that I should interview those children who had houses in the vicinity. The other school offered to give me a list of selected children. I took a firm stand in both the cases and gently informed the school about the need for random selection.

Both the private schools wanted the interviews to be conducted in the school premises. This was inappropriate from the research point of view and during the pilot itself it was realised that to make the parents comfortable, the best setting of the interview would be their residence, for the following reasons:

- It was inconvenient for the parents to take out time and reach the school. Since it served no purpose for them they either refused to come or were not particular in keeping an appointment. As a result, the initial few days were spent waiting, as many parents who had fixed the time did not actually reach the school.
- Interviews with two mothers who did come to the school, made it further evident that when forced to come to the school they were constrained by time and had other pressing concerns to return to. It was realised that when the interview is conducted in their homes, they could talk comfortably and simultaneously attend to other tasks.
- A meeting, which was being conducted in the school premises, was more likely to be inadvertently influenced by the setting and the possibility of critical comments would be reduced to a large extent.

The issue in the first school resolved itself, because even though the school wanted the interviews to be conducted in the premises, there was space constraint. The high fee charging school on the other hand provided a room to conduct interviews. However, choosing methodological rigour over my convenience I decided to interview parents in their homes. To the schools I spoke about both methodological rigour and parental convenience (though emphasising the latter) in choosing the setting of the interview, which was residence or in some cases their place of work.

The other challenge was the policy of the school to not share the contact details with an outsider. As a result the school reception had to repeatedly make the calls to get the appointment from the parents. Though this was inconvenient for both the receptionist and myself, nothing could be done immediately to resolve the problem. Taking baby steps towards building mutual trust and subverting the school authority by offering to make the calls resolved the issue gradually.

Another challenge faced in both schools was their desire to examine the interview schedule prepared for the parents. It is indicative of the control the school tried to exercise on the research.

The other suggestion, which led to awkwardness, was to conceal the identity of being a researcher and just tell the parents that I was a teacher in the school and wanted to talk about their children's education. This was proposed after a father who had not understood the purpose of the visit came to the school to enquire[9] about the purpose of my visit. It was not appropriate to ignore the suggestion considering the co-operation extended by the school and yet this was an uncomfortable suggestion, as I wanted to be honest with the parents. So I tried to use a middle path where I told the parents that I was doing my Ph.D. and was also associated with the school. The ensuing interaction with the parent was needed for the research study, but it would also be shared with the school to help improve it. This confused and labyrinthine introduction

9 This was the first interview in the study and gradually the explanatory introduction provided, became more elaborate.

made matters even more complicated for the parent to understand and the father during the second interview asked me twice as to why was I asking all this. So, from the next time on I just decided to be upfront about the purpose of the interview.

3. **Bridging the social gap:** In qualitative research, a researcher is the main instrument of data collection and her social position vis-à-vis the respondent is important. The status of any individual is neither fixed nor monolithic. It is a complex set of various inter-related statuses or identities (Merton, 1972). I am a woman, in my early 30s, wife, parent to a young child, Hindi speaking, educated, middle class, with roots in Uttar Pradesh and Delhi etc. I shared some of these identities with some parents and not with others. This led to varying social distance with different parents. Though it is not possible to eliminate the distance entirely but it is perhaps possible to try and reduce the visible social distance. In the Indian context, common manifestation of regard and being considered in a higher position is in the kind of seating offered. Like when visiting the houses in the *basti* I was often offered a chair, stool or box to sit on while the parent sat on the floor. I politely refused to accept a chair and insisted to sit on the floor with them. Accepting water and sharing tea with them at their house, selecting clothes that did not stand out were some of the attempts at minimising the social distance. I often consciously invoked my identity of being a parent of a young child to ease the process of rapport formation with the parents. Manifestation of social distance is not always linked to external determinants but is contingent on subjectivities of the people involved. I was aware of what I felt and thought while meeting a new person. This awareness can help in taking the extra step towards minimising the social distance. Generally I felt more comfortable and confident in visiting the houses of middle-class parents who had children studying in a central school and a high fee charging school. I felt most hesitant and as an intruder while visiting the *basti* houses. I was neither aware of their work schedule nor about their leisure activities. I only had an assumption about their being busy. Thus, in every visit, I was weighed down by the fact that I am taking up their time.
4. **Data accuracy:** Getting a correct list of students was the first step in data collection. Ironically, even though the government school teachers are required to collect, consolidate and forward a 'mountain of data' (Ramachandran, 2005) and this work takes a significant amount of their time, I faced great difficulty getting correct and complete data from both the government schools. The challenge was due to two reasons:
    - **Lack of Ownership:** In one school, the class register was neither complete nor was the entered data entirely correct. The current class teacher of class 1 felt no ownership towards the class. When I enquired about the discrepancies, he referred me to another teacher who was earlier responsible for Class 1. She was able to talk about most of the students correctly without referring to the papers and when needed was also able to retrieve the forms filled by the parents.
    - **Lack of Clerical Rigour:** In the other school, the data from all the classes had been collated in the computer in the school office. But the list provided to me was of the previous Class 1 with wrong phone numbers. I first happened to call the last principal, and then conducted an interview of a parent whose child was now in Class 2. Finally the correct data was acquired from individual teachers' registers.

5. **Recorder effect:** Audio recording is a necessary evil for data collection. It affects both the interviewer and interviewee and each interview, though to differing degrees. The presence of a recorder is often forgotten sufficiently to allow for authentic data collection. Though the anxiety of recording being experienced by the respondent resurfaced while answering questions which they were not confident about (like when a parent was discussing about how, bringing children from low economic background into the same school where their own children were studying, would impact their child's education), or felt that what they were sharing was probably an inappropriate topic (like when the government headmaster told me about how the teacher's union works and who has 'influence', or when the low fee charging Rajasthan Board school director talked about his critical views towards the Central Board of Secondary Education (CBSE) the respondents asked me to stop recording. These wishes were always respected, though later on, I took notes from memory.

   Even though audio recording is crucial for the study but for two common reasons some portions were lost. One has to be careful about these. One such problem was of accidentally pausing or putting the recording instrument on a standby. The other issue was regarding inputs received after a formal closure of the interview. Sometimes the parents after a pause or during an informal conversation over tea shared some insights, which may be important. In such situations, it is difficult to switch the recorder on again and hence one has to rely on mental notes and write them down as soon as possible.

6. **Accessing the marginalised households:** The residential *basti* from where most of the children for the state government school come is a big *basti* and many communities live here in their almost exclusive streets. The challenge was encountered in trying to find the house of the Kalbeliya children. Kalbeliyas are a tribal population living in various parts of Udaipur. I found that most of them were involved in rag picking and some people work as scrap dealers. The perception of the community in the *basti* is that both men and women consume alcohol at all times of the day. Thus, whoever heard that I wanted to visit a Kalbeliya house, declined to accompany me, (even my 'guide' girls) and as a result, I was also a little wary of going on my own. The teachers and the Anganwadi worker also discouraged me from going there alone. The news of a death caused by a brawl between a Kalbeliya man and a lawyer of a higher caste[10] was narrated to me by the Anganwadi worker as supporting evidence to her case of considering them dangerous and bad people[11]. Then I got help from the mobile library being run by a non-governmental organisation, which visits the *basti* twice every week. The facilitator accompanied me and also assured me that contrary to the common propaganda against entering the Kalbeliya streets, there was absolutely no problem and I could do it whenever needed. With this incident I realised that even though partly an outsider, the researcher is also impacted by the biases and stereotypes prevalent in the community and I think it is important to acknowledge this and analyse the data in that light. As a researcher, one has to be on the guard towards not perpetuating social biases and stereotypes (Moffatt et al., 2005).

   Conducting interviews of parents from government schools, who were amongst

10 http://udaipurtimes.com/brawl-at-purbia-colony-after-death-of-65-year-old-man/ (accessed on 19th july 2016) this incident was narrated by the anganwadi worker as an example of why I should stay away from the Kalbeliya community.

11 Though the Kalbeliya portion of the basti also comes under this Anganwadi she told me that she didn't allow them to come there, as the children were dirty and difficult to handle.

the most disadvantaged in the sample, posed an additional challenge as here often both the parents (and also elder siblings) go out to work. They work as wage labourers and leave early morning and come back after 6. They also do not enjoy the luxury of weekly breaks. This challenge was resolved by making repeated visits to the *basti* to see who was there and who was not, during the day and sometimes in the evening accompanied by the mobile library. I was always burdened by the realisation that they were severely constrained for time and interviews were further eating into the scarce time available to them.

7. **Language barrier in conducting interviews:** Qualitative research is a process of constructing meaning from the subjective experiences, which are expressed and constructed through language (Nes et.al, 2010) and so it is important to discuss the associated challenges and decisions taken.

   Interviews for this study have been conducted in Hindi, Mewari, and English and often in a constant switch between Hindi-English or Hindi-Mewari. I come from a Hindi-speaking background and am equally proficient in English. However, my competence in Mewari is highly constrained. Most parents interviewed were very comfortable in Hindi and some in English. Mostly the respondents assessed the limited knowledge of Mewari on my part and used more and more of Hindi, which most of them were familiar with as they live and work in an urban area. I encountered the language barrier with a few mothers from the government school, who were also economically the most backward parents in the sample. They were either more conversant or only able to talk in Mewari. In one interview, which was conducted with two mothers, who were neighbours, it was difficult to comprehend the responses as the mothers spoke entirely in Mewari and the interview proceeded in a very structured and restricted manner. In one case a Mewari speaking person accompanied me and took up the role of a translator. His involvement had to be instantly discouraged as, instead of merely translating he also interpreted the question and added suggestions. For the sake of more authentic data, it seemed appropriate to conduct the interviews with limited understanding of Mewari as in this case, so that the essence of the question would more or less be unchanged, though further probing would be limited.

8. **Transcription related concerns:** An important step in research and as Bailey (2008) says the first step in analysing data is transcription. I was faced with three issues in this regard:
   - Who will do the transcription?
   - What is the level of detail to be included?
   - Which languages to be selected for all the scripts?

Transcription is an immensely time-consuming task and it was impossible to do all of it by myself. I have transcribed more than two-thirds of the data on my own and the rest was outsourced to trusted and competent transcribers. To each transcriber the important research questions and the significance of getting the verbatim data was explicitly explained. As a corrective measure, I went over the outsourced interviews again, and filled the missing details wherever needed. Often questions and themes for analysis emerged in the process of transcription and were noted and elaborated during the process of transcription.

Transcription inevitably reduces data, as interaction in original is highly complex (Bailey, 2008). Care needs to be taken in the nature of the detail included in transcription, like when is it important to mention that the respondent coughed or laughed, or increased the pitch, etc. Apart from the verbal data, laughter (shy laugh or found it funny, etc.) and significantly long pauses have been noted. Other nonverbal data has been consciously left out as it would not be

used in analysis and would have increased the time needed to transcribe many fold.

The third challenge that transcription posed was of taking the decision regarding which language the final scripts should be produced in as the interviews were conducted in three languages. This decision was not taken lightly as many researchers have warned about the potential loss of meaning in translation (Birbili, 2000; Srivastava, 2006; Temple & Young, 2004; Nes et. al, 2010). Philips (1960, quoted from Temple & Young, 2004) calls it an 'unsolvable problem', yet it is essential to discuss the process of translation adopted and steps taken to ensure minimal loss of meaning. I decided to prepare all the scripts in English. As mentioned above since the interviews were in three languages, English being one of them, it made more pragmatic sense to have the scripts in one language. Secondly, the language of final submission of the thesis and sharing at other forums had to be English therefore translation to English was inevitable at some stage. In order to be true to the respondent, the practice in qualitative research is to present wherever needed the verbatim responses. In such situations, the author translates only the quotations to be included. In a text meaning is globally constructed and not inherent in small quotes, thus when a quotation is translated instead of the entire text then there is more probability of mistranslation or loss of meaning. For these reasons it was decided to translate entire interviews to English. The following strategies were adopted to ensure authentic translation:

- The focus during translation was on bringing in 'conceptual equivalence' instead of literal translation or 'lexical equivalence' (Birbili, 2000). Conceptual equivalence implies translating to get the correct meaning without worrying about getting the translation of each word. Lexical equivalence sometimes leads to unnatural or incorrect sentences in the recipient language, which may not represent what the interviewee may have wanted to communicate.
- In cases where phrases and sentences in the interview carried metaphors or appropriate translation was not attained at that time, phrases in the original language were retained alongside the translation, to be revisited.
- I have native-like proficiency in Hindi and English but very limited knowledge of Mewari. Thus, for Mewari translation native speakers were included who helped build the meaning in Hindi and it was then translated to English. To check the correctness, portions of it were given to other native speakers to translate back and see whether the translation is close to the meaning or not.
- I kept going back to the audio recording in the original language and in several rounds worked with the data.

Conclusion

Research is complicated business and entering the field is an overwhelming experience with a lot to observe, comprehend and record. Amongst various methodological challenges; pragmatic and ethical, the important thing for the researcher is to be able to gather voices of respondents. This includes being able to access muffled whispers hidden amongst the loud ones. These are important to bring out, as they would help build contesting accounts of quality.

The challenge in front of the researcher is to juggle with various considerations and capture as much as possible so that the theory constructed is as close to truth as possible.

While conducting interviews I many a time felt that my probing pushed the parents to think about concerns that they may not have thought earlier, or felt obligated to justify their choice even when they themselves were aware that this was not quality education according to them. In such situations, I felt unable to further pursue some strands of questions.

The challenges, considerations and learnings being discussed in the paper are useful for researchers entering the field, which is similar to the one in this study. And also in conducting interviews with the parents.

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Strengthening Public Education by Implementing RTE

Abstract

There is a decline in enrolment in government schools in many states in India and increase in enrolment in private schools, this is partly due to a migration of students from government schools to private schools. However, this shift leads to increasing stratification of school education, which is an obstacle to social mobility.

One way of addressing this stratification, as well as improve quality of school education in India, is to implement the RTE in letter and spirit. This will require the government to shut down private schools which do not meet the requirements of RTE with respect to infrastructure and teacher provisioning. The Central and state governments will also significantly increase their budgetary investment on government and aided schools to ensure they meet these RTE norms. Governments also need to invest in greater school – community linkages to strengthen government school accountability to the local community.

Such increase in investment is also required to meet the norm of 6% of GDP investment in education, suggested by the Kothari Commission report of 1966.

The percentage enrolment of children in government schools overall, is declining every year and that of private schools increasing, as the statistics collected by the Government of India indicate. 'Private' has become a buzzword for 'quality education', or at least to making a claim to be better than 'Government'.

Privatisation of School Education

Most private schools are similar to enterprise, where the clientèle is based on ability to pay tariff. The range of private schools, in terms of their resources and capabilities is wide; depending largely on the fees paid by the parents. At the top, there is a small percentage of well resourced elite schools catering to the upper classes. These schools have more than adequate infrastructure and support staff. Teachers tend to be well-paid, and they have a small teacher-pupil ratio of 1:20 or lesser, enabling individual attention to students. The annual fees for a child can easily be in excess of a lakh of rupees.

Private schools which cater to middle class sections of society have basic infrastructure and adequate teachers, though teacher-pupil ratios tend to be larger than those in the elite schools. At the other end, are the so called 'affordable private schools' catering to the poor, these schools tend to have poor infrastructure, pay poor salaries to teachers, and can offer only a limited range of learning opportunities to students, due to paucity of resources. This stratification is inevitable as private schools are 'unaided'; meaning they get no support from government and have to depend on fees paid by parents. Good schooling is expensive; providing schools, classrooms, libraries,

playgrounds, equipment for sports and laboratories, qualified teachers and rich learning experiences requires significant initial and recurring investments.

While having a range of enterprise is socially acceptable, this scenario is harmful in the case of school education. As the American philosopher John Dewey explains, the primary aim of education in any modern society is to help every student develop as a concerned and responsible citizen in order to evolve a just and democratic society. For Gandhi, the school was the primary institution to build a peaceful and non-exploitative society. The increasing privatisation of school education leads to increased stratification, which promotes social inequity. The rich and affluent are able to purchase good quality education (at least in terms of academic knowledge) in elite schools, while the children of the poor suffer in poorly resourced schools, which are not capable of providing quality education. Providing poor learning opportunities to a section of society negates possibilities to evolve a non-expolitative, equitable and democratic polity and society.

The middle class has accessed government schools in the past and continues to do so in areas where there are none or few private schools. However, the increasing enrolment of students in private schools, often leaves behind only students from very marginalised groups in government schools. This contributes to the further weakening of the government system, as parents of students attending government schools coming from increasingly marginalised backgrounds are unable to provide pressures for greater accountability of the government school system. More universal a public system is, more the chances of the users enforcing accountability on the system. David Kynaston puts it across humorously, "One only has to witness pushy private-school parents to realise that the state sector will never achieve its full capability without them."

Pasi Sahlberg, the Finnish educator has described how Finnish education has evolved from a steeply hierarchical one, made up of private, selective and less-well regarded "local" schools, to become a system in which every child attends the "common school". He has asserted that Finland's politicians and educational figures recognised that a profoundly unequal education system did not simply reproduce inequality down the generations, but weakened the fabric of the nation itself. In our country, already stratified on grounds of gender, caste, class, ethnicity and religion, school privatisation would further weaken national cohesion and 'unity in diversity'.

Funding Private Schools

One cause of the increasing enrolment in private schools, is the partial implementation of the Right to Education Act (RTE), specifically, implementation of the provision requiring private schools to admit students from marginalised backgrounds, to the extent of 25% of their enrolment. The fees of such students are reimbursed by the government to the private schools, the reimbursement amount being the government's per student expenditure in its own schools, or the actual fees collected by the private school, whichever is lesser. Parents are finding this a novel method to enrol their children in private schools, which otherwise would have denied their wards admission. With the government paying the fees, more and more parents are now able to fulfil their desire for enrolling their children in private schools. This move appears to have unfortunately strengthened the popular impression that private schools are better than government schools, as the government itself is paying parents to enrol in private schools! Parent desire for private

schools is extending even to those schools which may not be well resourced to offer good education, and may even be worse off than the neighbouring government school, in some or all respects.

In many states, especially in urban areas, this has triggered an exodus towards private schools, with parents scrambling to participate in the admission processes. In some states like Karnataka, a software application has been designed and developed to manage this process and significant efforts and time of education department officials at the state, district and block levels goes to implementing this single clause of RTE, managing government funded admissions to private schools.

Implementing RTE fully

While the 25% clause of RTE may be causing declining enrolment in government schools, the best way to reverse it, would be to implement the RTE fully, in letter and in spirit.

The RTE is not only about providing 'free and compulsory education' for every child in our country, it requires that such education must be of 'equitable quality'. Hence, it has clear and specific provisions stipulating the minimum physical and academic infrastructure required in each school, adequate number of teachers, minimum teacher qualifications, continuous teacher development etc. These clauses are critical to quality education. However, less than 10% of the schools meet all the norms. The remaining 90% schools include both government and private schools.

Strengthening Government Schools

The RTE is an act of Parliament, ratified by state legislative assemblies; not a single school should be allowed to violate it. The resource requirements to implement RTE fully, are simply impossible for the 'affordable' schools to meet, since they require investments far exceeding the fees that poor parents can pay. Such schools must be closed, and students from these schools transferred to neighbouring government and private schools that meet these norms. This can be done in a phased manner, beginning with schools that are worst in their compliance, and extending to schools which are less so. This phased process may also put pressure on schools to work for compliance.

While the RTE intended that well resourced private schools should become inclusive with government funding, it did not intend that the low cost private schools (whose costs per student may even be lower than that of the governments) should get government subsidy to admit students to poor quality education.

Likewise, all government schools too must fully meet RTE norms. Unlike private schools which depend only on fees paid by the parents, government schools get budgetary support. The central and state governments have to increase their education budget to ensure that schools are available all over the state with adequate infrastructure and well qualified and trained teachers. This is not an insurmountable challenge, as the government can raise resources to fulfil its obligations under the RTE. Indeed, countries that have been able to provide universal quality education, have only done so through adequate public investment.

Funding education

The 1966 Kothari commission recommended that India should spend at least 6% of its Gross Domestic Product (GDP) on education. The 2005 Tapas Mazumdar committee on funding RTE emphasised that budgetary support should even exceed 6%, if required to implement the act in letter and spirit. Unfortunately, nowhere in our history has this investment crossed 4.5%. Many countries poorer than India spend higher percentage of GDP on education. While India is ranked first globally for the number of children in the school going age, it is ranked

124th in percentage expenditure of GDP on education.

Professor Jandhyala Tilak has repeatedly argued that the Indian economy is quite capable of funding its schools adequately. The challenge is our polity, which is complacent about the need to provide equal opportunities to every child, irrespective of socio-economic background. This is painfully witnessed every year when the budgets are presented. The 2018 Indian budget for school education was around Rs. 50,000 crores, while concessions given to corporate sector was Rs. 85,000 crores, customs and excise revenue foregone was Rs. 154,822 crore (a quarter of this for import of gold, diamonds and jewellery), and concessions for individuals was Rs. 75,000 crores. Defence budget at 295,511 crores was nearly 6 times the education budget. Meeting 6% target would not be difficult, if some of these concessions were to be withdrawn or even reduced. The RTE clearly states that the central and state governments have concurrent responsibility for funding its implementation.

Table: Government expenditure on education in India, as a percentage of GDP

Year (Illustrative)	Education budget as a % of GDP
1951-52	0.67
1965-66	1.82
1985-86	3.71
1989-90	4.21
1999-2000	4.3
2000-01	4.4
2005-06	3.34
2010-11	4.5
2015-16	2.6

The level of financial support (measured in terms of per student investment) provided to the 'elite government schools', the Kendriya Vidyalayas, should be made available to all government schools across the country. This is essential to providing equitable quality education to all children in our country. If anything, the increasing proportion of marginalised groups in the state government run schools means that the per student investment in government schools must be even more than that of the Kendriya Vidyalayas or elite private schools, since in the latter, students are likely get better support from home to move towards an equitable playing field. Currently, it is a fraction of the latter.

Implementing the 25% Rule Selectively

An alternate interpretation of the RTE provision requiring private schools to admit 25% of students, could be that the government should implement it only where government schools are not accessible. In many states the norm of having a lower primary school within 1 kilometre, and a higher primary school within 2 kilometres is met in most habitations. There is no need to finance admissions to private schools in such habitations, to fulfil the RTE requirement of free and compulsory schooling. While this interpretation can create logistical complexities to identify eligible private schools, it would impede if not reverse the current movement to private schools. From 2019-20 academic year, the Karnataka education department has decided to reimburse admissions to private schools, only when there are no government or aided schools nearby. This has reduced the migration to private schools.

From 'Sarkari' Schools to 'Sarva-janiks' or 'Samudaya' Schools

The RTE mandates each school to constitute 'School Management Committees', comprising of parents and other local representatives, which would monitor the functioning of the school and prepare its development plan. To make community participation in the development and management of the school meaningful, the government needs to allow them much greater autonomy, and provide funds based on the schools development plan,

as required by the RTE. Such autonomy is required to build the school as an institution that can work with its community to meet local requirements, rather than treat the school and teachers as the implementers of rigid and detailed instructions from those above in the hierarchy.

Such decentralisation would also enable it to raise resources from well wishers for further institutional development. Greater ownership and participation by the community in the work of the school is also in line with Gandhi's vision of 'Nai Talim'. As a part of this, schools must also encouraged to be more 'sarvajanik' (public) or 'samudaya' (community) than 'sarkari' (government) schools, and rechristened accordingly.

Public Image

There is a need to challenge the popular impression that government schools are inherently inferior to private schools, which discourse is often promoted by the media and vested interests. There are innumerable stories and case studies of well functioning and good quality government schools and there is no reason why, given similar circumstances of adequate investments and support from stakeholders, other schools cannot become so.

For this government schools need to pro-actively communicate with their local community, share their work, challenges and invite support and co-operation. At a systemic level too, education department needs to provide greater publicity to the work being done in the schools, and invite community support to strengthen government schools. There is also a need to be transparent about the challenges and the under investment, and invite criticism to create a groundswell for improvement.

Strengthening RTE

There is also a need to further improve the RTE to support quality education. Currently, the RTE stipulates a teacher:pupil ratio to derive the number of teachers required in a lower primary school. However, this results in having just 2 or 3 teachers in small schools. In many schools, this means multi-grade schooling, as the 2-3 teachers have to teach grades 1 to 5, and all the subjects. This is a consequence of the policy to provide a lower primary school within 1 kilometre of every habitation, and its penal consequences are unfortunately being borne by teachers. While multi-grade schools have potential for greater collaborative learning, that state requires very high level of capacities on the part of teachers, access to multi-level resources and adequate teacher support, which is currently not available in many schools.

As Dhankar says, "the real solution to the (multi-grade) problem is to appoint more teachers and rectify the adverse situation. But appointing more teachers costs money. Since most of the children in these schools belong to the weaker sections of society, easier and less expensive solutions are sought. Therefore a pedagogical solution for this socio-economic problem is devised in the name of multigrade teaching strategies". The RTE must be amended to require one teacher per section, so that access is not at the cost of quality. Another option is to provide public transport facilities, so that children can go to larger schools with better infrastructure. However, this requires reliable transport facilities in rural and remote areas.

Currently, the RTE mandates free and compulsory education for grades 1 through 8 (children of ages 6 through 14), it should also allow for pre-school / early child education (from age 3 till 6); this needs to be mandated. Secondary education (grades 9-12) must also be covered under its ambit, to provide equitable opportunities for all children. This is recommended by the draft National Education Policy 2019.

It is Possible

Education is the most important pro-active investment to build a just, democratic and

equitable society. The shortfall in education investment condemns generations to poor socio-economic development. Fully implementing the RTE to ensure adequate infrastructure, facilities, and teachers in government schools is essential to avert a demographic disaster. This would also reverse the declining enrolment in government schools, as has been corroborated recently, in the states of Kerala, Rajasthan and Delhi. The 'public education rejuvenation campaign' of the Kerala government has focussed on improving infrastructure and academic quality in the government schools and sought support from community and well-wishers to strengthen schools. In Delhi and in Rajasthan, the governments have made significant investments in school infrastructure and teacher recruitment over the past few years, reflecting in increasing enrolment in government schools.

State and local governments must also invest in sharing and publishing information about government schools regularly. This will help counter discourse that equates government schools to poor quality schools and encourage closer links with and greater accountability to local communities. States also require much higher allocations from central government budgets for supporting improvements in their schools. The New Education Policy (draft) calls for a significant increase in investment in education, if these RTE norms must be met. Simultaneously, the so called 'affordable' private schools, which provide, and can only provide poor quality education, must be shut down, and students shifted to nearby schools that are RTE compliant.

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Engaging Students with Mathematics Through Story: A Case of Grade II Children

Abstract

The study discusses how a story acted as a catalyst for engaging primary school learners with mathematics as they learned the concept of repeating pattern. Engagement is viewed as a multidimensional construct made up of cognitive, motivational and emotional aspects occurring together. The study took place with 22 Grade II students (8 boys and 14 girls, age group 7 to 8 years) studying in a Government school of Delhi. The teacher in the study was a pre-service primary grade teacher and the study took place during her internship period. Data analysis showed the coexistence of the three aspects of engagement in the mathematics classrooms that used storytelling as a pedagogic tool. Students were engaged with the mathematical content as much as with the story. The findings also delve into the reasons behind students engagement with mathematics.

Introduction

Improving students' engagement in mathematics is a matter of concern for every teacher teaching the subject. Learning takes place when students engage with each other and with the tasks in hand. Fredricks et al. (2004) regard engagement as a multidimensional psychological construct where cognitive, emotional and behavioural components occur together. It explains that for profound understanding to take place it is imperative to engage children in all these three aspects of engagement. In this paper, we have attempted to address how storytelling proved to be an effective pedagogic resource for building students' engagement in mathematical classes.

Background of the Concepts

For the purpose of this paper, we need to consider two aspects:

1. The mathematical content;
2. Use of stories as a pedagogical resource.

Mathematical Content

The mathematical content which has been addressed in this paper and around which the stories were based was the concept of repeating patterns. Repeating patterns are patterns where a single motif or a group of motifs recur at fixed intervals. Liljedahl (2004) and Warren & Cooper (2006) explain that in repeating patterns there exists a discernible unit of repeat that gets generated by repeated occurrence thus creating a cyclic structure. The concept of repeating patterns appears in almost every curriculum of primary mathematics as it lays the foundation for many mathematical domains, such as functional thinking (Warren & Cooper, 2006) and proportional reasoning (Papic, 2007).

According to Warren & Cooper (2006), young children progress through a sequence of steps while learning repeating patterns. These include, copying the pattern or creating a replica of a shown repeating pattern using the same material,

extending a given pattern, identifying the repeating element, completing the pattern by filling the missing parts, constructing a new pattern, and finding structural connections between the patterns.

A first concept that needs to be introduced in learning repeating patterns is the concept of 'unitising'. Lamon (1994) asserts, the process of 'unitising' is the fundamental aspect in learning patterns. Unitising is "the ability to first construct a reference unit (a unit considered as the whole in that particular context) and, second, to reinterpret a situation in terms of this unit" (Warren, Miller & Cooper, 2012). To decipher repeating patterns, it is important for a child to identify the 'unit of repeat'.

Use of Stories as a Pedagogical Resource

Stories have the power to stir emotions, intellect, curiosity and imagination. Stories have been termed as the primal act of the mind (Wells, 1986). Studies investigating the use of stories for teaching mathematics have majorly focussed on stories providing a contextual base for discussion (Whitin and Wilde, 1995), providing problem posing and problem solving opportunities (Casey, Kersh & Young, 2004), improving mathematics related vocabulary (Capraro & Capraro, 2006) and engaging all students of a class, including those with learning difficulties (Courtade et al., 2013). While the Curriculum and Evaluation Standards for School Mathematics (CESSM) (NCTM, 1989) advocates "…the use of children's books as a vehicle for communicating mathematical ideas", Schiro (2004) and Egan (1986) lament that the mathematics that is taught to children lacks good stories. In addition, a recent review of the work done in this area by Flaveres & Schiff (2014) urges for rigorous research in understanding the effectiveness of using stories as a pedagogic tool for improving children's mathematical learning.

This study is a step forward in this direction as it illustrates how a story acted as a catalyst for engaging primary school learners as they learned the concept of repeating pattern.

Sample

The study took place with 22 Grade II students (8 boys and 14 girls, age group 7 to 8 years) studying in a Government school of Delhi. The teacher in the study was a pre-service primary grade teacher (pursuing B.El.Ed course) and this study took place during her school internship period.

Planning for the Study

A story based on a popular television cartoon character was chosen to build the concept of repeating patterns. The narration of the story followed the format of an epic story (Schiro, 2004) wherein a long story is narrated in smaller chunks, spanning across many sessions and in each session a sub-concept, making part of a larger concept, is embedded. As stated earlier the story used in this case was an adventure story based on a popular cartoon character and the mathematical concept embedded in the story was of repeating patterns.

To make a decision on the type of patterns to be used in this study a review of NCERT textbooks Grade II (NCERT, 2006) was done and it was found that till Grade II the children are expected to observe and identify patterns in the world around them, complete and continue patterns in a line or in a plane, and do skip counts of numbers like 1, 2, 3, 5, 10.

The story was split into eight sessions wherein each story session corresponded with various sub-concepts of repeating patterns of the type ABABAB and ABBABBABB, skip counting and elementary ideas of growing and inventing patterns. In each session, one sub-concept related to the idea of patterns was taken. Session 1 and 2 were based on repeating patterns of type AB and ABB; Session 3, 4 covered skip counting; in Session 5 and 6 the students worked on

elementary ideas of growing patterns; and in Session 7 and 8 pupils were asked to invent patterns. Each story session lasted for one hour approximately.

In this paper, we report the data obtained from the first two sessions that discussed the ideas related to repeating patterns of type AB and ABB. In the first session, the task was based on continuing a given repeating pattern. In the second session, pupils had to complete repeating patterns. Every session included story narration, concept introduction, discussions and worksheets. The teacher acted as the story narrator and also guided the students on their mathematical tasks.

Classroom observations of students' verbal responses, their written work and notes made by the pre-service teacher in her reflective journal (RJ) served as sources of data collection.

Story and the Mathematical Tasks

A summary of the story that was narrated in the class during two sessions follows:

Session 1

On a Sunday morning when Dee and his friends were not able to find a place to play, they requested Dee to help them do so. Dee showed them a beautiful garden through his magic sphere and they accidently entered the garden. None of them was aware that the garden land was ruled by a wicked magician. Dee, Nee and their friends got separated due to the evil spell cast by the wicked magician. He also took away Dee's gadget bag. Now, there were many adventures that Dee had to face in this quest of finding his friends and the gadget bag such as entering the castle where the wicked magician lived. The castle was secured by a 6 layered wired fence which was broken at many places. When Dee tried to enter from the broken spaces, he got a shock. Dee soon realised that the fence had magical powers and that it was strong as long as it was incomplete. Only after completing the fence could one cross it. So Dee had to complete the fence before crossing the boundary to reach the castle gate.

The process of building the fence gave many opportunities to embed tasks on continuing repeating patterns. The children were told that Dee had to complete all the fences given in the worksheet and teacher asked them if they would like to help Dee in doing so. The patterns were given in the form of a worksheet having 9 repeating patterns (Figure 1) of shapes/ symbols to be filled in. The 9 repeating patterns consisted of ABAB-type and ABBABB-type. These were presented to students in a jumbled way. Patterns '1', '3' and '7' were of type AB, patterns, '2', '6' and '8' were of the type ABB. Patterns '4', '5' and '9' were also of the type ABB when their first two units are ignored (such patterns have been categorised by Warren & Cooper (2012) as being of type AAB). Students worked in pairs to continue the patterns.

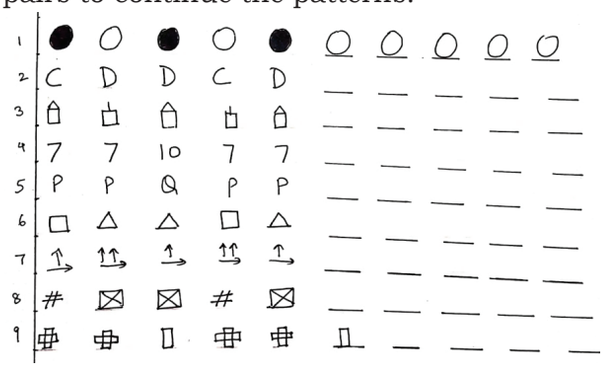

Figure 1: Continuing repeating pattern

Session 2

After the task on continuing patterns was completed, the story continued in the next session.

Having crossed the boundary, Dee had to enter the castle through a huge door .The door was made of huge tiles but Dee saw that there were many broken tiles on it. This time he was careful, he did not try to enter

through the broken tiles. Looking closely he saw, three pieces were missing from each broken tile and many pieces were lying on the floor. He guessed that they had to be placed back correctly in order to complete the door. Only then could Dee enter inside.

In this adventure, the mathematical task given to students was to observe the orientations of the units of the pattern and complete them (Figure 2). In this task, a 'Broken Tile'(Figure 2a) had to be completed using the options 'a', 'b' and 'c'(Figure 2b). Students had to look at the blank space in the Broken Tile and find an appropriate piece that would complete it.

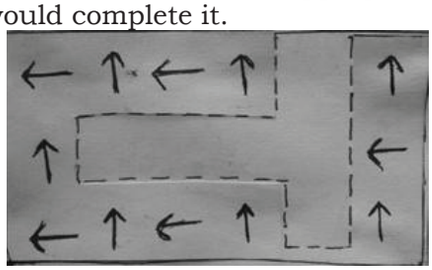

Figure 2a: Broken Tile

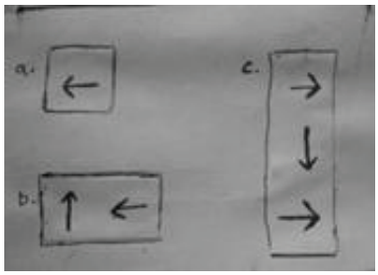

Figure 2b: Pieces

Figure 2: Broken tile completion

Note, while completing the Broken Tile the students had also to consider the orientation of the piece before placing it into the blank space (Figure 3).

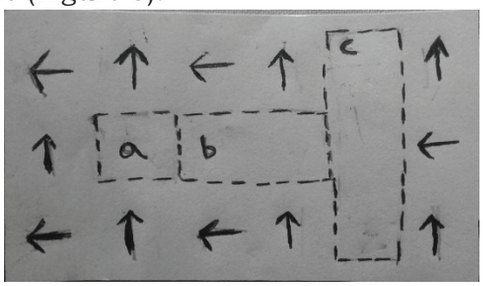

Figure 3: Solution for the broken tile shown

Engagement with the Mathematical Content

In all the story sessions, the teacher ensured that the story gave enough opportunities to the young learners to evolve themselves as active participants in the class. We have shown elsewhere how the specific acts of the teacher constructed a culture of participation (Singh & Gandhi, 2018); in the following sections the focus will be on highlighting students' engagement with the mathematical tasks such as identifying the repeating units and completing the pattern.

Identifying the Repeating Units and Continuing the Pattern

Given below are some examples of children's conversations as they worked on continuing patterns shared as part of Session 1.

For the pattern numbered '1' in Figure 1, some children worded loudly to state the pattern.

> Vidhi: "There is black colour in the first circle, then white colour, then black colour and then white..."
>
> Teacher (to the entire class): "Do you agree with this arrangement?"

Most students replied in affirmation. Then she asked them to state the **colour shape** that could come in the 6th place. Most students said it will remain white. The class proceeded to fill in the circles in alternate colours, black-white, green-orange etc; showing they had correctly identified the AB pattern.

For the pattern '2' (Figure 1), type ABB, some students initially ignored the extra 'D' considering it as the type AB. They completed the remaining blanks as CDCDCD. Seeing this, the teacher asked them to look carefully. A child pointed out the difference.

> Samta: "Here... after C there are two Ds"
>
> Teacher: "So what will come in the first blank"

Sana: "C"

Teacher: "Next?"

Parth: "D"

Teacher: "Next?"

Deepak: "One more D"

Teacher: "You see, there are two D's after each C. So now continue the pattern"

After this familiarisation with a new type of pattern, children seemed more careful in the subsequent questions. For the linear pattern '3' (Figure 1), after some thinking students identified it as being similar to the first question which was of the type AB. So when asked to predict the 6th blank, students responded as "rectangle with a line on it".

A point to be noted in their solutions was that the patterns of the two types were jumbled up in the worksheet yet students could go back and forth between the different types to fill the blanks. They explained the units of repeat as AB and ABB (or AAB) as the case was and filled in the blanks accordingly. They had imbibed the idea of first identifying the unit that was repeating cyclically in the questions and then continuing the pattern.

There was an unexpected response to pattern '5' by one of the students. One student had completed it as follows, 'P P Q R P Q R P Q R ...." When asked about it, the student explained that he had added a slant line under the 'P' at the 4th position and made it 'R'. This way he changed the AAB pattern to a new pattern of type-ABC (ignoring the first 'P' in the process). The child had been able to visualise a new pattern type that had not been intended by the teacher.

Completing the Repeating Patterns in a Planar Surface:

In Session 2, the students had to choose an appropriate piece to fill the Broken Tile (Figure 2a). The task in Figure 2a was an extension of task given in Figure 1 as, while in Session 1 the children had to continue a repeating pattern linearly; in Session 2 the children could consider the pattern in both horizontal and vertical direction. They had to first identify the repeating unit and then choose an appropriate piece to fill the gap. While doing this they had also to be careful about the orientation of the pieces.

After some grappling, children were seen to be checking the orientation of the piece to match it with the gaps. It was observed that children rotated the pieces so as to match them with its correct placement. For example, the piece titled 'a' having a single blank was identified and placed after checking its orientation. But to place pieces 'b' and 'c', the children struggled. Many groups of children asked the teacher for help. They had one common question.

Students: "How to put this piece- this way or that way?"

After some thinking, one of the students from a group announced a method to help everyone.

Aayush: "Aaha...! You can check the pattern along both lines(drawing in air a vertical line and horizontal line) to find the correct pattern".

This remark helped other groups to solve their problems as well. The solution strategy shared by this student was adopted by every group, except one.

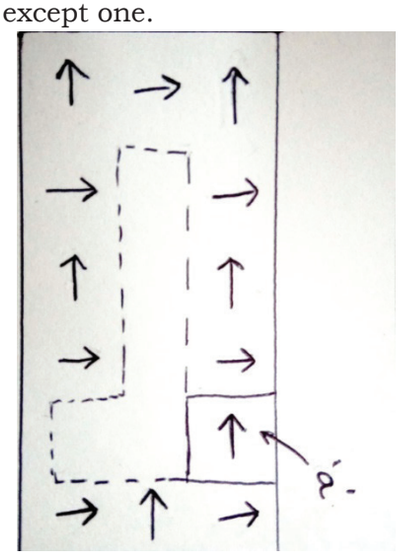

Figure 4: Solution attempted by a group of students

This group proposed a new way. After fixing

the first piece 'a' as shown in Figure 4, they brought the pieces 'b' and 'c' to the teacher and asked her to cut it into three pieces. Teacher did so and the students went back to their seat. Figure 5 shows the cuttings of the pieces 'b' and 'c'.

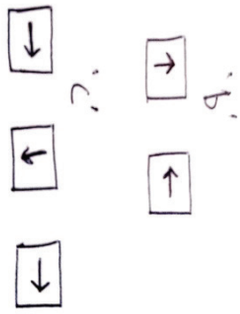

Figure 5: 'b' and 'c' pieces cut into single pieces

Now, they put each piece in its appropriate place by checking each one's position in the line. This method to find solution was invented by the students themselves. Seeing them, many students tore the pieces by hand and placed them accordingly. The teacher wrote in her Reflective Journal, "They have pasted the pieces correctly even if they tore them up in parts....earlier they would not care what they pasted...but today they have put their heads together and their work is very good" (RJ, Session 3, p.24). Children in the class were seen to be inventing strategies to find solutions.

Story as the Backdrop for Motivational and Emotional Engagement

During the first task that is in Session 1 students were spellbound when they were told the story of a famous cartoon character. They looked at the worksheets with wide open eyes as if they were seeing a lot more than the incomplete patterns. There was an element of surprise in their minds about how they could be talking of cartoon characters in their mathematics class. When the teacher asked them to speak about their observations, children were very forthcoming. Students were helping the protagonist by completing the broken fence. They imagined the linear patterns as fences to be crossed by the protagonist. Children were quick to get working on the sheet and they continued the repeating pattern. When they handed back the sheets to the teacher, they asked her to, "Give this to Dee". Since the teacher was the story teller, they expected that just like the teacher communicated the problems of the characters to the students, she would also mediate their solutions back to them. This showed that the children were emotionally attached to the story characters and they considered the problems of the protagonist to be 'real'. In her journal, the pre-service teacher wrote, "I was surprised that they completed the worksheet so fast. These were the same students who did not take the worksheets from me earlier." (RJ, Session 2, p.11). Teacher attributed this change in students' interest to the story. She also added that students were very attentive in the class then. She wrote, "I don't have to tell them to listen to me or remain quiet any more. They are so focussed on the tasks I give them that there are no problems of classroom management" (RJ, Session 2, p. 11) Time had become a resource for the students as they felt responsible for their contribution to tasks. They were eager to finish their task and did not want to waste their time in anything else. They knew any wastage of time on their part could lead to dire consequences for the protagonist. This showed that students were motivated to work upon the tasks embedded in the stories.

During storytelling, when students were told that the protagonist had got a shock on trying to enter the fence, their jaws dropped as if they could feel the shock themselves. Their motivation to complete the fence was fuelled by a desire to help the protagonist. When they completed the task, one child said, "Now the evil magician will get 22 electric shocks, one for each fence completed by us". The teacher later reported that giving 22 shocks to the magician was not a part of the original story, but seeing the enthusiasm of her students she repeated their statement so that it became a part of it. When the teacher announced the 22 shocks that the

evil magician had got due to students' good work, everyone clapped out of joy. This act also shows the emotional connect that students felt with the characters of the story. Their agency to change someone's situation was very powerful now.

When the Session 2 ended, the teacher collected the tiles from the students to arrange them in the form of a door. This was the 'door' that Dee was going to use to enter into the castle. Children's expression showed that they could imagine it to be a real door. The teacher asked the students to check the blocks completed by their friends and everyone did it diligently. She said, "I think they are very critical about their own work. They were also asking friends to check their work. They were checking each and every detail" (RJ, Session 3, p. 23). This was because they had concerns for the protagonist. The class acted as one team working for one goal. The story situation acted as a binding factor for the students. Students were totally engaged in their task because they felt responsible for their acts. They did not leave their seats for anything. They wanted to complete the task allocated to them with precision and alacrity.

Notably, the role of the teacher was only confined to probing the students to think more. She did not provide answers to the students. Her task was to let children get attached to the story characters so that they felt an urge to help the protagonist. She only posed helping questions such as , "Next...?", "So what will come in the blank space...?", "Do you agree to this?"Her limited intervention also encouraged students to find answers themselves with the help of their peers.

Discussion

In the above sections we have provided evidences of students' engagement with the content of repeating patterns that were embedded in a story. We saw that students were able to identify the units of repeat in the repeating patterns given in a linear way and in a planar style. In Session 1, students could identify the units of repeat as being AB or ABB and continued the pattern. They were 'unitising' the reference unit and reinterpreting the situation in context of this unit. In Session 2, it was observed that children rotated the pieces to find the correct orientation of the tiles for completing the patterns. Research suggests that in a repeating pattern spatial orientation is one of the dimensions that students face difficulty with (Tartre, 1990; Warren, Miller & Cooper, 2012) but, students in the story classrooms learnt to observe patterns in two dimensions simultaneously, and, when they could not do so, they found another way to solve their problem, that is, of splitting the pieces into smaller ones.

The students had developed a strong attachment to their work during this time because they felt that their mathematical expertise was valuable for someone in need of help. They felt empowered to drive the outcomes of the story by actively participating in solving the problems faced by the protagonist. Not only did they solve the problems in each session successfully, they also reasoned and extended their thinking, providing valid justifications for their examples. The children were seen to be communicating their insights with their peers. These anecdotes of engagement show that the story not only gave a context to the mathematical ideas but also provided a purpose for students to engage with the content.

The engagement of students with mathematics was evident from their involvement with repeating patterns (cognitive), concern for story characters (emotions) and empowerment to drive the story outcomes (behaviour). Phrased differently, the story helped bridge the gap between their 'subjective and objective realities' (Schiro, 2004). Students' emotional and personal connect (subjective) with the story characters led to their self-initiations and extensions in solving tasks on repeating patterns (objective)- therefore accounting for

the engagement. The classroom had been transformed into an engaged one where participants valued their own knowledge and that of their peers. The story had a role to play in this transition. Stories may have many more potentials that remain unexplored and uncovered.

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विद्यालय में लोकतांत्रिक प्रकिया

सार

यह लेख स्कूल द्वारा राष्ट्रीय मूल्यों पर आस्था रखने वाले नागरिकों के निर्माण के बारे में चर्चा करता है और दो महत्त्वपूर्ण बिन्दु उठाता है। एक तो यह कि शिक्षकों की मूल्यों के निर्माण में अहम् भूमिका है। न सिर्फ उन्हें उन मौकों का ध्यान रखना चाहिए जहाँ महत्वपूर्ण मूल्यों पर विमर्श का मौका हो वरन् उन्हें अपने व्यवहार में भी इन मूल्यों को शामिल करना है। लेख स्कूल में होशियार बच्चों व अन्य बच्चों के साथ किए गए व्यवहार, पुरस्कार व शाबाशी की संस्कृति और इनके सभी बच्चों पर हो रहे प्रभाव कि ओर भी ध्यान दिलाता है।

पृष्ठभूमि

एन सी एफ द्वारा निर्धारित शिक्षा के उद्देश्यों में मूल्य शिक्षा का उल्लेख प्रमुख रूप से किया गया है और इस बात पर ज़ोर दिया गया है कि मूल्य शिक्षा को अलग से न देख कर शिक्षण प्रक्रिया का ही हिस्सा बनाया जाए। साथ ही पांचवें मार्गदर्शी सिद्धान्त में भी राष्ट्रीय मूल्यों में आस्था रखने वाले नागरिकों के निर्माण की बात कही गयी है। इन बातों से अध्यापक की ज़िम्मेदारी ज्यादा बढ़ जाती है, अपेक्षा यह है कि वे शिक्षण अधिगम प्रक्रियाओं में मूल्य शिक्षा के अवसर तलाशें। प्राथमिक स्तर पर राष्ट्रीय मूल्य समानता, स्वतंत्रता, न्याय, राष्ट्रीय महत्व, पर्यावरण के प्रति संवेदनशीता जैसे मूल्यों को समझने के लिए विशेष प्रयास करने होंगे। इस क्रम में सबसे पहले तो शिक्षक को स्वयं इन मूल्यों की समझ विकसित करने की आवश्यकता है। सुबह की सभा से लेकर कक्षा शिक्षण, मिड-डे-मील, खेल गतिविधियां, बच्चों से होने वाली औपचारिक व अनौपचारिक बातचीत उनका सहज अवलोकन व इसके साथ-साथ मूल्यांकन प्रक्रिया में भी इन बातों पर ध्यान देना होगा। एक शिक्षक के रूप में मुझे लगता है कि हमें सोच समझ कर सभी प्रक्रियाओं में मूल्यों को लाने की ज़रूरत है। जैसे जैसे बच्चे व शिक्षक इन प्रक्रियाओं से गुज़रते हैं, नए अनुभव मिलते हैं तो शिक्षण प्रक्रियाओं में अपेक्षित परिवर्तन सम्भव हो पाता है। प्रैक्टिकल के साथ साथ सैद्धांतिक समझ भी विकसित होती है।

अनुभवों का दायरा :

मेरे अनुभव में कई ऐसे उदाहरण हैं जो अलग-अलग पहलूओं को बखूबी उभारते हैं। कई बार हम इन पहलूओं को देख कर भी अनदेखा कर देते हैं। या फिर हम वही देखना व समझना चाहते हैं जो हमें अच्छा लगता है।

इसका अनुभव मुझे अपने विद्यालय में हुआ। मैं सेवारत शिक्षक प्रशिक्षण में प्रतिभाग करने बी आर सी गया। एकल अध्यापक होने के कारण समीपवर्ती विद्यालय से मेरे स्थान पर वैकल्पिक अध्यापक साथी की व्यवस्था की गई। छः दिवसीय प्रशिक्षण के बाद जब विद्यालय लौटा तो बच्चों की कुछ शिकायतें थी। विद्यालय में बच्चों द्वारा छोटे छोटे गमलो में फूल एवं पौधे लगाये गए हैं। जिन को सुरक्षा की दृष्टि से नियमित रूप से शाम को कक्ष में रखा जाता है। प्रातः बाहर बरामदे में रखा जाता है। जिन को अंदर बाहर रखने में सावधानी बरतने के निर्देश व भाषण लगभग रोज ही दिए जाते हैं। जैसे एक-एक ले जाओ। हिलाना नहीं गिरना नहीं आदि। यह कार्य विगत दो वर्षो से चल रहा था। मेरा पूरा विश्वास था कि मेरे बच्चे पर्यावरण की सुरक्षा के प्रति संवेदनशील बन रहे हैं। मैं गर्व से इन गमलों को उगाने के उद्देश्य लोगों को समझाता। मेरा दावा था कम से कम ये बच्चे दूसरों के लगाये गमलों व पौधों को क्षति तो नहीं पहुचायेंगे।

लेकिन शिकायतों में सबसे पहली शिकायत यह थी कि मेरी अनुपस्थित में कुछ बच्चों द्वारा गमलों को लात मार कर इधर उधर फैंका गया। विद्यालय में प्रार्थना सभा शुरू हुई। देशभक्ति गीत, समूह गीत राष्ट्रगान के तुरन्त बाद नारे जो रोज़ ही लगते हैं। देश की रक्षा कौन करेगा, हम करेंगे हम करेंगे। मेरे अंदर अपने शिक्षण के उद्देश्यों का पूरा न होना घुमड़ रहा था। बीच में ही रोकते हुए बोला बन्द करो ये सब, क्या देश की रक्षा करोगे तुम? अपने छोटे गमलों व पौधों की सुरक्षा नही कर पाये। देश की रक्षा का मतलब जानते हो? थोड़ी देर सोचा तो

पाया कि आखिर यह इसे जानेंगे कैसे? इस नारे पर तो इन से बात ही नहीं हुई है। फिर उन से बात की गयी। अपने आस पास की हर वस्तु की सुरक्षा ही देश की सुरक्षा है। वो हमारे घर, गांव विद्यालय कक्षा यहां तक कि अपनी कापी किताब पैंसिल की सुरक्षा भी देश की सुरक्षा है। इस को भी समझने की आवश्यकता है। पैंसिल व कागज़ बनाने में लकड़ी का उपयोग होता है। अगर हम अनावश्यक रूप से इसे बर्बाद करेंगे तो हम देश की ही क्षति कर रहे होते हैं। ये नारा तो वर्षों से सुन रहा था लेकिन अब तक बच्चों के बीच चर्चा में नही आया था। इस अनुभव से लगा कि देश, नागरिक, सुरक्षा, सेवा, काम, समूह गीत, देशभक्ति गीतों व नियमों के उद्देश्यों पर बातें होंनी आवश्यक हैं।

इस घटना के बाद भी मैं ये दावा नहीं कर सकता हूँ कि सभी बच्चे गमलों की सुरक्षा एक समान उद्देश्य से कर रहे थे। चाहे वे शिकायत करने वाले बच्चे ही क्यों न हों। शिकायत करने के पीछे खुद को अध्यापक का करीबी जताना भी हो सकता है जो कि एक तरह से अलोकतांत्रिक मूल्य है। आज समाज में अक्सर देखने को मिलता कुछ लोग हैसियत और उम्र में अपने से बड़ों का करीबी बनने के लिए कई तरह की जुगत लगाते हैं और वे करीबी भी बन जाते हैं जिस के चलते कई बार सही प्रतिभा का दमन भी हो जाता है। इस के अतिरिक्त थोपा गया अनुशासन भी ज़िम्मेदार हो सकता है। जिस के कारण अवसर मिलते ही बच्चों द्वारा उस कार्य के प्रति अपनी नाराज़गी प्रदर्शित की गयी। ये सब बातें ही हैं जिनके कारण गमले या पौधों को सुरक्षा के लिए कमरे में रखना पड़ता हैं। क्योकि छुट्टी के बाद हमारे समाज के लोग उन पौधों को क्षति पहुँचाते हैं। जिन फूलों व पौधों को बाहर होना चाहिए था वो अंदर हैं। देश की रक्षा तन से करेंगे, मन से करेंगे, धन से करेंगे का दावा है लेकिन व्यवहार में यह नहीं दिखता। इस के बाद भी देश व पर्यावरण के प्रति कुछ लोगों की ज़िम्मेदारी के भाव को नकारा नहीं जा सकता है।

स्कूल का काम, पर्यावरण की देखभाल कौन करेगा?

ऐसा ही एक अनुभव 26 जनवरी को हुआ। संविधान के 69 वें जन्म दिवस को धूम-धाम से मनाने के बाद बच्चे पास के इंटर कालेज में अपने कार्यक्रम प्रस्तुत करने चले गए। विद्यालय के कार्यक्रम स्थल में कुर्सी टेबल चटाइयां बिछी पड़ी हैं। आफिस एवं अन्य कक्षा कक्षों के खिड़की दरवाज़े खुले हैं। अन्य दिनों ये सब कार्य बच्चे अपने अपने विभागों के अनुसार करते थे। आज कार्यक्रम के कारण उन्हें छोड़ कर जाना पड़ा। सारा कार्य अध्यापक एवं भोजन माताओं के सिर पर आ गया जिस कारण भोजन माताएं तो बड़बड़ाती हुई काम में लगी। अध्यापक जो कल तक चटाई की सलीके से तह चाहता था उसे भी पता चला की चटाई की तह लगाना कार्य है। कुर्सी टेबलों में भार होता है। खिड़कियां दरवाज़े बन्द करना एवं ताला लगाने में भी ध्यान देने की आवश्यकता होती है।

अक्सर हम लोकतांत्रिक प्रकियाओं पर चर्चाएं करते हैं। विद्यालय स्तर पर मूल्यों को विकसित करने की बात भी उसमें शामिल रहती है। लेकिन कई बार कार्यविभाजन के समय में स्वयं को अलग कर लेता हूँ। कार्य का विभाजन केवल बच्चों में करता हूँ जैसे विद्यालयी कार्य, सफाई, झाड़ू लगाना, कुर्सी मेज अन्दर बाहर रखना, अपनी कुर्सी साफ करना, कार्यालय या कक्षों की सफाई, बागवानी, फूलों में पानी देना, खुदाई करना, पुस्तकालय की देखरेख करना, टॉयलेट सफाई आदि कार्यों का विभाजन छात्रों में किया जाता है। स्वयं निरीक्षक की भूमिका में रहता हूँ। इस के पीछे मेरा तर्क है कि मैं बच्चों में उक्त मूल्य विकसित करने के लिए उन से चर्चा करने के बाद कार्य विभाजन करता हूँ। इस बात का भी ध्यान रखा जाता है, कि कार्य बदलते रहेंगे। लेकिन ये भूल जाता हूँ कि मेरी भूमिका क्या है? मेरा केवल निरीक्षक की भूमिका में होना इस प्रक्रिया को कब अलोकतांत्रिक बना गया मुझे पता ही नहीं चला। इस से जो मूल्य बच्चों में विकसित होने थे उसके विपरीत मूल्य विकसित हो रहे हैं। जैसे दूसरों से कार्य करवाना, जिम्मेदारी खुद लेने से बचना।

शिक्षा पर जब भी चर्चा होती है तो अध्यापक को एक रोल मॉडल के रूप में देखा जाता है। इस बात को सभी शिक्षाविद् स्वीकार करते हैं। लेकिन विद्यालय में मेरे द्वारा अपनाई गई उक्त प्रक्रियाओं में तो मेरा रोल बहुत कम था। जिससे मॉडल का भी वैसा ही बनना स्वाभाविक है। यानि कहा जा सकता है कि दोहरा चरित्र व असंवेदनशीलता जैसे मूल्यों के पीछे भी लोकतांत्रिक मूल्यों का आभाव छिपा है।

इनके पीछे के कारणो की पड़ताल करने पर यह पाया कि अपने लिए नियमों में शिथिलता व दूसरों के लिए शक्त होना। खुद आदेश देने की भूमिका में रहना। जिस का सीधा प्रभाव बच्चों में दिखता है। वे अपने से छोटी कक्षा के बच्चों को निर्देशित करते नजर आते हैं।

इस के अतिरिक्त सुन्दर सुसज्जित कार्यालय में कीमती कुर्सियां व मेज, फ़र्श पर बिछी मैट, खिड़कियों के पर्दे, मेज़पोश, कुशन युक्त फर्नीचर, पानी की बोतलें, चाय के लिए स्पेशल कप, अलग टायलट आदि। दूसरी ओर बच्चों के लिए

जूट की चटाई गद्ढे युक्त पर्स आदि का होना। भोजन अलग अपने कार्यालय में करना, थाली गिलास स्वयं साफ़ न करना आदि। जबकि विद्यालय एक ही है अंतर केवल शारीरिक शक्ति व उम्र का है। ये प्रक्रियाएं भी अलोकतांत्रिक व शायद चरित्र निर्माण के दावे को खोखला करने वाली हों।

अगली प्रकिया और भी जटिल है। वह भाषा व व्यवहार है। जो जीवन का प्रमुख अंग है। बच्चों की ढेरों ग़लतियां हमें दिखती है। जबकि ग़लती वही करेगा जो सीखने की प्रक्रिया में होगा। लेकिन अधिकतम के समाधान सुझाने की भूमिका में होने के कारण ग़लती के स्तर के अनुसार व्यवहार में परिवर्तन आ जाता है। उसी के अनुसार आवाज का बढ़ना व भाषा में कटुता या उपहास का होना ख़तरनाक व अलोकतांत्रिक है।

आगे चल कर ये भेद भाव घर परिवार समाज में देखने को मिलता है। परिवार के मुखिया या पुरुषों को पहले भोजन देना। उनके कपड़े व कमरे को स्वच्छ रखना। कार्यों के विभाजन में अंतर व घर में हर व्यक्ति के लिए अलग नियमो का होना, इस के अनेक उदाहरण मिलते हैं।

कक्षा में जब भी किसी विषय पर बात होती है तो स्वभाविक प्रक्रिया में कुछ प्रश्न किये जाते हैं। इन प्रश्नों के उत्तर कुछ बच्चे तपाक से दे डालते हैं। उन्हें शाबाशी भी मिलती है। बाकी बच्चे भी उस का उत्तर सोच रहे होते हैं। तब तक उस का पड़ोसी उत्तर दे चुका होता है।

क्या होशियार बच्चों का उत्साह अन्य को सीखने से रोकता है

जब कोई बच्चे हमारी कक्षा में बढ़-चढ़ कर जवाब देते हैं तो बहुत अच्छा लगता है। हम बाकी बच्चों को कहते हैं कि इसे देखो कितना अच्छा है इससे सीखो। उसका उन बाकी बच्चों पर क्या प्रभाव पड़ता है यह हम नहीं ध्यान रखते। मुझे यह बात बहुत बाद में समझ आई। और मेरे सामने एक सवाल छोड़ गई।

मेरे स्कूल में कक्षा 2 के छात्र मानस, दीपक का अनुभव लेकर बात को आगे बढा रहा हूँ। जब भी गणित पर कुछ बातें होती हैं तो दीपक खुश हो जाता है। यों कहिये कि गणित सुनते ही वो ज़्यादा सक्रिय हो जाता है। मानस सहम सा जाता है। जब कि मेरे अनुसार हिन्दी एवं अंग्रेजी विषय में मानस की ज़बरदस्त पकड़ है। जहां तक उस की रचनात्मकता पर बात करें तो किसी भी बिंदु पर अपनी बात रख पाता है। एक बार सुनी कहानी को ख़ुद सुना सकता है। अपने स्तर की कहानी कविता भी रच लेता है। जो भी उससे मिलता है। प्रभावित हो जाता है। कहा जा सकता है कल्पना करना, चीज़ों को खुद की नजर से देखना या सोचना, अनुमान लगाना, तर्क करना, वस्तुओं का आपस में सम्बन्ध स्थापित करना बहुत से गणितीय कौशल विकसित हैं। फिर भी गणित की बात आते ही उस के हाव भावो का बदलना सोचने को मजबूर करता है।

इस घटना पर ध्यान दिया तो पाया कि कक्षा कक्ष में गणित शिक्षण में भारी गड़बड़ी है। अक्सर जब भी गणित का कोई प्रश्न पूछा जा रहा होता है, प्रश्न हल करने को दिया जाता है। दूसरा बच्चा दीपक जल्दी उत्तर दे देता है या प्रश्न को लिखित हल कर लेता है। जिस के कारण उसे बहुत अच्छा, होशियार जैसे शब्दों से अलंकृत किया जाता है। निश्चित रूप से उसका आत्म विश्वास बढ़ रहा है। विषय के प्रति रूचि बढ़ रही है। लेकिन उसके साथी पर उसका विपरीत प्रभाव पड़ रहा है। पहला यह कि दीपक अन्य बच्चों को अपने अनुभव सुनाने के अवसर नहीं दे रहा है। वह दूसरे बच्चों के सोचने से पहले उत्तर दे कर बात समाप्त कर देता है। जिसके चलते दूसरे अनुमान लगाने व समस्या समाधान के लिये सोच नही पा रहे हैं। इस के लिए मेरे द्वारा ही उसके सही उत्तरों को प्रोत्साहित किया जाता रहा है। लेकिन इस के विपरीत प्रभाव से अन्य बच्चों के अवसरों पर हस्तक्षेप हो रहा है, मैं इसे समझ नहीं पा रहा था। इसका अर्थ ये नहीं लगाया जा सकता है कि प्रोत्साहित करना ग़लत है। लेकिन प्रोत्साहन से दूसरे के हित प्रभावित न हों। यह समझना शायद आवश्यक होगा।

दूसरी बात दीपक के अन्य साथियो ने सोचना छोड़ दिया। जो दीपक बताएगा उसे दोहरा देंगें या उसी का अनुसरण करेंगे। वे दीपक की बातों को अकाट्य सत्य समझने लगते हैं। यह मूल्य अन्य को अपनी बात रखने से रोक रहा है। क्योकि वे एक धारणा बना चुके हैं कि दीपक हमेशा सही बताता है। जो बहुत बड़ा मिथक है।

इस मिथक अवधारणा के चलते दीपक अन्य बच्चों को चुपके से उत्तर भी बताने लगा है। उस के एवज़ में वे अपने साथियों से कुछ वस्तुओं की सौदेबाज़ी कर रहा है। जैसे रबर पैंसिल या कोई खाने पीने की वस्तु जो उसे पसन्द है। यहाँ फिर मदद के रूप में कुछ लेने देने का मूल्य विकसित हो रहा है।

यही हाल मानस का हिन्दी या अंग्रेज़ी विषय में है। यहां मानस अन्य बच्चों के अवसरों को प्रभावित कर रहा है। अध्यापक का प्रिय बना है। हमेशा खुद ही जबाब देता है। अन्य बच्चों की बात (अभिव्यक्ति) को दबाने का कार्य कर रहा है। इस के चलते वह कई बार झूठी व मनगढ़ंत बातों को भी बढ़िया तरीके से बोल लेता है। क्योकि उसकी बातों को सुना जाता है इस लिए वह अपना प्रभाव और ज्यादा बनाने की कोशिश करता है।

यहां मेरे द्वारा यह समझने की कोशिश की गयी कि गणित व भाषा के उद्देश्यों को समझने की प्रकिया में शिक्षा के महत्वपूर्ण लोकतांत्रिक मूल्य के विपरीत कुछ आलोकतांत्रिक मूल्य कैसे विकसित होते हैं। जिन का मुझे पता ही नहीं चलता या देर हो जाती है। ये सब कक्ष में घटित घटनाएं होती हैं।

जिनका सीधा उदाहरण समाज में व्याप्त भ्रष्टाचार में ज्यादा विकराल रूप में है। कई बार ऐसे उदाहरण भी समाज में मिलते हैं; लोग अपने विषय के विशेषज्ञ होते हैं; फिर भी भ्रष्टाचार में लिप्त मिलते हैं। इन के पीछे हो सकता है ये कारण भी रहते हों।

निष्कर्ष

इन सब उदाहरणों और ऐसे ही अन्य उदाहरणों से मुझे लगता है कि हम शिक्षकों को सोचने की जरूरत है कि हम अपने कार्य के ढ़ंग व सोच का स्वमूल्यांकन व विश्लेषण कैसे करें। यदि इस तरह के काम को शिक्षक शिक्षण प्रकियाओं का हिस्सा बनाया जाए और उनमें शिक्षक स्वमूल्यांकन व गतिविधियों का अवलोकन करें, तो इससे इस तरह के मसलों को ज़ेहन में रखने में मदद मिलेगी व मूल्यों को शिक्षण प्रक्रिया का हिस्सा बनाया जा सकता है। इस के लिए इस बात की ज़रूरत होगी कि एक शिक्षक के रूप में हमें अपनी प्रत्येक गतिविधि का शैक्षिक मूल्यों के संदर्भ में विश्लेषण करना होगा। शुरुआती दौर में परम्परागत व व्यवस्थागत दबाव रहता है और स्वयं को उन से बाहर निकालना असंभव सा लगता है। लेकिन जैसे जैसे हम इन प्रक्रियाओं में आगे बढ़ेंगे तो इन्हें बच्चों की भागीदारी और उन का साथ इन्हे संभव बनाने लग सकता है। ये प्रक्रियाएं शिक्षण को बेहतर बना सकती हैं और पूरे विद्यालय परिवार का नज़रिया बदल सकती हैं। इसमें धीरे-धीरे समाजिक एवं व्यवस्थागत अपेक्षित सहयोग भी मिलने लगता है। आज मैं जिस विद्यालय में हूँ उस विद्यालय में आने वाले सभी अधिकारी, शिक्षा कर्मी बच्चों के बीच बैठ कर खाना खाते हैं और अपनी प्लेट स्वयं धोते हैं। प्राथमिक स्तर पर मूल्यों के विकास की प्रक्रियाएँ और बातचीत बच्चों को जीवन पर्यन्त स्वअनुशासित, नैतिक व लोकतांत्रिक बना सकती है।

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Review of the Draft National Policy on Education 2019 Chapter – 1 and Chapter 2

Abstract

This article highlights the important recommendations laid by the draft National Education Policy, 2019 on Early Childhood Care and Education and Foundational literacy and foundational numeracy.

Early Childhood Care and Education and Foundational literacy and foundational numeracy

The Basics of what is Foundational literacy and foundational numeracy

The draft of the National Policy on Education 2019 elaborates its vision for education through the preamble that envisions education as (P25) The historic Universal Declaration of Human Rights, adopted at the UN General Assembly in 1948, declared that "everyone has the right to education". Article 26 in the Declaration stated that "education shall be free, at least in the elementary and fundamental stages" and "elementary education shall be compulsory", and that education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms'. The idea that education must result in the 'full development of the human personality' continued to be reflected in influential reports such as that entitled Preamble 25 'Learning: The Treasure Within', which the International Commission on Education for the Twenty-first Century chaired by Jacques Delors, submitted to UNESCO in 1996.' The report quoted to bolster the policy also argued that education throughout life was based on four pillars: i) Learning to know, ii) Learning to do iii) Learning to live together and iv) Learning to be.

It adds (P25) *Such an articulation of a broad view of education encompassing the holistic development of students with special emphasis on the development of the creative potential of each individual, in all its richness and complexity, has grown increasingly popular in recent years, and many recent reports from UNESCO, the OECD, the World Bank, the World Economic Forum, and the Brookings Institution have highlighted the broad consensus that has developed.*

But, in the light of the vision detailed above, when one looks at the overall policy, in all the sections, the policy seems to defend all its propositions from an entirely '21st century economic development' perspective or an 'employability' perspective *only*. While I would not deny their importance, it is suggested that the policy should widen its own understanding of what the aims of education should be and its incoherence with the policy's vision. Unlike the vision, in many sections, the policy chooses to define 'development' as only economic in nature, then it chooses a certain stance that it should re-look at from a human development and welfare perspective elaborated in its vision. Further, to reflect on how the policy is written, in many places, it uses banal platitudes for stating larger educational goals, development and social and economic welfare of people, but it fails to discuss or

describe the meaning of terms, phrases and statements used. However good the intention, this brings a vague interpretation of each section by the reader and fails to communicate a meaning that all the readers will be able to associate to.

With regard to the first chapter, it is highly appreciable that after years of research and feedback from academicians and practitioners, the government has emphasized on the importance of ECCE and foundational literacy and numeracy. While it elaborates why ECCE should be included and 'What' should be included, it also differentiates 'quality' pre-school education from that of the private school education. It mentions "*Meanwhile, the private and other pre schools have largely functioned as downward extensions of primary school. Though providing better infrastructure and learning supplies for children, the consist primarily of formal teaching and rote memorization, with high Pupil Teacher Ratios (PTRs) and limited developmentally appropriate play-based and activity*-based *learning; they too generally contain teacher untrained in early childhood education. They generally are very limited on the health aspects, and do not usually cater to younger children in the age of 0-4 years."* Thus rather than a mere inclusion, it highlights and suggests the importance of age appropriate pedagogic practices to be used with such an age group. This is a big policy decision and will impact many children positively.

Another important aspect of this section is the policy's ability in being able to differentiate between the early 'cognitive simulations' that children require (0-3 years) before introducing them to an educational framework (3-8 years). This important emphasis will avoid articulation of ECCE as a 'reduced' version of the curriculum or an implication that the formal school instruction should merely be 'preponed' and started with 3 year old children. Lastly, a major achievement in this section is the suggestion for concrete policy decisions like expanding the Anganwadis and co-locating them with the existing primary schools along with stand-alone pre-schools and most importantly extension of the RTE Act to include early childhood education. Thus, the inclusion of this chapter is a thoughtful inclusion in the policy.

As for the second chapter, it can again be seen positively that the policy lays great emphasis on the teaching of foundational literacy and foundational numeracy. But while one should appreciate the research and intention behind such effort, it is suggested that the policy must spend time in elaborating on what it really means by 'foundational literacy' and 'foundational numeracy'. This section tries to throw some light on the same. The policy introduces this by stating :

(P55) The ability to read and write, and to perform basic operations with numbers, is a necessary foundation and indispensable prerequisite for all future school and lifelong learning. However, various governmental as well as non-governmental surveys clearly indicate that, at the current time, we are in a severe learning crisis with respect to these most basic skills: a large proportion of students currently in elementary school - perhaps over 5 crore in number - have not attained foundational literacy and numeracy, i.e., the ability to read and comprehend basic text and the ability to carry out basic addition and subtraction with Indian numerals.

In the above passage, the policy should elaborate on "what exactly will 'basic' be" and while these are extremely important, is only foundational literacy and numeracy sufficient for lifelong learning? If a policy limits the definition of foundational literacy and numeracy to this, then it will be an extremely reductionist understanding of what these are for a nation that already regards these skills as 'basic' which are literally translated as 'lower' in order, 'easy to teach' and can be taught to children only if

- Pupil Teacher Ratio (PTR) was less and classrooms were less crowded,
- if children were regular to schools,

- if children had access to ECCE, if there was curricular emphasis on foundational literacy and numeracy,
- If teacher's capacity in teaching them was built
- and if the community actively participated in it

All of the statements really contradict the existing policy documents and fail to see the problem in the implementation of those policy decisions and curriculum frameworks. It instead overlays a new understanding stating that this never existed. The National Curriculum Framework 2005- syllabus, not only described these foundational skills, but also elaborated an age-wise division of skills that could be taught to children. In fact the detailing in the mathematics curriculum is still a benchmark in redefining the pedagogy of mathematics and epistemological understanding of the subject. Thus, it is important for the policy to also review the existing documents in light of their execution and people's understanding of it. The policy further states that :

(P56) Schooling in the early years also lays too little curricular emphasis on foundational literacy and numeracy and, in general, on the reading, writing, and speaking of languages and on mathematical ideas and thinking. Indeed, the curriculum in early grades moves very quickly towards rote learning and more mechanical academic skills, while not giving foundational material its proper due. The principle must be that: if students are given a solid foundation in reading, writing, speaking, counting, arithmetic, mathematical and logical thinking, problem-solving, and in being creative, then all other future lifelong learning will become that much easier, faster, more enjoyable, and more individualised; all curriculum and pedagogy in early grade school must be designed with this principle in mind.

What it describes here is an 'observed practice' in the school. At the policy level, there were established provisions through years of rigor that went in revising the national curriculums, textbooks, teacher education programs and assessments. Despite the national frameworks, the states had *'chosen'* to design their own frameworks, textbooks, and teacher education programs that looked at the pedagogy of foundational learning in a traditional* (*single term used for various pedagogic practices that do not align with the constructivist pedagogy suggested in the revision of curriculum in NCF 2005, can be unpacked).* One such example can be taken from many state textbooks that actively choose to base their assumptions about foundational literacy entirely on acquisition of phonics. In such a case, the policy must reflect on the aspects of 'implementation' of the existing policies along with overriding it with newer policy decisions. For such gaps in implementation, it should also clearly define the terms, phrases and implications for the readers of the policy so that there is a uniformity in what the policy implicates. Similar examples can be seen in chapter 4, Curriculum and Pedagogy in Schools, where it posits :

(P74) Studies in cognitive science demonstrate that children prior to the age of 8 learn best through play-based, activity-based, and discovery-based multilevel flexible styles of learning and interaction, whereas around the age of 8 children naturally begin to adapt to a more prescripted style of learning, indicating that teaching-learning processes in Grade 3 may also begin to transition to a more formal style of learning, e.g. by incorporating some basic textbooks, while still maintaining a strong play- and discovery-based approach.

The term ' *prescripted style of learning'* opens up the pandora's box of what this term may mean to the readers of this policy. Would it mean that a discovery-based approach can only be used to cater to 'early age groups' and the rest of the education can largely be 'prescriptive'? Are '*discovery-based multilevel flexible styles of learning and interaction'* not formal styles of learning? Can textbooks not be a source of / lead to *discovery-based learning styles?* Further, even when the policy tries to meet the gap between what is suggested in policy and what is implicated, it states :

(P 57) Because of the depth and severity of the problem, teachers cannot be asked to go at this alone - a large scale nationwide effort and dedication will truly be required, which will involve the community as well. Students themselves can be a first major resource in this regard. Studies around the world show one-on-one peer tutoring to be extremely effective for learning - not just for the learner, but also for the tutor. An old Indian saying incisively states that "Knowledge is the only quantity that increases for oneself when one gives it away to others"; indeed, one-on-one peer tutoring by senior students was one of the key successful hallmarks of the ancient gurukula system. Prestigious peer-tutoring positions will be instituted, not just for foundational literacy and numeracy, but across all school subjects, in order to improve learning outcomes for all.

While it describes an implicated nationwide 'effort and dedication', it should elaborate in concrete terms 'what will these efforts be?'. The above statement *"Knowledge is the only quantity that increases for oneself when one gives it away to others"* also reflects a certain epistemological stance that a national policy is adopting, which I strongly think is against the vision of the policy and the existing documents that understand knowledge as *construction* and not as a *body or a quantity*. Examples of such phrases, will bring ambiguity for implementers of the policy. The entire assumption about holding '*remedial classes'* for foundational literacy and numeracy raises many questions for its understanding amongst the readers. Some of these are :

- Why is a remediation required?
- Is there no role of teachers not knowing the pedagogy of these skills? Why are they not talked about ?
- Why are civil society organizations repeatedly falling back on curriculum frameworks and still trying to tell the teachers the 'correct' (described in position papers and NCF) ways to teach?
- Will a mass remedial help if the remedials are also carried out with the same assumptions about the nature of the subject, assumptions about the learner and the curriculum ?

For the clarity of implications, these are the questions that the policy must seek to answer. It furthers these assumptions in the community's support in such remediation by stating : (P58)*"If every literate member of the community could commit to teaching one student/person how to read, it would change the country's landscape very quickly; this mission will be highly encouraged and supported."* It needs an elaboration of what are these 'skills' that the community will teach to its wards. In fancy ways, it describes the increased focus on school foundational literacy and numeracy through designated times and events and fails to elaborate ' what is to be done in that time' assuming that the schools and teachers understand such subjective interpretations. If one has to summarize the emphasis on this travesty of foundational literacy and numeracy, it would be:

"Do this, do that, do it a lot. Involve him, involve her and do it a lot. Train them, train all, prepare the schools and involve technology, and do it all – except 'what is to be done'.

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MOOCs (Massive Open Online Courses): A Potential Solution for Challenges in Indian Higher Education

Abstract

Higher education in India is undergoing considerable changes to develop a good education system. The Indian education system faces many difficulties and challenges such as equity, quality education, access to education and individualised learning. Fifty percent of the Indian population is under the age of 25 and this requires the setting up of many universities and colleges to provide access to education for all young learners, which could result in huge expenditure. Although the numbers of educational institutions are being increased by the government, there is still a gap between the demand and supply. India is a populous and developing country that needs to not only reduce expenditure, but also provides quality education. MOOCs (Massive Open Online Courses) can be seen as a potential solution for the Indian higher education system.

Introduction

India provides the facility of training and education in almost all aspects of knowledge. According to the latest edition of the All India Higher Education Surveys (AIHES) launched by the Ministry of Human Resource Development in 2016-17, the Gross Enrolment Ratio in higher education is 25.2 percent. The aim of India is to attain 30% of Gross Enrolment Ratio in higher education by 2020. India is still far behind countries like China and USA which have a Gross Enrolment Ratio of 43.39% and 85.8% respectively. According to the All India Higher Education Survey (AIHES) Gross Enrolment Ratio is "a statistical measure for determining the number of students enrolled in undergraduate, postgraduate and research level studies within the country and is expressed as a percentage of the population."

The Indian higher education system is on expansion to meet the requirement of young Indian population for providing equal access to all the young people of the country as more than 50 percent of Indian population is under the age of 25. The quality of higher education in India is significantly poor as compared to major developing nations of the world. India faces a need for systematic change to improve the quality of teaching and learning in affiliated colleges.

There are many challenges that the Indian education system is facing today. The number of educational institutions has been increased by the government of India to provide access of higher education for all the individuals but still, there is a gap between demand and supply as institutions are still short in numbers as compared to the population. The uneven growth of population and access to opportunity for higher education is still a challenge for the Indian

education system. Quality of education in India is still lagging far behind compared to the world level. There is also a need to improve the credit system of India in comparison to the world-class system. Despite so many challenges, many educationists believes that the Indian higher education system has the opportunity and capability to make its mark at the international level.

Mcaully Stewart et al (2010) states, "MOOC is an online course with free and open registration, publicly-shared curriculum and open-ended outcomes." According to The European Association of Distance Teaching Universities (EADTU) MOOCs are "online courses designed for large numbers of participants, accessible anywhere by the internet, open to everyone without entry qualifications and offer a full course online for free". There are many ways of using MOOCs in the education system along with another teaching method by blended mode, flipped classroom or separately by itself without any other method of teaching. MOOC can be developed by the teacher and there is the opportunity of using already available MOOCs from worldwide platforms like ALISON, Courses, edX, Iversity, etc.

MOOC in India

With the increasing trend of MOOC all over the world, India also looks forward to joining the futuristic idea of MOOC. The first initiative was taken by IIT Bombay in July 2014. IIT Bombay offers many open courses which enroll more than 35,000 students from all over the world. Birla Institute of Technology and Sciences (BITS) Pilani collaborate with Harvard and MIT to offer MOOCs to its students as well as outsiders by using edX (MOOCs platform) in August 2014. Lady Sri Ram College (New Delhi), Learning Links Foundation and Bluebells Schools International (New Delhi) had alliances with Course which is a MOOC platform which collaborates with the top most universities in the world to provide the best possible courses.

A trial of providing free online certificates to engineering students on algorithm, design, and analysis was started by the alliance of Visvesvaraya Technological University (VTU) and Microsoft Research. The National Programme on Technology Enhanced Learning (NPTEL) project which is funded by the Ministry of Human Resource Development (MHRD) is joined by The Indian Institute of Science Bangalore (IISc Bangalore) and The Indian Institutes of Technology (IITs) of Chennai, Delhi, Guwahati, Kanpur, Kharagpur, Mumbai and Roorkee for the purpose of delivering MOOCs. On 5th September 2014, saw the launch of The National Virtual Academy for Indian Agriculture, at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) to facilitate access to quality education on agriculture as more than seventy percent of the Indian population is involved in agriculture.

An online platform named Study Webs of Active Learning for Young Aspiring Minds (SWAYAM) was initiated by the Ministry of Human Resource and Management. SWAYAM is going to use the Open edX MOOC platform to deliver MOOCs courses. A programme named Global Initiative of Academic Networks (GIAN) was initiated by the MHRD and the National Science Foundation (U.S.A.) in which faculty members of US Institutions deliver the teaching in academic and research institutions across India.

There are some other digital initiatives in India are one of these is SWAYAM Prabha, which is a group of 32 of a similar nature Educational DTH channels and the National Digital Library which is a virtual repository of learning resources. Swayam Prabha with 32 DTH channels is to make accessible good quality educational content to everyone. Since it would cover diverse fields is to another way of offering non face to face content to those interested. The content in this can

supplement the many courses offered under Swayam as well as other courses and can be accessed at their own location conveniently. It does not even require the internet and has a great potential to spread content above education.

Benefits of MOOCs

Provide World-class Education

MOOC is offered by different international universities and their recognised professors and hence provide world-class education to individuals all over the world without any restriction of time and money.

Innovative Initiative in Teaching

MOOC is an initiative which came with a new idea of teaching. The teacher can use MOOC in blended mode and also in a flipped classroom. The teacher can develop MOOC and use the already developed MOOC.

Accessibility

MOOC can be accessed online from anywhere and anytime for free. It is openly accessed by anyone without any pre-eligibility criteria.

Reduce the Expenditure on Education

MOOC reduces the expenditure on physical infrastructure and provides online education which needs very little expenditure. This reduces the expenditure on the education system and provides an economical system which is the need of developing country like India.

Helpful in Improving the Gross Enrolment Ratio

The MOOCs it an excellent platform to increase the total number of learners enrolled in higher education. It provides an opportunity to those who are engaged in some professions to earn at their convenience and be supported in their learning. It also provides them an opportunity to learn at their own pace and through their own preferred ways. It therefore helps those who have dropped out or unable to continue education by providing them ways and means to learn on their own.

Promote Equity and Quality in the Indian Education System

MOOC provides open access to all and provides equal opportunity in the education system. Most of the MOOCs allow downloading of the content and using it offline which also reduces the restriction imposed by the internet especially in rural areas. MOOC is developed by professionals who ensure the quality of the content of the course. It also provides knowledge for the sake of knowledge. In India, SWAYAM provides four quadrants for the courses hosted by it to maintain the standard of the course.

Educational Content can be Easily Updated in MOOC

With the passing time, we encounter new researches and knowledge which cannot be easily updated in print media like books but MOOC content can be easily updated. It provides the updated content for learning for quicker than other learning materials.

Promote Collaborative and Independent Learning

MOOCs encourage peer learning and collaborative learning as the learner is allowed to interact with individuals enrolled in a particular course from all around the world with the help of the Discussion Forum. Since a MOOC instructor is not available all

time, a learner has to learn and understand the content by himself, which promotes independent learning.

Self-paced and Individualised Learning

MOOC allows you to move at your own learning pace without imposing any restriction to learn the particular content within a set time. It promotes individualised learning which is the need of today's education system.

Availability of a Variety of Courses From Worldwide Platforms

MOOCs offer a variety of courses related to many subjects. It provides options to choose different courses from worldwide platforms. Colleges allow one to access only a limited number of subjects. Even schools provide a limited number of subjects to study, but this is where MOOC can be helpful.

Challenges Faced by the Indian Education System for Proper Implementations of Mooc in India

1. A MOOC can be created by anyone, so this increases the possibility of development of content by an unprofessional person. In such cases, MOOC may provide content which is not of good quality. So a student must choose carefully and join the MOOC which is developed and created by professionals.
2. Different languages are used in India and MOOCs are not available in all the languages which restricts its use in India.
3. Lack of awareness about MOOC is also a challenge in India as individuals do not know about it.
4. To access the MOOCs, there is a need for basic digital literacy which restricts the access in India. Many who do not have access to Internet cannot reach.
5. Low completion rate of MOOC programme also shows that it a great challenge to use such courses in the education system of India.

Conclusion

MOOC programmes bring a huge revolution in education in all around the world and the Indian education system has also benefitted. In spite of its challenges, MOOC is very beneficial for Indian higher education as it can provide worldwide Quality imbued education and reduces the cost incurred. This is needed by a developing country like India. It promotes self-paced learning which is beneficial for all kinds of learners. The need for digital literacy and some knowledge of technical devices like laptop and mobiles, restricts its availability to some extent. Access from smart phones which are used by most of the young learners. However, opens new possibility MOOC can be used in blended mode with other teaching methods which increase its effectiveness. MOOC can be used to increase the gross enrollment of students so it is a very efficient and effective tool which can be used as a support for higher education in India.

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Women's Education and Social Reform in India: Creating 'Angels in the House?'

Abstract

This article discusses the various aspects involved in the process of introducing women's education in India during the social reform period of the 19th century. It focuses on the developments with regard to women's education during this period both within the Hindu and the Muslim communities. Available literature on social reform is used to track the nuances of the approaches adopted by the reformers to introduce and strengthen women's education within the two major religious communities, i.e. Hindus and Muslims. The article further goes on to draw attention to the commonalities and differences in the manner in which the question of women's education within the two communities was addressed.

> "Education is necessary for women, no doubt,
> But let them be 'angels in the house,' not social gadabouts."

Some of the landmark events and discussions that took place in colonial India during the 19th century have been discussed by historians through the frame of "social reform" (Chakravarti, 1998; Bhattacharya et al., 2001; Sarkar & Sarkar, 2007). Social reform is a term used to refer to the wide range of efforts made during the 19th century within the Hindu as well as the Muslim communities to transform practices that were regarded as retrogressive during the period. Notably, almost all the issues taken up by the social reformers related to women. Of particular focus for the social reformers of the Hindu and Muslim communities for instance were the issues of child marriage, widow immolation, widow marriages, polygamy, women's education, wearing of veils by women and the rights of Muslim women to initiate divorce. With reference to all these subjects, the social reformers sought to *alter* the customs by reforming the patterns of understanding that were responsible for the widespread acceptance within the society of those specific social practices.

A significant feature of the reform period was that while the actual focus of the intended reform in all the instances was the home or the private realm, it was the *public* implication of how familial life was understood that was at the heart of the discussion and debate that took place. The period of reform was a unique moment in the history of India because the private and the public were being marked by the reformers in particular as distinct and yet connected. This article will elaborate on some of the critical features of the reform period by focussing on the subject of women's education, both within the Hindu and the Muslim communities. It draws on the available literature on social reform to track the nuances of the debates on women's education within the Hindu and Muslim communities and goes further to draw out the commonalities and differences in the nature of the discussions within the two communities.

The legacy of the debates around women's education and the resolution arrived at in the 19th century continue to shape the present understanding of the education of women and girls. Though the practices of child marriage, widow immolation and

polygamy are still prevalent, they are no longer regarded as the norm. However, in relation to women's education certain tensions, such as reconciling to the kind of education provided to girls/women with her role within the home for instance, are continuous with the concerns expressed in the 19th century. In other words, the threads of these contemporary articulations can be traced back to the manner in which the issue of women's education was configured in the 19th century.

Background

It is a well-established fact by now that viable indigenous systems of education existed even in the 17th and 18th centuries, i.e. prior to the introduction of a modern schooling system in India (Acharya, 1978; Dharampal, 2000). However, in-depth information regarding these indigenous systems of education across the different regions of the country is not available. The references made to the native educational system by the reformers in some cases, early reports by the British administration and biographies and autobiographies from the 19th century provide some insights into the educational system that existed in pre-colonial India. These references make it clear that education was largely available to the upper castes among the Hindus and to the elite among the Muslims.

Among the upper caste Hindus, boys were provided rudimentary education either at home or in "pathashalas" or "gurukuls." In some rare cases, Hindu girls were educated, but only till they were married off. On the other hand, education was more widespread among Muslims. Both boys and girls were taught the letters so that they could read the Holy Quran. After the first few years, however, the education of girls was stopped. The boys continued their education with different teachers. The indigenous system of education gradually died out due to a combination of reasons that included declining patronage from the local elites as well as the British government for that form of education, non-availability of teachers (especially women teachers), introduction of modern common schools and the greater lure of English education for boys.

An interesting aspect of the 19th century Indian situation is that the decline of the indigenous educational system led to a gradual but increasing focus on the education of girls and women (Forbes, 1998). Such an observation in turn raises a critical question: what in the circumstances of that particular period, i.e. the 19th century, led to the subject of women's education being pushed into the public domain, making it one of the most contentious issue of those times? An examination of the terms of the debate as they took place separately in the Muslim and Hindu communities provide a clue to understanding this issue better.

Before beginning to explore the social reform period vis-à-vis the subject of women's education, some specific features of the reform age that made discussion and dissemination of ideas possible may be highlighted: The introduction of print media in the form of newspapers, magazines, novels, tracts, manuals, letters to the editor as also the new practice of forming associations of a modern kind, (various kinds of *anjuman* and *samaj* were founded during this phase) enabled the shaping of a public sphere and public discussions (Devji, 2007; Seth, 2007). Importantly, women too participated in the use of these new modes of communication and association.

Another aspect of the reform period too needs to be noted, especially since it tends to get lost in most accounts of the period. The point is that the positions in relation to reform in general, and to women's education in particular, were contradictory and fractured. There were no neat lines of continuity even among all those who supported education or the group that opposed education. Each victory was provisional and hard won for groups on either side of the divide. Women's education then was a highly contentious issue when it was first raised, with strategic shifts and alliances marking its development.

Education for Muslim women

Historical studies of the late 18th century and the early 19th century have mentioned the names of some accomplished Muslim women of letters who were well acquainted with Arabic, Persian and Urdu (Minault, 1998; Naim, 2007). Azizunnissa Begum (1780 – 1857), the mother of the social reformer Sir Syed Ahmed Khan, the Begums of Bhopal -- Sikandar Begum (1819 – 68), Shah Jahan Begum (1838 – 1901) and Sultan Jahan Begum (1858 - 1930), Abadi Banu Begum (1852 – 1924) and Ashrafunnissa Begum (1840 – 1903) are among them.

Later reformers such as Nazir Ahmed Dehlavi, Khwaja Altaf Husain Hali and Mumtaz Ali, who were all influenced by Sir Syed Ahmed Khan's ideas on education, however, went much further than him in advocating the importance of education for women. The genre chosen by these reformers was fictional narratives. Their ideas on women's education were best expressed through novels that enjoyed wide readership. Nazir Ahmad's *Mirat ul-Arus* (The Bride's Mirror) and Hali's *Majalis un-Nissa* (Assemblies of Women) helped considerably to introduce the idea that Nazir Ahmad in particular propagated the greater need of education for women than for men. According to Nazir Ahmad, men and women possessed equal intelligence. He argued that men were capable of gaining knowledge through their participation in the outside world but women could acquire knowledge only through reading and education. Education for women moreover was essential so that they could be better managers of the house, good companions to their husbands, educators of their children and good Muslims as well.

Reformers such as Mumtaz Ali and Nazir Ahmad were quick to recognize the fact that though they were advocating for women's education, material that could be used for women's education itself was scarce. They emphasised the need to produce literature that could be used for the education of *Muslim women* since the form and content of education had to adhere to the Islamic faith. They wrote fictional accounts and novels with a view to use them for pedagogic purposes. As a result, for the first time, there was material that addressed the benefits of women being educated. Moreover, these materials were widely circulated and read. Interestingly too, for the first time again, fictional role models were being produced for Muslim women.

The Muslim reformer-writer was in fact responding to a question that dominated his time. *The question was about whether there was a need to differentiate the education of men from the education of women*. This was a key issue that had to be sorted out in relation to women's education. The resolution of the issue was in terms of accepting that since the division of roles between men and women was different their education too should necessarily be different. This approach is most marked in Maulana Ashraf Ali Thanavi's work *Bihishti Zevar* (The Ornaments of Paradise). This book, which was a guide for Muslim women, became a compulsory part of the gifts given to a newly wedded bride. There were other writers though who held a different opinion. Mumtaz Ali who wrote *Huquq un-Niswan* (Women's Rights) and went on to found the weekly newspaper, *Tahzib un-Niswan* (The Women's Reformer) with his second wife, Muhammadi Begum, was one such reformer. In his book, Mumtaz Ali argued for broad based and socially useful education for women as against a narrow household centric education.

The efforts of these writers resulted in an expansion of the market for textbook literature and by the end of the 19th century many textbooks were produced in Urdu. Among the more widely used textbooks were those written by women as well, such as *Tahzib un-Niswan wa Tarbiyat al-Insan* (The Cultivation of Women and the Instruction of Humanity) by Shah Jahan Begum. As part of the effort to promote women's education, a number of women's magazines in Urdu too were started towards the end of the 19th century. The first of these was *Akhbar un-Nisa* (Women's News) founded by Syed Ahmed Dehlavi in Delhi in 1887. Around the same time, *Mu'allim-i-Niswan* (The

Women's Teacher) was started in Hyderabad by Maulvi Muhibb-i-Husain. While *Akhbar un-Nissa* had to close down after a short time due to the resistance it faced from within the community, *Mu'allim-i-Niswan* appeared every month for fourteen years. The other notable publication that addressed women's issues was *Tahzib un-Niswan* (The Women's Reformer) started by Mumtaz Ali and Muhammadi Begum in Lahore in 1898. This newspaper, which was a strong supporter of women's education, had a long and influential life until the time it closed down in 1950.

Two other magazines/journals in Urdu that were widely appreciated during the reform period were the *Khatun* (Lady/ Gentlewoman) and *Ismat* (Modesty/ Chastity/Honour). The former was started by Shaikh Abdullah and Wahid Jahan Begum in 1904 as the monthly journal of the Women's Education Section of the All-India Muhammadan Educational Conference of Aligarh. *Ismat*, on the other hand was a literary journal founded by Rashidul Khairi in Delhi in 1908. Many women writers contributed to these magazines and debated on a range of topics including the education of women, veiling, the responsibilities of a Muslim woman as a wife and a mother, etc. Discussion of political matters was missing from these journals that focussed only on social issues. These early efforts at bringing out journals however, inspired a later generation of women to edit their own journals. In Hyderabad for instance, Sughra Humayun Mirza began the monthly *An-Nisa* in 1919 and Sayeda Begum Khwishgi editted *Hamjoli* starting from 1930.

While the content of education was an important point in the discussions, there were many other issues that were debated as well. For instance, the question about how *zenana* education (education that simulated the conditions of veiling) could be ensured was a critical one that recurred ever so often in the many writings of the period. The question emerged in the wake of an earlier practice when girls were educated within the sheltered environs of their house. Given the fact of a changing time wherein *ustanis* (female teachers) were not available and the economics of educating girls was becoming prohibitive, the dilemma was whether one could provide *zenana* like conditions in common schools where a number of girls could be educated at once. The issue about the strict adherence to veiling practices was necessarily about women from the elite strata of the society. In fact, it is a striking feature of this phase that debates about education revolved almost entirely around education for girls from *ashraf* ("respectable/ cultivated") backgrounds.

The earliest schools set up were primarily for girls from "respectable" families. The discussions about women's education took place initially in those metropolitan sites where there was a substantial Muslim population. Aligarh, Lahore, Delhi, Hyderabad and Bhopal were among the major centres from which the reformers initiated their work. Shaikh Abdullah and Wahad Jahan Begum set up the first common school for Muslim girls in Aligarh in 1906, Syed Karamat Hussain set up a school exclusively for Muslim girls in Lucknow in 1912, and Abdul Haq Abbas established the *Madrasat ul-Banat* (Muslim Girls' School) in Jalandhar. Rokeya Sakhavat Husain, who was the other key reformer during this period, started the Sakhavat Memorial Girls' School in Calcutta in 1911. All these reformers faced stiff resistance from their orthodox detractors who felt that women's education would harm the existing social order.

To an extent, resistance to girls' education was not as severe in Hyderabad. The Hunter Commission noted in the early 1880s that there were 11 girls' schools with 519 students in Hyderabad. In 1881, Dr. Aghornath Chattopadhyay started a school open to upper-class girls from all religious communities. About 26 Muslim girls joined this school. Patronage for girls' education was also provided by Salar Jung's daughter, Nurunnissa Begum and by Syed Hussain

Bilgrami's wife, Sayyida, and his sister Begum Shujaat Ali. Encouraged by the support of the social elites, two schools for girls were established in Hyderabad: the vernacular-medium Nampally Girls' School (founded in 1890), which in the 1920s became the Women's College of Osmania University, and the English medium Mahbubiya Girls' School (founded in 1907). Both the schools were open to students from all religious communities.

The sustained efforts by the reformers resulted in women's education becoming acceptable among a wider cross-section of people. The reformers emphasised the need for educating Muslim women as a way of weeding out the corrupt practices that had crept into the Muslim community. These Muslim reformers were on a stronger footing by invoking the Holy Quran, which underscored the need for both men and women to access knowledge. They argued that education for women was essential so that they could be good companions for their educated husbands, good mothers for their sons and good Muslims by being able to differentiate between true Islamic injunctions and superstitious or wasteful customs. Support for women's education came from *ulemas* as well as liberals from the professional classes.

Education for Hindu women

Prior to the 19th century, education for Hindu girls was virtually non-existent. There was instead a strong feeling within the community that any girl who was taught to read and write would turn into a widow soon after her marriage. Getting educated therefore was regarded as an evil sign that consigned women to lifelong suffering. Together with this extreme belief regarding how fate was being tempted through education of women, there was also the more practical apprehension that a woman who could read and write would become involved in intrigue and bring dishonour to her family. The Hindu social reformers therefore faced an uphill task in battling these two dominant conceptions of the time before they could successfully popularise the notion of education for women (Forbes, 1998; Sarkar, 1999).

It was the missionaries who first attempted to educate adult women from Hindu families. They approached the landed elite families that had acquired English education and offered to teach the womenfolk of their families. Having themselves been exposed to a western liberal education, some of these families recruited women from the missionaries to provide *zenana* education to their women. This practice however didn't continue for long and the missionaries later started common schools for the education of girls. These missionary schools were most successful in South India. For instance, by the mid-nineteenth century, nearly 8000 girls were being instructed in day schools and boarding schools set up by the missionaries. However, girls from upper caste families did not attend these schools both because it entailed their having to step out of the purdah that they customarily observed outside the house and because of the fear of being converted to Christianity. It was mainly girls from lower caste and poor families who accessed the missionary schools (Forbes, 1998).

The primary effort of the social reformers on the other hand was to make education a respectable option for girls from upper cast families in particular. The support for setting up schools for girls from "respectable" families came from different groups in different parts of the country. In and around Calcutta for instance, the initiative of the Calcutta School Society formed by Radha Kant Deb as well as the efforts of the Brahmo Samaj leader Keshab Chandra Sen were important. Later in the century, the Prarthana Samaj too played an important role in promoting the cause of female education. In the north, especially in Punjab, the Arya Samaj founded by Swami Dayanand Saraswati was a vocal supporter of women's education (Kishwar, 2007). Vireshlingam was a key figure in promoting the education of girls in the coastal Andhra

region of the Madras Presidency (Leonard & Leonard, 2007). The Theosophical Society too was among the catalysts in South India while influential figures such as Jotiba and Savitribai Phule, M. G. Ranade, Pandita Ramabai and D. K. Karve provided the impetus for campaigns supporting the education of girls in the western part of the country (Chakravarti, 1998; Forbes, 1998; Bhattacharya et al. 2001).

The earliest initiatives in terms of setting up schools for the education of girls came from Calcutta where the male reformers had support from the local British administration as well. The Hindu Balika Vidyalaya, which was among the most important schools for girls opened in Calcutta in 1849 by J.E. Drinkwater Bethune who was the President of the Council of Education. Pandit Ishwarchandra Vidyasagar was appointed as the School Secretary. Later, as the Assistant Inspector of Schools, Vidyasagar started 40 girls' schools between 1857 and 1858 in villages around Calcutta (Sarkar, 2007).

In North India, the Arya Samaj started its first school for girls, the Arya Kanya Pathshala in 1890 and the Kanya Mahavidyalaya (the high school) in 1892 in Jullundar through the efforts of Lala Devraj and Lala Munshi Ram. The Arya Samaj's emphasis on women's education was part of their larger effort to purge Hinduism of its distortions and return it to the pristine state of the Vedic times as it was envisaged by the Arya Samajis. Women were regarded as an important component of this project since the responsibility of producing healthy progeny lay with them, as did the task of nurturing the next generation in a manner appropriate to the task of building a vital and virile Hindu nation. The argument therefore was that without proper education, women would not be fit to take on such an onerous task. The Arya Samaj regarded the establishment of schools as important also in order to counter the activities of the missionaries and in order to produce women teachers who could teach subsequent generations of school going girls. In fact, by 1910, the Kanya Mahavidyalaya had produced 50 *adhyapikas* or female teachers who were working in different schools in the province (Kishwar, 2007).

The approach of the social reformers prominent in the field of women's education, most of who were men, was primarily instrumentalist. Women's education was deemed important because it furthered other causes such as of reviving Hinduism or because education held the potential of transforming women into good mothers and wives. It was rarely the case that a woman was seen as an individual for whom education may be beneficial to deal with her life circumstances. It is precisely for this reason that Pandita Ramabai (1858 – 1922) stands out as an extraordinary figure in an appraisal of the reform period (Chakravarti, 1998; Vishwanathan, 2007). She was a remarkable person who championed the cause of women's education in order to secure women her rights as a human being in a society that was constituted by the twin hierarchies of gender and caste. In her work *The High Caste Hindu Women* (1888), she presented an incisive analysis of this society and articulated her vision in bold and powerful terms in order to bring about a change in the situation of Hindu women.

Born into a Brahmin family, Ramabai's early life was unconventional in the sense that she received education in Sanskrit from her father and also remained unmarried until the age of 22. In her early year Ramabai led an itinerant life along with her parents and her brother. After the death of her parents and her brother, she married Bipin Behari Medhavi, a lower caste, but was widowed soon after the marriage. She subsequently converted to Christianity, but was opposed to the dogmatic stance of the institutionalised Church too. In 1889, Ramabai founded the *Sharada Sadan* (Home of Wisdom), a school for widows, where comprehensive training was provided to the students in literature, morals, physiology, botany and industrial work such as printing, carpentry, tailoring, masonry, wood-cutting, weaving, needle work etc. By 1900, about 80 women had

been trained in Sharada Sadan to earn their own living through teaching or nursing.

In 1897, Ramabai established *Mukti*, her second school near Poona in Khedgaon, meant once again for widows. Ramabai's work was pathbreaking in that through her activities she addressed in radical ways some of the most important issues of the time, i.e. of women's education and the untenable plight of widows. Unlike the reformer D.K. Karve, who adopted a paternalistic and protectionist attitude towards widows and whose schools were meant only for the upper caste widows, Ramabai regarded widows as important members of the society who were entitled to a life of honour and dignity. She admitted women across castes into her school. Ramabai's iconoclasm paralleled that of Jotiba Phule who was a powerful critic of Brahminism and of gender inequalities. Phule was also exceptional in that he was the only one among the pantheon of reformers who established a school exclusively for low-caste untouchable girls in Poona in 1848. On the whole therefore, the initiatives of the reformers resulted in transforming the Hindu community's stance in relation to women's education.

Education of Hindu and Muslim Women: Overlapping Features

The initiatives taken up and the efforts made within the social reform period are often discussed separately for the Muslim and the Hindu communities. It is indeed true that the efforts made during the reform period were distinct for each community and were restricted to the particular community from which the social reformer hailed. The mode of address too was defined by the priorities of each community and what they regarded as the subject of reform. Among the Muslims for instance, the many aspects surrounding the issue of veiling had to be consistently addressed throughout the reform period whereas within the Hindu community, the extent of latitude that was permissible for widows was a regular point of contention, including within debates on women's education.

Notwithstanding the different priorities of each of the communities, it needs to be emphasised that there were several significant points of overlap too in the approach adopted by the two communities, especially at the structural level. Since the reform efforts in both the communities vis-à-vis women's education took place in the colonial period, they were influenced not only by the colonial discourse about the native civilisation, but the positions taken up by the Hindu and Muslim reformers were also shaped by each other's activities and initiatives.

Both the Muslim and the Hindu social reformers of the 19th century were responding to the cultural critique launched by the British regarding the backwardness and moral collapse of the Indian civilisation. Moreover, since the British critique mounted itself on the observable evidence of women's low status in society, the Hindu and Muslim reformers too internalised the rationale that women would be the catalysts of change. And hence, among the various efforts made to improve the situation of women, education of women too was given a lot of importance.

The colonial critique in fact fed into the production of internal narratives and explanations within both communities about their decline from a golden age of triumph: while the Muslim community attributed their extant "backwardness" to profligacy and impiety together with the political overthrow of Muslim rule by the British, the Hindu community over a period of time began to believe that Muslim rule had led to their downfall. Common to the thinking in both the communities, however, was the faith in the regeneration of the community as a whole by working for the reform of women. Additionally, since many of the reformers were becoming familiar with a western liberal framework and were in fact professionally placed within such frameworks, they sought to bring about greater harmony between their personal and professional lives by

seeking to transform certain social practices and relationships. This manner of thinking had a definite impact on their decision to support women's education.

Another interesting point of similarity between the Muslim and the Hindu reformers was with regard to the importance both gave to the scriptural sanction that was available for women's education. From Nazir Ahmad onwards, who may be regarded as the first strong proponent of Muslim women's education, every reformer who supported the cause of Muslim women's education quoted from the Holy Quran that "It is a duty incumbent on every Muslim man and every Muslim woman to acquire knowledge" (Minault, 1998). Similarly, when promoting the cause of women's education, Ishwarchandra Vidyasagar was not satisfied with just providing humanitarian arguments, but cited the scriptures to demonstrate that women's education had the highest sanction within Hinduism (Sarkar, 2007).

The turn to scriptures for securing consensus within the community can be explained partly in terms of the growing legitimacy that British rulers gave to the written text over oral narratives or local customs. Perhaps the move was also addressed to the manner in which the orthodoxy was consolidating itself by citing the scriptures and therefore the need to refute them on their own terms. Also, it is not easy to classify the reformers as being either traditionalists or western educated modernists. They were a complex mix of both and hence it might have been important for their own convictions to find support from the scriptures.

Common again to the manner in which women's education was discussed within both the communities is the fact that class and caste considerations were central to how the issue was configured. The focus of most social reformers was entirely in relation to upper or middle class and upper caste women. The number of upper caste/ class families who were convinced by their arguments seemed to provide a measure of the success of their efforts at every turn. More strikingly, the reformers in fact sought to create a distance and distinction between women of the upper and lower classes through the kind of education that was imparted to them. Apart from the school established by Jotiba Phule, the missionary schools were the only ones that welcomed students from lower classes and castes, but the reformers did not deem it important to engage with their efforts.

Finally, judged from the vantage point of the present, we find that though hugely significant for its time, the social reformers from both the communities were functioning within limited frameworks. They wanted women to be educated and yet dependent on the men in their family; education was not envisaged as an instrument of freedom for women. However, we do find that even in a period that predominantly held such views, there was a radical break by a few individuals from the established mode of understanding the issue of women's education. Pandita Ramabai and Jotiba Phule among the Hindus and Rokeya Sakhavat Husain among the Muslims are representative of counter-hegemonic approaches. All three of them sought to broadbase education so that it was available to all women, irrespective of their class and caste. They also consistently fought against the imposition of restrictions on women in their pursuit of education as well as in their life choices and decisions.

The limitation of the reform period in relation to women's education apart, the beginning made for the education of girls and women in this period have been immensely significant. The paths forged by Ramabai and Rokeya provide important instances of alternate thinking in relation to women's education. It is by traversing these paths established during the reform period that many women leaders emerged who could even petition the government and the nationalists for women's rights on a range of subjects. The social reform period therefore opened out new vistas for women and enabled a new world of women's political activism in the years that followed.

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Menace of Ragging: Addressing Concerns

Abstract

This article is based on a research study on ragging in higher education institutions with special reference to a medical college in Agra. Though the site is specific it shows the inter-sectionalities between social variables such as caste, class, gender, etc. and frequency and nature of ragging. It also highlights different aspects of ragging such as its origins, causes and implications, thereby offering rich insights. A few cases of ragging highlighted by media are also listed. After discussing suggestions to curb it by several committees set up for the same are discussed and limitations pointed out.

"*He wished to depart and safeguard himself in a secure place to be never found again. All witnessed him tremble and cry, but they did not stop and let him go even after an hour of reasonless fun. An hour of torture, an hour of tormented roaming in the college wearing just his underpants, an hour of unending trauma... lifelong mental damage !"* (Naveen, 1st year student, A-One Medical College)[1]

The depiction of Navin's agony highlights the damage caused by ragging to innumerable students every year. The unheard trauma of the young minds, spells out the face of ragging in today's world. Ragging has always been questioned by common people as well as by scholars. Policies have been issued from time to time to curb this menace. Despite the fact that ragging has been strictly banned in all colleges of India. It is still rampant, the ban has not been very effective. Which is evident from the number of ragging cases still reported by different sources. However, the unanswered question is: Why does ragging exist? When and how will the educational system be freed from this menace? Where is the solution to this problem?

This paper endeavours to examine the menace of ragging in higher education institutions with a special focus on a medical college in Agra, from which primary data was collected. The paper is organised into seven parts. The first part focusses on the origin of ragging. The second part highlights the reported cases of ragging, committees formed to curb ragging, major cases of ragging and change in the nature of ragging with time. The third part deals with media and ragging. The fourth part focusses attention on the geographical spread of ragging. The next part underlines the choice of site for carrying out the present research. The sixth and seventh parts lay out the findings with major focus on the nature and prevalence of ragging and its connection with gender, caste and class.

The Origin of Ragging

Ragging is also known as *hazing* in the US and *bastardisation* in Australia (Wikipedia Contributors, 2019). It involves newcomers being bullied or ragged by senior students. Ragging still seems deeply rooted in the world even if it is banned. If we trace back the history of ragging, it began roughly 2000 years ago in Greece. Initially termed as pennalism 'a system of mild oppression and torment practised upon first year students'.

1 Pseudonym

Ragging was condemed by scholars like Plato who defined this tradition by saying "practical jokes played by unruly young men that injured the hazed and citizens who got in the way" (Sterner, 2007 as cited by Klinger, 2017). St. Augustine of Hippo, a fourth-century North African Catholic bishop, termed it as "acts of devils." In the mid-17th century, it was not just condemned, but banned by the institutions like Harvard College. The first known action that took place against hazing was in the year 1684, when one student was expelled for hitting students and making them perform acts of servitude. This seems quite tame when compared to modern day hazing (Sterner, 2007 as cited by Klinger, 2017). After adopting different measures to curb the vicious cycle of hazing, it remained entrenched in colleges and universities in the western world.

As far as India is concerned there is no evidence which records ragging as being an indigenous phenomenon in ancient Indian educational institutions. But there is a possibility of it being introduced as a result of British Colonialism during the post World War II, when soldiers returning from war re-entered college and initiated the tradition and techniques of ragging. Thereafter, it might have gradually made an entry into Army and English public schools (Cohen, 2010). It became conspicuous only after independence, with a different term called "ragging', and shockingly its current forms range from whimsical to brutal. Till the late 60's, ragging was never a serious problem in India as it was relatively in a much milder form, primarily because higher education was confined to some particular sect of the society and hence ragging was confined only to a part of the civilised (sic) community of this country. Gradually, as higher education became accessible to different communities, ragging became a soft weapon to settle the animosity between students of different castes, communities and religions, etc." (Kirti, 2017).

Cases Reported and Committees Formed

In the present time, ragging has been one of the most serious issues in higher education in India. In educational institutions, ragging has become a norm rather than the exception across the country. There have been many cases of ragging that shook the whole nation. It was highlighted when the dismembered body of a 19-year-old boy was found in Tamil Nadu in 1996. A senior had abused him physically and it was discovered that when he refused to strip, he was forced to lick his footwear. (Kumar, Nov 12, 2010)

In 1999, the UGC formed a four member committee under Prof K.P.S. Unny to uproot ragging. They defined ragging as "*Display of noisy, disorderly conduct, teasing, excitement by rough or rude treatment or handling, indulging in rowdy, indisciplined activities which cause or likely to cause annoyance, hardship, physical or psychological harm or raise apprehension or fear in a fresher, or asking the students to do any act or perform something which such a student will not do in the ordinary course and which causes him/her shame or embarrassment or danger to his/her life."* It suggested a three-pronged system to control the impact of ragging in educational institutions namely: 'Prohibition - Prevention - Punishment System; that is, prohibition by Law, prevention by following a set of guidelines and punishment in case ragging takes place in spite of prohibition and prevention.

The failure of implementation of the guidelines suggested by Unny's committee and the increasing rate of ragging cases, stipulated Supreme Court to form another committee under Dr. R K Raghavan, in 2006. The committee was asked to invite effective suggestions and methods to prevent or control ragging. The committee was also asked to give suggestions for possible action against persons involved in ragging and also against institutions that are unable to control ragging in their premises.

Though committees from time to time were formed to take action to prevent ragging, but still ragging cases were being reported. In one of the medical colleges (2009), four drunk seniors attacked a 19-year old student who later died due to brain hemorrhage. It was one of the most infamous cases of ragging as the Honorable Supreme Court realised that the death of the student clearly indicated that the 'formulation of guidelines and regulations was not sufficient. Hence, the Honourable Court ordered that such regulations shall have to be enforced strictly'.Thereafter, University Grants Commission framed UGC Regulations on curbing the menace of ragging in higher educational institutions, 2009, which have been notified on 4th July, 2009 in the Gazette of India. These regulations include the submission of anti-ragging oath affidavits by students during admissions at colleges or online, regular raids of hostels where newcomers have been accommodated, and providing them brochures/information booklets containing the telephone numbers of the anti-ragging helpline.

In 2015, the Supreme Court mandated the study of the prevalence, causes and solutions to curb the ragging menace in universities. The research was based on a survey conducted among over 10,000 students in 37 colleges across the country and led by a committee of scholars from the JNU. The report was named *Psychosocial Study of Ragging in Selected Educational Institutions in India*. It highlighted social discrimination in ragging. Thereafter in 2016, an amendment to the definition of ragging was made by the UGC to broaden anti-ragging regulations by giving a comprehensive picture of ragging and by linking abuse with social variables. *"Any act of physical or mental abuse (including bullying and exclusion)* ***targetted*** *at another student (fresher or otherwise) on the ground of colour, race, religion, caste, ethnicity, gender (including transgender), sexual orientation, appearance, nationality, regional origins, linguistic identity, place of birth, place of residence or economic background."*

Despite the fact that almost three decades have passed since ragging has been recognised as a deeply rooted problem, the country is still to find the best solution to stop the menace of ragging. Though, effects have been made to solve this problem, they seem to have failed in eradicating this menace from the formal space of education.

In 2018, a student of management was hospitalised after being allegedly ragged by seniors at the institute. He was beaten for 3 hours. Many students from the same college revealed that they had faced ragging and were too frightened to leave their hostels. (Unnithan, Sept 7, 2018).

The cases highlighted above are only a few that were reported. The manner in which the proportion of ragging cases is increasing it might need greater efforts to uproot it completely.

Ragging and Media

Ragging unfortunately has become an integral part of the Indian higher educational institutions as is evident from the fact that it often constitutes the central theme in several films. Many films portray ragging as an enjoyable activity. For example, films like *Waqt Humara Hai, Munna Bhai MBBS, Three Idiots, Main Hoon Na* dealt with the theme of ragging. However, instead of projecting the damaging influence of ragging on young students and sensitising the public to its adverse effects, it ended up endorsing it. The projection largely revolved around either an arrogant newcomer who had to be tamed in or an awkward fresher who needed to be reigned in. Ragging was justified as a reasonable activity, which brought in fun and laughter. Films often rely on ragging scenes for bringing in humour and laughter for the audience. Use of demeaning names such as *telu, murga* is seen as being funny rather than disrespectful. For example, in *Waqt Humara Hai* forcing student to smoke, proposing to a boy or a girl, slapping and insulting are all projected as funny behavior rather than something to be condemned. Similarly by making the fresher wear mismatched clothes or even walking around

half-naked are perceived as being funny. In the movie *Munna Bhai MBBS,* the protagonist and his batchmates had to walk a ramp with bare chest and thus become part of ridicule by the senior students.

The famous dialogue, '*Jahapana Tussi great ho, Tohfa kabool karo'* from the movie *Three Idiots* enjoyed by the public and youngsters, underlines the ragging issue. The word *tohfa* is symbolises as removing the pants, bending down and showing ones backside to the seniors. Though it evoked laughter in the audience, it was not in good taste.

However there are a few films, which have shown the negative side of ragging such as in film *Table No. 21*, where the protagonist and his friends repeatedly rag a boy ridiculing and humiliating him. The continuous act of ragging like threatening, pouring red colored water over him when he suddenly enters into his room; removing his clothes in front of all and shaving his head etc. made such a negative impact on the boy that he finally loses his mental balance. He was ragged to such an extent that he could not live a normal life again. The movie displays the real effects of ragging that are unacceptable in a civilised society. Another film, named, *Gulaal* too highlighted ragging and its negative impact. A boy is humiliated by senior students asking him embarrassing questions and when he tries to run away, the seniors remove his clothes and lock him in a room with another person already there.

Even though, films such as those mentioned above did not eulogise ragging, it would not be wrong to assume that such scenes were inserted to add a fun element to the film. They evoked laughter and not sympathy in the audience.

Ragging and Regional Distribution

The number of ragging complaints are gradually increasing. There were 3,022 complaints of student ragging received by the UGC between the years 2013 and 2017. The report also included the increased cases of ragging in these years being 640 in 2013 to 901 in 2017, an increase of 41 percent. Shockingly, it rose by 75 percent, from 515 in 2016 to 901 in 2017. It has been observed that Uttar Pradesh tops the chart of most ragging incidents reported in any state. Uttar Pradesh alone got maximum complaints of ragging between 2013 to 2017 with 15 percent or 461 cases. In the year 2017, around 143 complaints were reported making it highest registered state in these years (Mallapur, Jun 12, 2018).

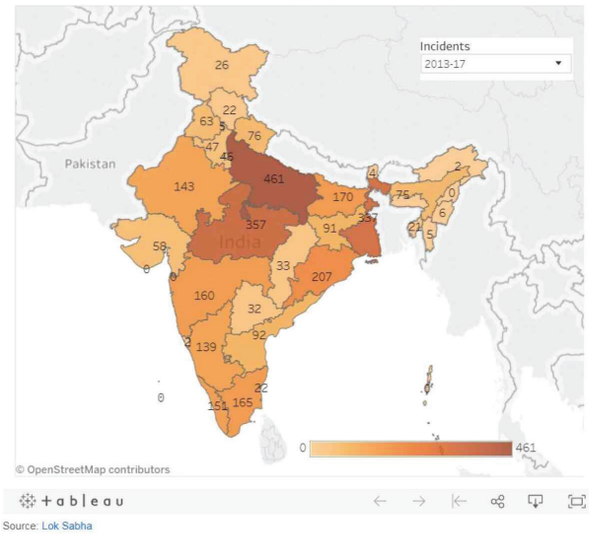

Figure: Reported Incidents of Ragging Across India, 2013-17

Insights from a Field Study

The data for the present study was collected from one of the oldest medical colleges in Agra established under the British reign. Ragging seems to be so rooted in the culture of the college that it is called Pushp Varsha or Mass Call in this medical college.

Almost every year as the session commences, the news and pictures related to instances of ragging get published in the newspapers. Few of the incidences are as follows;

In August 2014, five students, reportedly drunk, scourged a first year undergraduate for refusing to pose as a *murga* (rooster). In the

same year in September, some senior MBBS students reportedly thrashed a newcomer outside the campus for having long hair and coming to college riding a scooter (Dev, Aug 21, 2014). In the following year, a second-year student complained against his senior who did not allow him to fill water in his cooler after an argument and locked the junior in a room and scourged him (TOI, May 2, 2015).

After two years in the year 2017, another incident was reported where a student of the 2015 batch, lodged an online complaint saying that one of the senior student of his college thrashed him and even threatened to kill him (Lavania, Mar 12, 2017). In the year 2018, ragging appeared to be more prevalent when it took social media as its tool to rag more students and some senior students forwarded a seven sheet long guideline as a WhatsApp message to their juniors. The message contained some of the following guidelines for juniors - wear black coloured pants and white shirts; keep your eye on the third button of the shirt whenever you walk in the college; donot talk to each other in English in the college; donot bring any vehicle to the college; donot refute any senior as they are always right; you are only allowed to utter the word SORRY and no other word or argument with your seniors. The whole message was written in obscene language. The junior students were also told to come one by one and read the forwarded message in front of all and those who refused to do so were thrashed by the senior students outside the college campus. (New Desks, Amar Ujala, Oct 03, 2018)

An anti-ragging organisation, called *Aman Movement*, maintained data on complaint of ragging and gave medical college-wise distribution of cases registered by the anti-ragging call centre. The report highlighted that 13 complaints of ragging had beeen registered by the students of one of the medical colleges of Agra from 2012 to 2019, which is one of highest among all the medical colleges of Uttar Pradesh.[2]

Therefore, the survey was conducted to examine the prevalence of ragging in this medical college of Agra and its relation with demographical variables. The study involved 100 first year students of the medical college. The sample comprised students across categories of gender, caste and class. A survey was administered to all the students, their responses collected and analysed along two axes (i) prevalence and nature of ragging and (ii) its relationship with demographical variables like gender, caste and class.

Prevalence and Nature of Ragging

At first glance the college might not give away the prevalance of ragging as boards and posters suggest that it was a ragging free campus and ragging had been abolished and rooted out completely. On the contrary, the prevalence of ragging was visible and noticeable within a few minutes of arrival into the first year classroom by looking at the physical appearance of the freshers. The peculiar look of students prominently indicated the way ragging was happening as female students had applied lots of oil in their hair which was tied in two ponytails whereas boys were either bald or had short haircuts. All of them were in white dress. Boys were supposed to come to college in white full sleeved shirts, white pants, red tie, white coat, red socks and black shoes whereas girls had to wear white salwar kameez, white dupatta, red socks and black PT shoes. It seemed to be their uniform as if they are attending school, whereas the dress code of medical students is a white coat.

Ragging was not restricted to just the physical appearance; the first year students were also supposed to follow rules set by their seniors such as they were expected to greet the seniors every time they came

2 *Aman Movement* was launched by Raj Kachroo in the memory of his son, Aman, who was ragged to death in 2009. It is co-partnered with UGC and MHRD to implement National Ragging Prevention Programme in India.

across them; to keep their eye on the third button of the shirt whenever they walked within the college. They were not permitted to communicate in English; not to refute any senior and were only allowed to utter the word SORRY. They were also not allowed to argue with their seniors. Ragging was not only limited to this. The junior students were not allowed to go to the canteen so either they carried a lunch box with them or they remained hungry. They usually had their classes on the 3rd or 4th floor, but they were prohibited to use the lift. The juniors were not supposed to walk abreast and they were asked to walk in a single file, and bend their heads while walking. Students residing in the hostels said that they were not allowed to sit if any senior passed by. Even in the dining hall they were supposed to sit in the corner seats and not in the centre rows. They were not even allowed to bring bikes / scooters, mobile phones and other electronic accessories to college.

On further inquiry it was found that physical ragging was taking place in the campus as about 43% of the students asserted that they had faced physical ragging which constitutes acts such as slap yourself/ someone else, sit in a 'cuckoo' position so as to embarrass oneself; to do chores for seniors such as washing clothes and cleaning their rooms. They were usually asked to do silly things like push-ups, climbing on trees and exercise on the main road.

Alongside the physical ragging, verbal ragging was also prevalent in the college as 67% of the first year students stated that they faced verbal ragging. The acts that constitute verbal ragging include teasing juniors if they belong to any particular class, caste or creed; seniors calling junior male and female students as 'Fuchcha' and 'Fuchchi' respectively; forcing juniors to answer personal/socially-unacceptable questions/ topics; teasing juniors with inappropriate verbal language and many such acts that are meant to exhibit superiority of seniors over juniors all of which ultimately leads to mental trauma, uneasiness and discomfort for the fresher.

The worst part was the ragging came to the fore when some students acquainted the researcher with their experience of sexual ragging where they admitted that seniors indulging in ragging of sexual nature. Though the percentage of the students facing sexual ragging was only 11% this kind of ragging disturbs the students mentally, physically and psychologically.

Ragging and Social Context

The study revealed significant connection between social-economic-cultural locations of freshers and nature of ragging. Among the social cultural factors, gender, caste and class were identified for deeper investigation.

Gender

With many incidents coming to the fore, it was also found that there is a difference in terms of ragging encountered by boys and girls. Although females are still considered weaker in terms of physical strength, in this study, female students admitted that they did not face harsh ragging as faced by boys. Data shows that 72% of male students have faced ragging as compared to only 40% of female students. Boys were usually asked to change their hairstyle, approach a strange (girl), and slap a person without any reason. Whereas girls were asked to follow orders given by seniors like sing a song or dance etc. and then laughed upon by seniors.

In the present research, verbal ragging was found to be most common style of ragging i.e. almost 7 out 10 students face such ragging in college. The second most prevalent style was physical ragging. Prevalence of sexual ragging was also evident. Although the average percentages of responses were least in sexual ragging but it is the most severe kind of ragging and 9% of boys said that they faced sexual ragging. All of them were asked to kiss a statue situated at a public point and do acts having sexual tone.

It was also revealed by the National Anti-Ragging Helpline, the crisis helpline of the

University Grants Commission (UGC), that more boys than girls have complained about being subjected to ragging on campuses. Most complaints come from institutes attached to hostels, where ragging becomes easy and goes unnoticed by authorities.

Caste

When it comes to castewise distribution of ragging, 53% students of general category have faced incidence of ragging whereas the percentage increased to 69 % for Dalit students. Despite eradication of untouchability and the allotment of specific kinds of work to different castes in the caste hierarchy, 13% of the students complained that their seniors compelled them to clean the washrooms just because they belong to the SC category. Many of the SC students said that they are easy prey for seniors to do their personal work especially in hostels like washing their clothes and bringing hot water for them. Many of them belonged to the low socio-economic group who could not afford to leave the college and take admission in another college so there is no clear evidence that that whether their caste or their class was making them an easy prey. The findings of this study coincides with the findings of a report on Psychosocial Study of Ragging in Selected Educational Institutions in India (2015). The report highlighted "Caste-based discrimination was admitted by eight per cent of students; however, high percentages were reported from colleges in the North. Caste and gender-based discrimination are most prevalent in a government medical college in UP." In the same research it was found that economic background is one of the critical factor of ragging and about six percent of students admitted economic-discrimination during ragging.

Class

Poverty remains an important issue in India, and a clear association was found between socio-economic status and ragging: students ragged physically and verbally were more likely to come from middle or lower-socio-economic backgrounds in comparison to the students who were from richer households. Students belonging to lower strata informed that their seniors asked them to do their personal works such as washing clothes, cleaning up the room, bikes and other stuff. They often addressed them with weird names that lowered their self-confidence. Low socio-economic status does somewhat increase the risk of being ragged in college just because such students are unable to afford an extravagant lifestyle. Ragging in the form of financial abuse was more prevalent among students of higher socio-economic backgrounds. Seniors often asked them to pay their personal bills of canteen, mobile phones, petrol and other expenditure. They often borrowed their cars and bikes. It was found that socio-economical class does not play a significant role in ragging. It actually affects the style of ragging. Data shows that 61% of the low socio-economic students have faced ragging as compared to 59% of the high socio-economic students.

Conclusion

Many comprehensive and practical recommendations have been proposed and detailed reports been made. However, execution is confined to adding a page to the prospectus stating that ragging is a crime, displaying slogans of ragging-free campus at the entrance of the college or university and asking students and their parents to sign an affidavit at the time of admission. The main idea behind signing such affidavits is to inform parents that if their child is caught ragging he or she would stand rusticated. Everything which seems perfect in planning, fails in execution and thus is unsuccessful in achieving the objectives and goals. The effort put by different agencies and the government seem to be inadequate in reality as a large number of students are suffering from this

unbearable agony of such a disgraceful activity.

The government is spending time and efforts to keep a record of ragging and stakeholders share advice or protest when something unpleasant happens. Rather, it should be the shared responsibility of the government, stakeholders, college authorities and staff and students. Various committees have made detailed recommendations such as conducting orientation programme and workshops to make students aware of steps to be taken if they are ragged. The college must seek the assistance of professional counsellors and anti ragging campaigners at the time of the orientation programme. These programs ensure that students' voices are heard and necessary action is initiated by concerned authorities.

Anti-ragging committees must include teachers, wardens, representatives of students from junior-senior section, parents/guardians, domestic help and some professional staff. Inclusion of over-burdened teachers to be a member of an anti-ragging squad will have no significant results. Teachers are already under enormous pressure with academic and non- academic assignments. In the first few months, they are usually busy making timetables, notes, preparation for lectures and conducting orientation programmes. They are already a part of many academic and non-academic bodies. They also need to supervise during exams and later evaluate the answer sheets and give grades. Abolishing ragging is not the sole responsibility of any one set of teachers and administration but it should be taken as a shared responsibility. Parents too should not ignore their wards' complaints by taking it casually. The biggest problem of ragging is the weakness and irresponsible attitude of the institutions and civil society. The teachers, clerical staff, wardens, staff of canteen, security in charge, research scholars, peons, watchman, gate keeper, and sweeper should be empathetic when they see a group of seniors and juniors involved in an unusual activity. Prevention is the only way to eradicate this disgraceful activity from our higher educational institutions.

Note from Editors: Although this article is about ragging in colleges, it is relevant to schools as ragging in some form exists in schools. We need to be aware of th issue and act in a manner that does not remain a menace

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Solving Numerical Problems in Chemistry and Physics: Ideas for High School Teachers

Abstract

This paper presents literature-based ideas for teaching numerical problem solving in high school science, specifically in Chemistry and Physics. Factors contributing towards success in problem solving are discussed. The importance of prior subject-matter knowledge, and a single strategy applicable to different types of problems are emphasised. Selected examples of problems with solution strategies from high school Chemistry and Physics are outlined. Implications for problem solving in science teacher preparation are explained. Recommendations for science teachers to utilise in their teaching are provided.

What is Problem Solving?

Problem solving involves a series of cognitive actions with a goal originating from instructions in a problem to the desired solution or answer (Chi, Glazer, and Rees, 1982). Newell and Simon (1972) define problem solving as determining a solution pathway through a problem space from the initial state of the problem to a desired answer. The initial problem state consists of information in the problem plus knowledge about the problem. The problem space consists of the initial problem state, solution path and goal state. Strategies and processes employed in the problem space are critical to success in problem solving; they considerably differ between successful and unsuccessful problem solvers (National Academy of Sciences, 2000; Newell and Simon, 1972; Chi et al., 1982). Subject matter content knowledge base of successful problem solvers is strong and deep compared to unsuccessful problem solvers. Successful problem solvers can easily and flexibly access needed information and knowledge for solving a problem compared to unsuccessful problem solvers. Successful problem solvers can qualitatively visualise the problem space before proceeding with solving the problem whereas unsuccessful problem solvers are quick to take refuge under formulae.

One key factor essential to understanding the difference between success and failure in problem solving was discussed by Whitehead (1929) in "The Aims of Education and Other Essays" when dealing with passive learning and inert knowledge. Inert knowledge may be defined as what is recalled under explicit cues, but not applied spontaneously in solving problems. Passive learning leads to inert knowledge and meaningful learning to active knowledge. So in problem solving situations the capability of the problem solver to recognise the problem situation, bring to remembrance all the background knowledge and information needed to work forward in solving the problem depends on whether the related background knowledge and information is active or inert (Kumar, 2010). Therefore, the quality of the teaching strategies used by teachers impacts how students learn, and solve problems. In this context, it should be made clear that

teaching students to memorise information, formulae and problem solving strategies by rote learning is excluded from discussion and discouraged by the authors.

Science teacher training programmes should develop successful problem solving skillset in their candidates. According to Ekici (2013) about 28% of pre-service teachers in science have no ideas about how to improve problem solving skills among students while a majority of them believed it could be improved by helping students with improving their problem solving process. Student's ability to perceive the nature of the problem task and awareness of solution strategies are key to their success in problem solving (Dostal, 2015). The ability of the students to clearly understand the question, to perceive the problem, and to recall similar conceptual information related to problem situations affect success in problem solving (Tambychik and Meerah, 2010).

In dealing with Chemistry problem-solving Heyworth (1998) recommended improving student conceptual understanding of the topic before expecting them to solve problems.According to Phonapichat and Sujiva (2014) unsuccessful problem solvers were unable to figure out what is expected because they disliked reading long problems, were quick to guess and not think about the problems, were unable to comprehend long problems, and lacked an understanding of the information and knowledge needed to solve problems. How to help students become successful problem solvers is a challenge facing teachers at all levels and in all subject areas. The following discussion will highlight successful problem solving strategies in science with selected examples of Chemistry and Physics problems at the high school level. The examples are selected to represent a medium level of difficulty and the strategies easily transferable to a wide range of topics.

Example of Chemistry Problem Solving

The problem chosen for Chemistry involves the calculation of molarity of a solution.

The problem - A solution contains 20 grams of Sodium Nitrate ($NaNO_3$) in 500 mL of water. Calculate the molarity of the solution. Given atomic mass of Na = 23; N = 14; O = 16.

The ability to recognise the problem statement –what factors are present in the problem statement and the goal – state what is to be accomplished is necessary to develop solution strategy in the problem space that will lead to success in solving the problem. An understanding of the Periodic Table of elements, atomic mass, molecular formula units and unit conversion, solutions, solutes, solvents and basic mathematics are necessary to successfully solve a molarity problem in Chemistry. Also, reading comprehension at the elementary grade level is essential besides the ability to visualise the strategies and processes involved in the problem space.

Step 1. Calculate the Molar mass of sodium nitrate ($NaNO_3$).

$$23\ g + 14\ g + 16(3)\ g = 85\ g\ NaNO_3$$

Step 2. Calculate the number of moles by dividing the mass of sodium nitrate by molar mass.

20 g $NaNO_3$/ 85 g $NaNO_3$ = 0.235 moles of $NaNO_3$

Step 3. Convert the units for the amount of solvent from millilitres (mL) to litres (L).

Amount of Solvent (Water) = 500 mL = 0.5 L

Step 4. Calculate the Molarity by dividing the number of moles of sodium nitrate by the volume of solvent.

Molarity of the $NaNO_3$ Solution = 0.235 moles of $NaNO_3$ / 0.5 L of Water = 0.47 M

This protocol concurs with the protocol reported by Heyworth (1989) in solving a similar molarity problem by successful problem solvers using paper and pen method. A secondary analysis of the solution profiles from the Kumar and Helgeson (1996)

study of 60 high school Chemistry students solving a Chemistry molarity problem using a computer platform ("Hyper Chemistry") in Apple Powerbook and NEC PenPoint computers showed the above solution protocol in the solution paths of successful problem solvers.

Examples of Physics Problem Solving

In order to become a better Physics problem-solver the following things need to be in place.

(1) The student must know and understand the principles of Physics and,

(2) The student must have a strategy that is applicable to different situations in Physics.

The strategy is not just memorising and plugging-into formulas, as unsuccessful problem solvers do. Instead, qualitatively thinking and visualising the problem situation, and developing a mental map of a solution strategy for proceeding are recommended as the best approach. With practice, a strategy with generalisable patterns may develop over time. (Zemelman, Daniels, and Hyde, 2012)

The results of a study by Reddy and Panacharoensawad (2017) indicated that poor mathematical skills and lack of understanding the problem are also major obstacles in the domain of problem solving in Physics.

As with so many other learning activities, it may be useful to develop an algorithm, which breaks a problem solving strategy into a series of steps. According to Persin (2000) this strategy has five major steps:

Step 1. Read the problem carefully and write down what was given as a list of labelled quantities.

Step 2. Determine what you have to find and label it with a variable as well. Make sure you are able to visualise the steps toward the solution in qualitative terms.

Step 3. Look over your list of equations and determine which one will solve the problem.

Step 4. Solve the equation for the unknown.

Step 5. Substitute-in the values of the given information and calculate the solution.

At this stage of our discussion, there are physics terms and/or concepts that a student needs to understand. These concepts need to be learned as they are taught, to keep from falling behind.

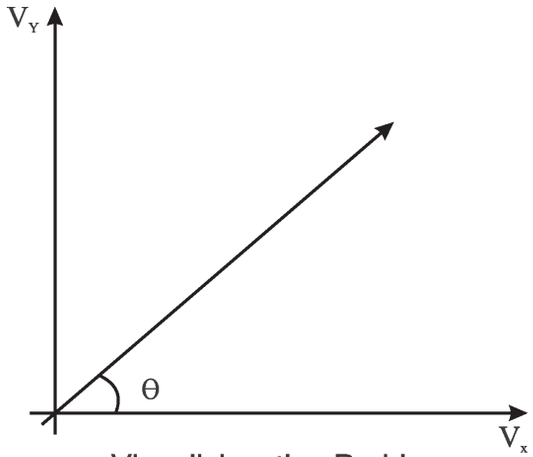
One part of learning how to solve a problem is to know what approach to use. The student will need to recall the concepts and principles that are useful in solving the problem. For example, just to name a few from Serway and Faughn (2006):

- If linear motion is involved, use the kinematics definitions of velocity and acceleration, along with the equations of motion.
- For vector problems, use SOHCAHTOA to find the x and y components of the given vector. If components are given, use the Pythagorean theorem for the resultant.
- If forces are involved and objects interact due to these forces, use Newton's Laws of Motion, particularly the 2nd Law, F = ma.
- The concept of forces that act over a time interval and cause objects to change their velocities suggests using Conservation of Momentum.
- Frequently in situations involving thermal physics or electromagnetism, the principle of Conservation of Energy is useful.

Now let's take a detailed look at how to use the steps while solving some problems.

Example 1: A cannonball is projected from the surface of the Earth with an initial velocity of 85.0 m/s at an angle of 35.0° with the horizontal. How fast is it moving in the x-direction, and how fast in the y-direction, respectively?

a. 69.6 m/s and 48.8 m/s
b. 48.8 m/s and 69.6 m/s
c. 69.6 m/s and 42.3 m/s



Visualising the Problem

Solution: Using the properties of vectors.

Given: Initial velocity, v = 85.0 m/s

Angle of projection, θ = 35.0°

Find: Velocity in the x-direction, v_x = _____

Velocity in the y-direction, v_y = _____

$v_x = v \cdot \cos(\theta) = 85 \cdot \cos(35) = 69.6$ m/s

$v_y = v \cdot \sin(\theta) = 85 \cdot \sin(35) = 48.8$ m/s

Answer is choice a. 69.6 m/s and 48.8 m/s

Example 2: An automobile moving along a straight track changes its velocity from 40.0 m/s to 80.0 m/s in a distance of 2.0×10^2 m. What is the acceleration of the vehicle during this time?

a. 8.0 m/s^2
b. 9.6 m/s^2
c. 12 m/s^2
d. 6.9 m/s^2
e. 0.20 m/s^2

Solution: From Galileo's study of motion, 4 equations:

Given: Initial velocity, u = 40.0 m/s

1. $\Delta s = v_{avg} \cdot \Delta t$, with $\Delta s = s - s_0$, $v_{avg} = (u + v)/2$
   Final velocity, v = 80.0 m/s
2. $v = u + a \cdot \Delta t$
   Displacement, $\Delta s = 2.0 \times 10^2$ m
3. $v^2 = u^2 + 2a \cdot (\Delta s)$
   Find: Acceleration, a = _____
4. $s - s_0 = u \cdot t + \frac{1}{2} a \cdot (\Delta t)^2$

Based on the given information, equations 1, 2, and 4 can be eliminated from the solution since we were not given the change in time, Δt. Therefore, we should use equation 3, $v^2 = u^2 + 2a \cdot (\Delta s)$ and solve for the unknown, acceleration, a.

Solving for acceleration, we get,

Substituting the given, we get,

Therefore, our answer is choice c, which is 12 m/s^2

Example 3:A 10.0 kg mass is dropped from a height of 15.0 m. Neglecting air friction, and using 9.81 m/s^2, find its velocity when it strikes the ground?

a. 18.0 m/s
b. 17.2 m/s
c. 12.7 m/s
d. 16.9 m/s
e. 20.2 m/s

Solution: (using Conservation of Energy):

$K_i + U_i = K_f + U_f$ with $K = \frac{1}{2} m \cdot v^2$ and $U = mgh$

or

$\frac{1}{2} m \cdot v_i^2 + mgh_i = \frac{1}{2} m \cdot v_f^2 + mgh_f$ and g = 9.81 m/s^2

Given: Initial kinetic energy, $K_i = 0$

Since the mass was dropped, and $v_i = 0$

Mass, m = 10.0 kg

Initial height, h_i= 15.0 m

Final potential energy, $U_f = 0$ since the mass strikes the ground

Find: Velocity when striking the ground, v_f = _____

Therefore, $0 + mgh_i = \frac{1}{2} m \cdot v_f^2 + 0$. Solving for v_f and noticing that the mass, m, cancels

We get, v_f = 17.2 m/s , choice b

Discussion and Implications

Students may use different tools or tactics with differing areas of Chemistry and Physics, but the overall strategies remain the same. Sometimes, students may have already acquired some problem-solving skills and habits from previous courses in Biology, Mathematics, or Computer programming. Like other areas of learning and life, some of these habits may be beneficial and some may actually hinder your progress in learning how

to solve Chemistry and Physics problems. So, in learning this approach, a student must be willing to try new ideas and to discard old habits that may in fact be a hinderance to their understanding. As a student matures as a Chemistry and/or Physics problem-solver, it may occur that the strategies used in the solution path will become second nature. Students will automatically begin to do those things that will lead them to construct an effective solution to the problem.

In problem solving it is very important that there is no room for misconceptions. Misconceptions resulting from erroneous thinking and wrong information can inhibit success in problem solving (Novak, 1994). As Novak (1994) suggested "teacher should be aware of their own thinking, look for error patterns in student assignments, pay attention to student communications in class, make sure their understanding of the science concept/principle is error free, and when in doubt don't hesitate to refer authoritative books and consult with experts in the field". Additional recommendations from the work of Reddy and Panacharoensawad (2017) include allowing more class time for teacher-guided problem solving practice, and providing summary notes on key topics with examples of solved problems related to those topics.

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शिक्षक कर्म व शिक्षक की इसके लिए तैयारी

सार

यह पर्चा शिक्षक व उनकी तैयारी के आयामों को खंगालता है। यह इस बात पर ज़ोर डालता है कि शिक्षक की तैयारी सिर्फ महाविद्यालय की चारदीवारी के भीतर नहीं होती उसकी मनोस्थिति व मानस पर समाज व ढांचे के गहरे प्रभाव पड़ते हैं। शिक्षक की तैयारी के कुछ महत्त्वपूर्ण आयामों को आज के शिक्षक की तैयारी व 'प्रबंधन' के विर्मश में नज़रअंदाज़ कर दिया जाता है, हालाकि वह बहुत महत्त्वपूर्ण हैं।

परिचय

शिक्षक कक्षा में क्या करता है और उसकी सम्पूर्ण कार्य क्षमता दोनों पर, शिक्षा के ढांचे में शिक्षक की स्थिति व शिक्षण कर्म के प्रति नजरिए व उसके समाज में दर्जे का बहुत असर होता है। शिक्षक के अहम व शिक्षकीय कार्य की मर्यादा, रूतबा व उसके कार्य करने के उत्साह के साथ-साथ इस कार्य में स्वायत्ता व स्व-जिम्मेदारी की भावना का काफ़ी हद तक क्षरण हो गया है। और यह क्षरण इस तरह बढ़ता जा रहा है कि शिक्षक की तैयारी व उसे और अधिक सिखाने के सभी प्रयास लगभग निरर्थक ही हो जाते हैं। चूंकि शिक्षक सीखने सिखाने में एक बहुत ही महत्वपूर्ण भूमिका निभाते हैं, इसलिए उनके स्वयं के सीखने, सिखाने के उत्साह को बनाये रखने व लगातार काम करने की इच्छा पर ध्यान केन्द्रित करना आवश्यक है।

शिक्षक की क्षमतावर्धन का मसला शिक्षा क्यों, कैसी शिक्षा और इन प्रश्नों पर समाज व शासन की दृष्टि क्या है, आदि से भी जुड़ा है। किन्तु इन सभी बातों को नैपथ्य में रखकर हम इस संदर्भ यानि शिक्षक की तैयारी की राह में किए जा रहे वर्तमान प्रयासों, उनकी ऐतिहासिक पृष्ठभूमि व इन दोनों के मंथन से निकल रहे पहलुओं पर विचार कर सकते हैं। हम इस पर्चे में अन्य इंगित पहलुओं के मद्देनज़र शिक्षक की तैयारी के वर्तमान मसलों पर नज़र डालेंगे।

कक्षा के काम के लिए तैयारी

कक्षा के लिए शिक्षक की तैयारी के कई आयाम हैं और इन्हें कई पहलुओं/आयामों पर समझना होगा। पहला आयाम शिक्षकीय ज्ञान का है। यानि बच्चों को दिया गया पाठ्यक्रम पढ़ा पाने के लिए शिक्षक को क्या-क्या सीख लेना चाहिए। इस विषय के बारे में सोचते समय बच्चों की उम्र, कक्षा, पृष्ठभूमि, उनकी भाषा व संस्कृति के साथ-साथ उनके समुदाय की आकाक्षाएँ और सामाजिक मसलों की समझ भी एक प्रमुख पहलू है। हालांकि, यह समझ, शिक्षक को बच्चों व समुदाय के साथ वास्तविक अंत: क्रिया के दौरान ही हासिल करनी है, लेकिन इसे हांसिल करने की जरूरत, ढंग व मानसिक तैयारी पहले होनी होगी। इसके अलावा जो विषय, पढ़ाया जाना है उसकी प्रकृति की समझ, उसके ऐतिहासिक विकास क्रम का अहसास, उसकी अवधारणाओं, प्रक्रियाओं और कौशलों में कुछ हद तक सक्षमता व प्रवीणता की जरूरत है। इसके साथ-साथ इंसान कैसे सीखते हैं, उन्हें सीखने के लिए कैसे प्रेरित कर सकते हैं व उम्र के अनुसार बच्चों का व्यवहार कैसा होता, सीखने का ढंग कैसा होता है और सीखने की राह में किस तरह की पगडंडिया अथवा प्रत्यक्ष रूप से अटकाव दिखने वाले मोड़ आते हैं आदि सभी, शिक्षकीय ज्ञान के आयामों का हिस्सा हैं।

दूसरा आयाम मान्यताओं, मूल्यों व भावनाओं का है। हालांकि इस पर विवाद हो सकता है कि क्या ये सब शिक्षकीय ज्ञान के दायरे में आते भी हैं अथवा उनसे विलग ही हैं। यह भी कहा जा सकता है कि इन सब के पीछे आधार तो तार्किक व दार्शनिक विश्वास ही हैं। और इनकी स्वीकार्यता मानवीय समाज की समझ, बराबरी के तर्कपूर्ण अहसास, सामाजिक अंत:क्रिया में पारदर्शिता व सहकार के महत्व को समझने से ही होगी। यह सब शिक्षक की औपचारिक तैयारी का हिस्सा नहीं बन सकता क्योंकि यह व्यापक सामाजिक प्रक्रियाओं का हिस्सा है। मान्यताओं, मूल्यों व भावनाओं जैसे मसलों पर हम दिमागी विवेचन की संभावना तो बना सकते हैं किन्तु 'मन व व्यवहार' बदलने का काम इस प्रक्रिया से होना मुश्किल है। हालांकि

कुछ लोग यह तर्क देते हैं कि इस संदर्भ में शिक्षक की तैयारी के दौरान ज्ञान की कसौटियों की समझ को विकसित करने का प्रयास, उसके लिए मान्यताओं को बनाने, आँकने व बदलने का आधार बनेगा। अत: शिक्षकों में इसके उपयुक्त विकास के लिए सघन, तीखी व तर्कपूर्ण बहसों व उससे एक ठोस दृष्टिकोण विकसित करने का लक्ष्य उनकी तैयारी के कार्यक्रमों में होना चाहिए।

किन्तु, इस विषय के महत्व को समझते हुए व इन मसलों पर समझ को बदले हुए व्यवहार में प्रतिबिंबित होने की मुश्किल को समझते हुए, लोग अब यह भी पहचानने लगे हैं कि मान्यताएँ व मूल्यों का पुन: उन्मुखीकरण मात्र तार्किक प्रक्रियाओं से नहीं होता। इसी लिए शिक्षक की तैयारी व उन्मुखीकरण के दस्तावेजों में यह कहा जाता है कि वयस्कों में इनका विकास, उन्हें अलग ढंग से व्यवहार करने के मौके देने व साथ ही उनसे अलग ढंग से व्यवहार के द्वारा ही हो सकता है। इस का एक निहितार्थ यह भी है कि ठीक ऐसी ही प्रक्रिया बच्चों में भी इन अपेक्षित रवैयों को विकसित कर सकेगी। किन्तु यह भी एक सीमित स्तर तक ही हो सकता है क्योंकि, अब यह भी समझा जाने लगा है कि मान्यताएँ, मूल्य व भावनाएँ आदि परिवार, समुदाय, पूरे समाज और उसके ताने-बाने व उनमें अंत:क्रियाओं से रचे जाते हैं। और इन सब को कुछ हद तक बदलने पर ही शिक्षकों के दृष्टिकोण बदले जा सकेंगे। यह समझ शिक्षक की तैयारी, उत्साह व दृष्टि संचयन व उसमें विकास को एक साथ देखने की कोशिश करती है। यह कल्पना है कि इन मसलों पर विमर्श व व्यवहार को मान्यता मिलने से धीरे-धीरे यह समाज में भी पहुंचकर व्याप्त हो पाएगी। इस मसले को समझने का महत्व इसलिए है कि इसका शिक्षक की तैयारी में सही प्रस्तुतिकरण, प्रत्यक्षीकरण व विवेचन स्वयं इसे ही पोषित करेगा और इसे ज्यादा संभव बनाएगा।

यह स्पष्ट है कि समाज में सही-गलत का फैसला व उसके आधार हमेशा मंथन में रहते हैं। न सिर्फ कौन सा ज्ञान सही है (खासतौर पर समाजशास्त्र व ऐसे विषयों में), किन्तु कौन सी बुनियादी मान्यताएँ व कौन से व्यवहार मानक व सही हैं, यह भी बदलता रहता है। इस सबके बीच शिक्षक से कई तरह की अंर्तविरोधी अपेक्षाएँ हैं। एक ओर तो यह है कि बच्चा बहुत महत्वाकांक्षी और प्रतिस्पर्धा में पनपने वाला बने, स्मार्ट व्यवहार करने वाला व स्थिति के अनुसार अपने हित की ओर झुका हुआ व्यवहार व निर्णय लेने वाला (pragmatic) व्यक्ति बने। दूसरी ओर यह अपेक्षा है कि बच्चे में सहकार, सहयोग, सहजता, करूणा व अन्य आदर्शवादी मूल्य विकसित हों। इनमें से कौन सा चुना जाए? दस्तावेजों पर तो यही कहा जाता है कि लक्ष्य, दूसरे समूह में आए मूल्य विकसित करना है। किन्तु यह काम बहुत ही कठिन है क्योंकि इसमें स्वार्थ और अहम की भावना से जूझना होगा। शायद एक बात तो यह समझनी व माननी होगी कि स्व-हित व बहुजन हित orthogonal नहीं होते। बहुजन हित में ही दीर्घकालीन स्व-हित भी है। असल में यह सब उलझे हुए मसले हैं और इन पर बहुत बहसें हुई भी हैं और होती भी रहेंगी। पर यह तो स्पष्ट ही है कि यदि इस तरह की समझ को किसी भी हद तक विकसित करना है तो इसके लिए शिक्षक के पास कम से कम संवाद करने की तो स्वतंत्र जगह होनी चाहिए। अगर उसके पास बच्चों को इस तरह से अनुभव देने का अधिकार भी न हो और उनके लिए अपने विवेक से समय के उपयोग की योजना बनाने की, सीखने के लक्ष्यों को आवश्यकतानुसार आगे-पीछे करने की स्वतंत्रता न हो तो शिक्षक की समझ के बावजूद यह सब कक्षा में कैसे हो पाएगा? और फिर मसला यह भी है कि शिक्षकीय ढांचे, यहाँ तक की समाज में भी शिक्षक के साथ हो रहे व्यवहार, उसकी कार्य स्थिति के अलौक में शिक्षक की इसके लिए तैयारी व उसमें इन सब का विकास कैसे होगा? कुल मिलाकर मूल्य व धारणा के आयाम पर काफी संशय है। इस मसले पर अस्पष्टता के कारण शिक्षक तैयारी में इसे संभव बनाने के लिए आवश्यक तत्वों को शामिल करने के बारे में बहुत ध्यान से सोचा भी नहीं जाता था।

तीसरा आयाम बच्चों के साथ व्यवहार करने का कौशल अख्तियार करने का है। बच्चों के साथ व्यवहार एकतरफा मामला नहीं है और सिर्फ बच्चे/बच्चों व शिक्षक/स्कूल के बीच का मामला भी नहीं। हम यह तो सिखा सकते हैं और शायद अभ्यास भी करवा सकते हैं कि बच्चों से आदर से पेश आना चाहिए। इसके लिए तालुकक आधार उदाहरण व दृष्टांत सब बनाए जा सकते हैं। किन्तु यदि पालकों व समाज में इसका आधार बिल्कुल अलग है तो कक्षा व स्कूल में इस अंतर के तनाव से कैसे निपटा जाएगा? और इस अंतर से जूझने के लिए शिक्षक की तैयारी कैसे हो पाएगी? और इसमें उसका आत्मविश्वास व कार्य कुशलता कैसे बनेगी? वैसे यह सवाल भी इस पहलू के संदर्भ में रहेगा ही कि क्या यह मात्र समझ से हल होगा या कुछ और भी चाहिए? क्या यह इसपर निर्भर है कि शिक्षक के मन में पालकों व समाज का कितना सम्मान है, उनकी बात को सुनने व समझने की कितनी इच्छा और उसके लिए कितना धैर्य है?

शिक्षा समाज की प्रथाओं व ज्ञान को बच्चों तक पहुँचाने का कार्य भी करती है और उसे आगे बढ़ाने, व्यापक करने व समाज की प्रथाओं व ज्ञान में आमूल परिवर्तन करने का प्रयास भी। बच्चों, उनकी सीखने की क्षमताओं, प्रवृत्तियों, मंशाओं व बचपन के प्रति एक संवेदना व समझ से सम्मत दृष्टिकोण, जो कि आज की प्रचलित समझ व प्रथा से बिल्कुल भिन्न है,

समाज में, शिक्षक में व स्कूल में कैसे स्थापित कर पाएंगे? क्या इसकी समझ, इसके प्रति सचेतता व ऐसा कर पाने की काबलियत के विकास के लिए शिक्षकों की तैयारी के कार्यक्रम में कुछ किया जा सकता है? कुछ किया जाता है?

चौथा आयाम शिक्षकों के संज्ञानात्मक विकास, अपने कार्य पर चिन्तन मनन, योजना बनाने की काबिलियत, व्यवस्था बनाने की क्षमता, व्यक्तित्व की प्रभावशीलता, समुदाय व अधिकारियों से संवाद कौशल जैसे पहलुओं का है। इसमें पारस्परिक वार्तालाप, आपसी सहकार, स्कूल व कार्य के प्रति स्वामित्व, जिम्मेदारी व पहल, बड़े व छोटे ढांचों में कार्य की समझ आदि शामिल हैं। जाहिर है कि यह सब एक दो-चार साल की संस्थाबद्ध पाठ्यचर्या में नहीं हो सकता शिक्षक तैयारी; परिप्रेक्ष्य, वर्तमान ढांचा और सवाल, तैयारी के ये आयाम साफ रूप से यह भी दिखाते हैं कि शिक्षक की भूमिका कक्षा की अंत:क्रिया से ज्यादा व्यापक है। किन्तु जहाँ एक ओर अकसर शिक्षक पूर्व तैयारी की पाठ्यचर्याओं में भी शिक्षक को एक सामाजिक परिवर्तन के अग्रदूत के रूप में भी व्याख्यायित किया जाता है, वहीं उसकी तैयारी सामाजिक व अन्य सभी व्यवस्था संबंधी मसलों को दरकिनार कर कक्षा की योजना व उसके क्रियान्वयन पर ही होती है। इसमें तो अकसर विषय की अवधारणाएँ व उसकी समझ के विकास पर भी पर्याप्त जोर नहीं होता। सिर्फ पढ़ाने, समझाने व प्रस्तुतीकरण बेहतर करने पर ही पूरे प्रयास का फोकस होता है। किन्तु शिक्षक की व्यापक तैयारी के लिए जाहिर है कि उसकी अंत:क्रिया न सिर्फ उसके छात्र-छात्राओं से अपेक्षित है वरन् पालकों व व्यापक समाज से भी। निष्कर्ष यह है कि शिक्षक की तैयारी सामाजिक, सांस्कृतिक व राजनैतिक वर्तमान में स्थित है और इसीलिए यह एक लगातार प्रक्रिया है, जिसमें एक व्यापक संदर्भ व व्यापक भागीदारी अपेक्षित है। यह एक ऐसी प्रक्रिया है जो शिक्षकीय जीवन के दौरान जारी रहेगी ही और इसकी कुछ तैयारी अभी उपलब्ध ढाँचों के बाहर भी होनी चाहिए।

वैसे अभी के प्ररिपेक्ष्य में भी हो रही शिक्षकों की तैयारी के भी बहुत से ढंग रहे हैं। इनमें से सिर्फ संस्थागत तरीकों पर भी नज़र डालें तो उसमें सेवा पूर्व व सेवारत तैयारी की संस्थागत प्रक्रिया व उसकी अनवार्यता, शिक्षा दिए जाने के बरअक्स बहुत अधिक पुरानी नहीं है। फिर भी इस पर बहुत से वैकल्पिक तरीके सोचे गए हैं और इनके आपसी संतुलन व क्रम पर भी बहुत मंथन हुआ है। इसमें से कौन-सा सही है और कौन-सा बेहतर इस पर सोच विचार करने की अवश्यकता है। यह भी सोचने की आवश्यकता है कि तैयारी के लिए कौन सी प्रक्रिया अपनाई जाए। क्या ज़्यादातर काम संस्थान में हो अथवा ज़्यादा काम स्कूल में ही हो और तैयारी व सुदृढ़िकरण का पूरा समय स्कूल में ही लगाया जाए? तैयारी के लिए फ़ैक्ट्री कौन हों? क्या स्कूल में पढ़ा रहे अनुभवी शिक्षक ही हों अथवा शैक्षिक शोध करने वाले ही हों या फिर मात्र कुछ ज़्यादा डिग्री हासिल किए हुए लोग हों? और ऐसे ही बहुत से और मसलें हैं, इन मसलों का अभी गहराई से विश्लेषण नहीं हुआ है हालांकि कई जगह इसकी बात हुई है।

शिक्षक की तैयारी के संदर्भ में एक और बड़ा प्रश्न यह है कि क्या प्रशिक्षण, शिक्षण प्रारम्भ करने से पूर्व शुरू हो और प्रशिक्षण का बड़ा हिस्सा सेवापूर्व समाप्त कर लिया जाए? यानि शुरू में, शिक्षक बनने से पहले ही पूरी तैयारी हो जाए और शिक्षक बनने की काबिलियत का प्रमाण-पत्र मिल जाए। अभी के मॉडल में ऐसा ही होता है और ठीक ऐसा ही अन्य तकनीकी व्यवसायों में होता है। हालांकि इनकी रचना में व अवधि में महत्त्वपूर्ण फ़र्क हैं, जिनके बारे में काफ़ी बात हो रही है और शिक्षक तैयारी के इस ढ़ंग को बेहतर करने के लिए कई प्रस्ताव भी दिए जा रहे हैं। इसके विपरीत एक बिल्कुल अलग ढ़ंग वह है जिसमें एक लम्बे शुरूआती प्रशिक्षण के स्थान पर पहले छोटे सा उन्मुखीकरण, उसके बाद कुछ समय तक भावी शिक्षक स्कूल में पढ़ाऐं और फिर लम्बा प्रशिक्षण हो। यानि एक शुरूआती संक्षिप्त परिचयात्मक तैयारी के बाद, कुछ साल पढ़ाने के अनुभव के बाद तैयारी या सुदृढ़िकरण का बड़ा हिस्सा आए। पढ़ाने के इस दौर में आप प्रशिक्षु शिक्षक के रूप में ही हैं और इसमें आप का मैंटर व आकलनकर्ता स्कूल आचार्य अथवा हैडमास्टर है। यह अनुभव आप की तैयारी का बड़ा हिस्सा है और इस अनुभव के बाद आप इसको औपचारिक कक्षाओं में शिक्षा के सिद्धांतों व अवधारणाओं के आइने में आंकेंगे व विश्लेषित करेंगे। इससे आपको अपने अनुभव को और शैक्षिक अवधारणाओं व सिद्धांतों को साथ-साथ समझने में मदद मिलेगी।

शिक्षक तैयारी की इन दोनों रूपरेखाओं के पक्ष-विपक्ष में तगड़ी दलीलें हैं। हम यहाँ इस की और ज्यादा व्याख्या नहीं करेंगे। जैसे हमने पहले भी इंगित किया एक और प्रश्न जिस पर भी अलग-अलग तरह के विचार हैं, वह शिक्षक की तैयारी के तरीके व उसके स्थल का है। प्रश्न यह है कि शिक्षक की तैयारी का अधिकांश (लगभग पूरा) हिस्सा बच्चों की कक्षा में व स्कूल में गुजरना चाहिए अथवा उसमें महाविद्यालय के अध्यापन व अध्ययन की भी काफी जगह हो? इसमें व्यवस्थित व गंभीर रूप से समुदाय के साथ अंत:क्रिया आदि तो अभी क्षितिज पर भी नहीं है। (यह प्रश्न सेवारत तैयारी के संदर्भ में भी पूछा जाता है, हालांकि उतनी तीव्रता से नहीं।)

दूसरा सवाल स्कूल के साथ रिश्ते का है। यह पहले प्रश्न से जुड़ा तो है लेकिन इस पर कुछ स्वतंत्र विचार की भी जरूरत है जिससे इसके प्रमुख लक्ष्य चिन्हित किए जा सकें व उन्हें हासिल करने का ढंग भी।

फिर यह प्रश्न है कि प्रशिक्षण ले रहे शिक्षक को स्कूल व कक्षाओं में क्या-क्या करना चाहिए? यानि स्कूल अनुभव कार्य के दौरान क्या-क्या होना चाहिए और कैसे? कक्षाओं में बच्चों के साथ अंत:क्रिया में कितना समय जाना चाहिए? कितना स्कूल की पूरी कार्य प्रणाली को समझने में? और क्या इसमें कुछ और हिस्से भी हैं। क्या वह स्वयं अपनी कक्षा अथवा पाठ योजना बनाएं और उसी का इस्तेमाल करें? क्या वह किसी अनुभवी शिक्षक द्वारा किए जा रहे शिक्षण का अवलोकन करें? क्या वह स्कूल के कार्यक्रम में शामिल हो कर उसके ढ़र्रे में चलें या एक दर्शक की तरह उसका अवलोकन कर, उस में कमी-बेशी और उसके गुण पहचानता रहे? क्या वह स्कूल के दौरान प्रधान पाठक व मेंटर शिक्षक के अधीन हैं या फिर उसका नियंत्रण महाविद्यालय से ही होगा और अगर दोनों का संयुक्त नियंत्रण है तो इनमें संतुलन कैसे होगा?

इस सब प्रश्नों व उनके संबंध में सम्भव चुनावों के कई तरह के मिश्रण प्रचलन में हैं। इन सब पर कई तरह के मत व तर्क हैं किन्तु सबसे बड़ा प्रश्न इन सूझबूझ से रचित कार्यक्रमों के क्रियान्वयन के ढंग व उनकी गुणवत्ता का है। जब से यह प्रशिक्षण कार्यक्रम शुरू हुए हैं व इनको महत्वपूर्ण व लाभदायक बताया जाने लगा है तभी से इन्हें अध्यापक बनने के लिए अनिवार्य काबिलियत के रूप में घोषित किया जाने लगा है। शिक्षक शिक्षा के महाविद्यालयों की गुणवत्ता के पोषण के लिए एक राष्ट्रीय काउन्सिल का गठन किया गया। यह इसलिए क्योंकि यह लगा कि विश्वविद्यालय अपने द्वारा प्रमाणित व नियंत्रित महाविद्यालयों में शिक्षक शिक्षा का स्तर ठीक नहीं रख पा रहे हैं और कम से कम कुछेक कालेज ऐसे खुल गए है जिनमें आवश्यक व्यवस्थाएं व नियमित कार्य बिल्कुल नहीं होता। बाकी बहुतों में अधूरे मन से कार्य करते बहुत से लोग हैं। इस प्रवृत्ति को रोकने के लिए बनी काउन्सिल की ज़िम्मेदारी नये महाविद्यालय खोलने को नियंत्रित करना व शिक्षक शिक्षा की गुणवत्ता को सुधारना था। यह विवाद का विषय हो सकता है कि क्या पाठ्यचर्या में कागज़ी विचारों में अत्याधिक सुधार के बाद भी कुछ विश्वविद्यालयों अथवा कुछ महाविद्यालयों में ही सही, क्या शिक्षक शिक्षा की गुणवत्ता बढ़ी है अथवा नहीं। पर इस बात पर कोई विवाद नहीं है कि काउन्सिल के बनने के बाद महाविद्यालयों की संख्या में अति तीव्र विस्तार हुआ है और इनमें व्यवस्थाओं की उपलब्धि व कार्यक्रम की गंभीरता का चिंताजनक क्षरण हुआ है। जैसे-जैसे निगरानी व प्रशिक्षण की अनिवार्यता पर जोर बढ़ा है वैसे-वैसे उसके सर्टिफिकेट के लिए मारा-मारी तो बढ़ी है लेकिन उसके कार्यक्रम में संचालन व अभ्यार्थियों की भागीदारी के स्वर दोनों में कोई बहुत अधिक परिवर्तन आया प्रतीत नहीं होता। इन प्रयासों से अथवा शिक्षक की योग्यता परीक्षा के आने से शिक्षकों की इज्जत में अथवा उनके प्रबंधन के ढंग में कोई अंतर नहीं आया प्रतीत होता है। उनका सामाजिक व प्रशासनिक ओहदा जस का तस है।

अंत में, शिक्षक तैयारी के संदर्भ में तीन प्रमुख सवाल जिन पर गहराई से सोचने की ज़रूरत है वे यह हैं कि:

1. शिक्षक व शिक्षण कर्म की स्थिति में अंतर आने तक शिक्षक की तैयारी अथवा शिक्षक योग्यता व पात्रता परीक्षा से शिक्षकीय कार्य कितना बेहतर हो सकेगा।
2. शिक्षक की तैयारी की प्रक्रिया कितनी शिक्षक बनने से पहले होनी चाहिए और कितनी शिक्षकीय कार्य करने के दौरान। इस व्यवस्था में यदि काफी हिस्सा बाद में होता है तो आकलन की प्रक्रिया कैसी होगी?
3. प्रशिक्षण के दौरान स्कूल के साथ रिश्ते क्या हों? जैसा हमने पहले भी कहा यह दूसरे प्रश्न से जुड़ा है लेकिन इस पर कुछ स्वतंत्र विचार की ज़रूरत है।

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Pedagogical Process in Science at Government Secondary Schools of Odisha

Abstract

Considering the broader aim of Science education as cultivating scientific literacy among citizens of the country by developing a sense of inquiry, rational thinking, and objectivity through varied exploratory activities, examining the process of science learning in schools is very significant. The intention of this paper is to present the findings related to pedagogical processes in Science with respect to content, pedagogical strategy employed, resource management and assessment. In this exploratory research, qualitative survey method has been adopted and 51 schools from 6 districts of Odisha participated. The pedagogical process is captured using classroom observation, FGD with students and interview with Science teachers. A checklist was used to examine the laboratory facilities in the schools. It was found that activity based classes were very limited. A teacher centred process with question and answer session was observed predominantly in the classrooms. Hands on activity as a pedagogic medium was not much explored in the classrooms. However, in a few schools, efforts are made to motivate students by involving them in science exhibition and science quizzes. It was also found that laboratory and ICT tools were not integrated to the teaching-learning processes. More involvement of teachers and their commitment to the profession may lead to better planning of the lesson. The findings indicate that there should be conscious effort from all the stakeholders to revamp science learning processes in Government Secondary schools of Odisha.

Introduction

Science is a human enterprise and it distinguishes from other ways of knowing through the use of empirical standards and logical arguments. In Science, experimentation and theory building complement each other. The process of science depends both on making careful observations of phenomena and on inventing theories for making sense out of those observations. In addition, the processes and ideas of science are of great importance to everybody in varied ways and it helps in taking well-informed decision. Therefore, understanding science and its processes are of great significance. In a progressive forward-looking society, science can play a truly liberating role, helping people escape from the vicious cycle of poverty, ignorance and superstition (NCF, 2005). The opportunities provided at school to understand nature in a more scientific way is one of the most important pre-requisites for the same.

Curriculum and Pedagogical Process in Science at the Secondary Stage

Science, as a compulsory subject in the school curriculum reiterates its epistemological function, in addition to the pragmatically based disposition to contribute to technologically advanced society. At the secondary stage, Science is considered as an interdisciplinary composite subject.

Considering the nature of Science, NCF 2005 reiterates the need for involving students in hands on activities. It offers systematic experimentation as a tool to discover/verify theories with scope for learning science through locally relevant resources. Since all phenomena are not directly observable, inference and interpretation are also to be integrated in the curricular process. At this level of schooling, the role of technology in helping learners to visualise and comprehend various natural phenomena cannot be ignored. All these curricular processes are to be followed to make students understand the product aspects of science as well as acquire the skills that lead to generalisation and validation of scientific knowledge. This would help learners to understand science as a social enterprise and can relate scientific knowledge to their immediate and global environment. Imbibing curiosity, creativity and aesthetic sense are not to be ignored in the realm of validation of scientific knowledge. Effective ways of creating scientific temper among learners should to be the major thrust area of any science curriculum at the secondary level. Socio-scientific issues could be addressed through teaching-learning process in Science at this stage.

The appropriate pedagogical processes is very significant in the process of uplifting our children into a more rationalised community who can ask questions, reflect on various socio-cultural issues, involve in productive argumentation and so on. Different documents such as NCF-2005 suggest science education which is true to child, true to life and true to science and envisages a learning environment wherein child constructs knowledge out of experience. The document has also emphasised this attribute of Science curriculum by specifying the requirement for adopting different validities of Science curriculum such as cognitive, content, process, historical, environmental and ethical validity. It also specifies an approach of teaching-learning process based on critical pedagogy. A constructivist based classroom which is open for children to question, involve in productive dialogue and discussion, building knowledge based on subjective reality of children wherein the teacher is a reflective practitioner would lead to a healthy, stimulating classroom environment. The contemporary view of learning is that individuals actively construct the knowledge they possess (Mestre and Cocking, 2000). In this regard the role of the Science teacher in acquisition of scientific knowledge in a Secondary Science class cannot be underestimated (Arubayi, 2015). This is very essential to a paradigmatic shift from subject centred, teacher centred dogmatic classroom situation. In this regard, analysing the pedagogic processes in a Science classroom becomes inevitable to address the quality issues in learning and suggest initiatives to revert the pedagogy into a powerful medium for quality change in the government school scenario of India. Genome (2012) defined the place of the teacher in Science as "making the science come alive by illustrating how classroom Science applies to the professional laboratory and make the students aware of the relevance of science to their lives". Opportunities are to be provided for children to hypothesise, make connection, experiment, critically observe and understand the pattern underlying natural phenomena. The pedagogical processes are to be in this direction with scope for reflecting on the interface between science, technology and society. A greater responsibility is on the part of teachers to provide meaningful learning experiences in Science using various pedagogical strategies with the help of appropriate learning resources such as a laboratory, science kit etc.

Context of the Study

As discussed earlier, Science, being a domain of inquiry, demands a learning process which helps children to explore the world with rigour. In this context, various initiatives are undertaken by Government of India (GOI) through its flagship programmes such as Rashtriya Madhyamik Shiksha Abhiyan (RMSA) in collaboration with State

Governments to improve quality learning in Science. Unfortunately, the pedagogical process of Science was not being given due regard compatible with the facets of nature of Science. A case study conducted by OMSA (2016) in Odisha revealed that TLMs, Labs, Libraries are not used regularly by students and teachers in schools. There are few researches conducted on Science classrooms to understand the subjective reality of pedagogical processes (Karamustafaoglu, Bayar and Kaya, 2014; RMSA, 2016). However, in the context of Odisha, in-depth studies were not conducted to study the pedagogical processes in Science with reference to content, pedagogical strategies, resource management and assessment. The studies conducted to analyse the processes in science at schools of Odisha is very few. In this scenario, State Coordination Committee of Odisha suggested to undertake an in-depth research to understand processes in Science at secondary schools of Odisha. Accordingly, it was approved by PAC of NCERT to conduct a research on this very significant element of Science education. Hence, this research is intends to give a real picture of Science learning in the state so that it helps authorities to plan for better Science learning at secondary schools. The challenges in ensuring the validities of science curriculum at government schools have to be understood not in isolation, but by considering the subjective reality of the context. In this context, a qualitative survey was conducted with an intention to examine the pedagogical processes in government secondary schools through classroom observation, interview with science teachers and focus group discussion with students.

Objective

The objective of the study is to examine pedagogical processes in Science existing at Secondary schools of Odisha with respect to

a) Content
b) Pedagogical strategies adopted
c) Resource management
d) Assessment

Research Design

The present research followed an exploratory research. It was an attempt to study the situation qualitatively to unfold naturally whatever emerges.

Sampling and Sample

Stratified random sampling method was employed for selection of the sample. Out of 30 districts of Odisha, 6 districts were selected, 2 each from 3 revenue divisions. From the Southern division, Ganjam and Koraput districts have been selected, from the central division, Khordha and Balasore and from the Northern division, Keonjhar and Sambalpur were included in the study. Data was collected from 51 schools covering these 6 districts. Nine government secondary schools from each district except Sambalpur with 6 schools were included. 51 secondary school Science teachers from these districts had participated in the study. One Focus Group Discussion with ten 9th standard students was conducted in each school. The study was delimited to 9th standard students and Science teachers who teach these students.

Tools and Techniques

Classroom Observation Schedule: This tool was used by the investigator to observe the pedagogical processes in the 9th standard Science classroom at Government Secondary Schools of Odisha. The observation schedule was of three parts. Part I is regarding the background information about the teacher and the observed class, Part II is for observation of classroom practices and Part III for the observer's points of reflection and remarks.

Interview with Science Teachers: This tool was used for seeking information from the Science teachers regarding pedagogical processes followed in Science in class IX of their schools. The interview schedule was developed to get more information about the other aspects of Science pedagogic processes

which was less possible for the researcher to capture during classroom observation.

Focus Group Discussion: This tool was used for examining the views of 9thstandard students about the teaching-learning process in Science in their school.

Check List: This tool was used for seeking information regarding the availability and functionality of science laboratory equipment, chemicals, charts, working and demonstration models and specimens which are essential for conducting experiments/ demonstrations for 9th standard students.

Analysis of pedagogical processes in Science existing at Secondary schools of Odisha with respect to 'content'

Content is one of the most important aspects of the pedagogical process in Science as like other subjects. The relevance of the provisions of concepts in the curriculum depends largely on the perception of the teacher who is expected to transact those in the classroom. To explore relevance of the concepts in Science, data was collected by using Classroom Observation Schedules, interview with Science teachers and Focus Group Discussion with the students.

51 classrooms in 51 schools from 6 districts were observed with the help of an observation schedule. Out of 51 teachers, it was observed that 36 (70.58%) teachers teaching Science graduated in biology and 15 (29.41%) teachers graduated in Physical Science. It was also observed that most of the teachers from biology background opted to teach life science concepts when the classroom observation was done. These teachers that content from Physical Science was difficult for them to transact in the classroom. The frequency and percentages of each category of the observed data are mentioned below in the table.

Table 1.1: Analysis of the pedagogical process w.r.t content (N=51)

Items	Yes f (%)	Partially f (%)	No f (%)
Linking content with Prior knowledge	27 (52.9)	12 (23.5)	12 (23.5)
Proper Sequencing of the content	42 (82.4)	6 (11.8)	3 (5.9)
Items	**Often f (%)**	**Sometimes f (%)**	**Never f (%)**
Correlating with real life situation	20 (39.2)	22 (43.1)	9 (17.6)
Examples and Activities beyond the textbook	5 (9.8)	23 (45.1)	23 (45.1)
Raising Higher Order Thinking questions in the class	2 (3.9)	15 (29.4)	34 (66.7)

From the above table, it is clear that in 53% of the classes teachers linked the content with prior knowledge. In 23.5% of the classes, prior knowledge was either partially or not linked to a new content in a class. It is observed that 82% of the classes have properly sequenced the content in the class. However, only 39% of the classes often correlated the content with real life situations-while the remaining 61% of the classes have either sometimes or never correlated the content with real life situations. While 10% of the classes provided examples and activities beyond the text book only 4% of the classes raised Higher Order Thinking (HOT) questions in the class.

From the analysis of teacher's interview schedule it was found that 22 (43.13%) teachers opined that the content of the class IX Science book is appropriate to the level of the learners. But 11 (21%) of the teachers

said that the content was difficult for the learners. These teachers were mostly from remote places in the district- Koraput and Ganjam. For example one of the teachers in Ganjam stated that *"The content is not difficult for a normal class IX students' level, but it is difficult for our students where most of the students are slow learners. Even some students cannot write properly."* It indicates that the teachers perceive difficulty in the content with respect to the learners' prior knowledge and performance. In addition to this, a few teachers consider the Life Science part easier than the Physical Science part.

25.49% the teachers also mentioned that the content is not sequential with respect to the organisation of chapters in the Science textbook. They expressed that in the Life Science unit 'Cell and its Organisation' should come first, then 'Tissue' followed by the chapter 'Biodiversity'. Many teachers expressed that the Chapter 2 in Physical Science- 'Is Matter around us Pure' has to be sequenced after Chapter 3 'i.e. Atoms and Molecules'. Some teachers also felt that the Class VIII Science book and Class IX Science book are not linked. Such as 'light' and 'electricity' chapters are in Class VIII, but not in Class IX and again it appears in Class X. A few teachers expressed that the concepts such as 'valency' had not been included in the current textbook; which is required for writing chemical formulas in Chapter 3.

Almost all (50 out of 51) the teachers said that the activities given in the book are sufficient but they are unable to conduct the activities and experiments in the class due to large number of students in the class and inadequate space for conducting activities. Some of the teachers added that materials available are not sufficient for providing opportunity to all the students to conduct the experiments. Only 11 (21.56%) teachers felt there is a need for more examples. They also added that more explanation and simple examples are needed for the chapter 'Gravitation'. The chapter 'Motion' especially the graphs explained for derivation of equations of motion are difficult for students to understand as expressed by 55 percent teachers. The other difficult concepts are Newton's Laws of Motion, Atoms and Molecules, Atomic Structure, Propagation of Waves in the chapter 'Sound' and Gravitation. Many teachers (36.53%) expressed that 'Tissue system' is difficult for the students to comprehend due to heavy theoretical discussion in the chapter. All the teachers expressed their concern about numerical problems being difficult in all the chapters for the students.

During the Focus Group Discussion with the students, when they were asked to specify the difficult areas in Science, students expressed that the technical terms and formulae in Science were difficult for them to understand and/or remember particularly in units such as 'Bio-diversity', 'Sound', 'Tissue' , 'Motion' etc. They articulated that *"We are able to understand these topics in class but cannot remember after some days"*. The concepts which involve more thinking or solving numerical problems or extrapolation of facts are more difficult for students to understand. However, they find the topics which give emphasis on memory or lower order thinking easy.

Analysis of pedagogical processes in Science at Secondary Schools of Odisha with respect to pedagogic strategies adopted

Quality of school learning is largely dependent on the pedagogical practices being conducted in the classroom. The basic pedagogical practices followed for classroom transactions include planning the lesson for attaining the defined learning objectives, sequencing the activities depending on the arrangement of concepts, adopting appropriate teaching learning methods enhancing the learners' active involvement and participation, use of appropriate and contextual resource materials, using learners' experiences and involving them in argumentation, observation and experimentation. The data obtained by using Classroom Observation Schedule and interview with Science teachers are analysed to study the pedagogical strategies employed in the Science classrooms. The frequency and percentages of each category of observed

data are mentioned below in the table 1.2.

Table 1.2: Analysis of pedagogical process with respect to pedagogical strategies as observed in the classroom (N=51)

Items	Yes (in percentage)	Partially (in percentage)	No (in percentage)
Provided situation to think over	7.8	33.3	58.8
Directly stated the topic	58.8	3.9	37.3
Focussing only on textbook	47.1	49	3.9
Appropriate methodology according to the content	27.5	45.1	27.5
Appropriate methodology according to the level of the learner	19.6	49	31.4
Items	**Often (in percentage)**	**Sometimes (in percentage)**	**Never (in percentage)**
Encouraged students questioning	7.8	17.6	74.5
Promoted Observation	13.7	29.4	56.9
Promoted Argumentation	2	19.6	78.4
Promoted Analysis	21.6	45.1	33.3
Promoted Experimentation	5.9	7.8	86.3

It is clear from the table that 59% of the classes did not provide situations for students to think. The teacher directly stated the topic without linking students' previous knowledge in the same percentage classes. It is observed that 47% of the classes focussed only on the text book. In less than 50 % classes, the methodology was found appropriate with respect to content and level of learners (45% and 49% respectively). In most of the classes lecture method, and discussion method was followed. It was also seen that some teachers read out line by line from the textbook and then lectured the same. The experiments were explained by drawing diagrams on the blackboard. Some of the teachers were seen dictating important points in the class. More than 75% of the teachers did not encourage students to either question or involve them in argumentation in the class. Observation was not promoted in more than fifty percent classes. Only 22% of the teachers promoted analysis in the classroom where as opportunity for experimentation was very rare (6%). Attempt to develop thinking process, questioning ability, observation, argumentation and experimentations of the learners was rare.

Interview with the teachers also presented similar findings. Teachers responded that they were following the demonstration method and other traditional methods. 86% teachers were not conducting experiments and activities with students-while teaching and 70.58% teachers said that they were using the demonstration method for teaching Science. Teachers were mostly busy in completing of the syllabus rather than following innovative and modern methods of teaching. Students were not performing any experiments or activities in the classroom. However, focus group discussion with the students revealed that in 45% (23) of the schools, teachers do demonstrate a few experiments in class. They also expressed that most of the experiments were explained by drawing diagrams on the blackboard. Others were using the lecture cum discussion method. But during observation only 5.9% of the teachers demonstrated experiments in class and 86.3% of the teachers had not conducted any experiment. Only 13.7% teachers provided opportunity for promoting observation among students. Explanation of concepts was mainly accompanied with

examples. Most of the teachers appreciated the 5E learning cycle; they expressed that "*though it was suggested to use the 5E model for teaching Science but we are not able to do this due to large number of students in the class or due to lack of time.*" A few teachers didn't specify the method they use, rather expressed that they use the methods according to the requirement of the topic. While answering the item on type of opportunities provided to the students for activities and experimentation, most of the teachers talked about demonstrating the experiments in class. Except a few, they also said that students do not perform any experiment in class. Most of the teachers expressed that they give examples to relate the content to day to day life. Only one of the teachers from Sambalpur said that learners are provided with projects to complement classroom learning. Students are of the view that they are not able to understand some difficult concepts in Science as they find the method not very interesting. They are not giving opportunity to perform certain activities and experiments either in the school or at home, except a few. In few schools, students expressed that "*the teacher asked us to do small observations at home. For example we were asked to observe germination of seed at home and we have also done the experiment.*" Numerical problems associated with Science content mostly in Physical Science are difficult for the students. Teachers did not solve numerical problems frequently and such problems were given as homework. Because of lack of practice in solving the problems, students found the problems difficult to solve.

Analysis of pedagogical processes in Science existing at Secondary schools of Odisha with respect to resource management

Resource management is a skill of making full use of the available resources to make the students understand and learn about any content. These resources include the Science laboratory, Science kit, Resources created or developed by teachers and students, ICT resources, Availability of library resources in Science, Reference materials used by teachers, Adequacy of materials and frequency of use of the materials. Proper managing of these available resources can enhance students' learning to a greater extent. The frequency and percentages of each category of the observed data are mentioned below in the table 1.3.

Table: 1.3: Pedagogical Processes in Science with respect to Resource Management (N= 51)

Items	Often f (%)	Sometimes f (%)	Never f (%)
Uses appropriate resources in the class	4 (7.8)	9 (15.7)	39 (76.5)
Integrated technology resources in Science teaching	2 (3.9)	2 (3.9)	47 (92.2)

It is indicated in the table that the use of appropriate resources in the class and integration of technology resources in Science teaching is 8% and 4% respectively which is negligible. Useof technology in the classes was delimited to displaying some pictures on the mobile while teaching 'Cell' by only two teachers. Most of the classes had neither used appropriate resources (77%) nor integrated technology in Science teaching (93%). Few teachers used charts while teaching but the use of locally available resources were not observed anywhere except by one teacher at Ganjam district while teaching 'Sound'.

It is found from the above analysis that except a few, Science teachers teach without appropriate resources which is an essential aspect of Science teaching. Very few teachers are using charts, lab equipment and ICT for teaching Science. It may be noted that all the govt. schools have been provided with a projector, a Knowledge Yantra (KYN) machine which is preloaded with the videos for all the chapters of Science. In the interview, teachers

claimed that they use charts, lab equipments, and ICT lab for teaching Science. One of the teachers expressed "*I used to display some videos by downloading from YouTube*." Most of the teachers expressed that lab materials are used mainly for teaching Physical Science whereas charts are used for teaching concepts such as tissues, plant cells, animal cells etc. and models of the eye and ear in Biological Science. But most of them were not doing any experiments involving chemicals in the class due to safety issue.In some schools the chemicals were outdated and not in a usable condition. In most of the schools labs were managed well and materials were kept in an unorganized way in a room called Science room. Nowhere in the observed schools, the students were going to the Science lab for doing experiments. Students expressed that teachers bring some materials to class not so frequently and demonstrate; however students were strictly not allowed to touch any material in most of the schools. That means, the materials have been used, though not frequently but for teachers' demonstration purpose only. But the discussion with the students revealed that they were highly interested in doing experiments in the Science laboratory. They also expressed that no learning resources were prepared from the immediate environment. Most of the teachers expressed that they involved the students in competitions on Science exhibitions, Science quiz, projects etc. However, on a daily basis, no activities were conducted in Science classes in most of the schools. All the teachers appreciated activity based learning in Science and demanded well-equipped laboratory in the schools. They also revealed that charts were the most extensively used learning resource, that too supplied by the Government, not self-developed.

By analysing the Science laboratory checklist it was found that in most of the schools the equipments given in the Science kit were available. However, the number of equipments available were not adequate for involving the students. In some old schools, the equipments available were outdated and not required according to the present course of study. In around 30% of the schools, the equipments-were properly maintained and utilised by the students which is revealed by the triangulation of the data collected from the teacher and students. In almost all the schools, essential chemicals were not available. It was found that the Science labs in most of the schools were not properly maintained. In most cases the equipments-were dumped in the cupboard. There were a few schools where well equipped laboratories were available; however, rarely it integrated in the teaching-learning process. The video supplied by the government had been shown to students occasionally and all the teachers appreciated those videos. They expressed that videos had to be prepared more in number covering all the concepts and supplied to the teachers. It indicates that they are neither aware of e-content process nor teacher's role in its development.

Analysis of Pedagogical processes in Science with respect to Assessment

The learners' assessment is analysed with respect to the strategies followed- oral, written or performance wise; self and peer assessment, Continuous assessment, provision for follow up and feedback. The frequency and percentages of each category of the observed data are mentioned below in the table 1.4 followed by qualitative analysis of interview and FGD data.

Table 1.4: Pedagogical processes in Science existing with respect to assessment

Items	Often f (%)	Sometimes f (%)	Never f (%)
Focusing upon right or wrong response	46 (90.2)	3 (5.9)	2 (3.9)
Pose questions even on right or wrong	3 (5.9)	19 (37.3)	29 (56.9)

Informal assessment procedures used during the lesson	27 (52.9)	21 (41.2)	3 (5.9)
Items	Yes f (%)	Partially f (%)	No f (%)
Provided scope for peer and self-assessment during the lesson	3 (5.9)	5 (9.8)	43 (84.3)
Providing feedback after assessment	1 (2)	10 (19.6)	40 (78.4)
Items	Yes f (%)	Partially f (%)	No f (%)
Assessment was done at the beginning of the lesson	38 (74.5)	13 (25.5)	
Assessment was continuous	29 (56.9)	21 (43.1)	
Items	Oral f (%)	Written f (%)	Performance f (%)
Mode of assessment	42 (82.4)	9 (17.6)	0

The table reveals that in 90.0% of the classes, assessment has been done in the class focussing only on right or wrong response, 57% teachers did not pose questions even on right or wrong responses. Informal assessment is done mostly during the lesson. There was no scope for peer and self – assessment during the lesson (84%). There is almost no feedback provided after assessment (78%). There was continuous assessment of learners during the lessons (57%). The assessment was done mostly in the [82%] oral mode.

A glance at the analysis shows that during the assessment, focus was on right and wrong answers. Informal oral assessment was done during the class. There was no scope for self or peer assessment and feedback after assessment. The teachers informed that there was 4-6 formative assessments conducted in terms of unit test and two summative assessments i.e. one half yearly examination and one annual exam. All the exams were in the form of written exam in all the schools. There was no scope for peer and self-assessment. The result after assessment was reported to the students through a report card. One teacher at Keonjhar district said "*I motivate the students personally to improve their performance by giving appreciation. But I am not able to organise any extra remedial class for them.*" Others also said that they could not take further steps to improve the students' standard. The students also revealed that a unit test, one half yearly test and one annual examination was conducted in the schools regularly. These answer sheets were valued and reported to parents in time for feedback. No feedback was obtained either from the parents or from the teacher.

Major Findings

The major findings of the study are

1. The teacher assess previous knowledge of the students before teaching a new lesson in the class through a few questions.
2. Sequencing the content of the lesson was mostly done properly.
3. Content with real life situation were sparingly correlated in the class, however teachers sometimes give examplesbeyond the textbook.
4. The teachers were not raising any HOT question while teaching in class.
5. The teachers find it difficult to conduct activities and experiments due to large number of students in the class or unavailability of functional equipments.
6. The school laboratories are not well equipped with TLMs, models, charts,

equipments, chemicals, specimens for use of the students.

7. The teachers are not utilising community resources or resources of the neighbourhood for teaching Science in the class.
8. Most of the teachers are giving importance to the content, examples and activities given in the textbook and not going beyond the textbook.
9. Appropriate methodology was not followed according to the content and level of the learner.
10. The teachers rarely encourage students to raise questions in the class, promote observation, argumentation, analytic power, higher order thinking skills and experimental skills.
11. Students face difficulties in understanding some units in Physical Science and solving numerical problems in Physical Science.
12. Teachers are not conducting any individual and group activities for learning Science.
13. In the class during teaching, the teacher assesses through mainly knowledge type questions and higher ability questions are neglected.
14. In almost all the schools, 4 unit tests and two terminal tests have been conducted regularly and results are communicated to the parents but no feedback is taken from the parents or from other teachers for the improvement of learning Science.

Discussion

The study was an attempt to examine the pedagogical processes in Science with specific reference to content, pedagogical strategies employed, resource management and assessment. It is found that conventional method of teaching was mainly followed in Science classrooms with less or no variation among schools. This finding is in agreement with that of Karamustafaoglu, Bayar and Kaya (2014) who found that the teachers preferred to employ traditional, teaching methods in Turkey. It is clearly evident that non-traditional teaching methods based on student centred discussion, laboratory practices, role playing and project-based learning etc. are lacking in the pedagogical practices in Science in government secondary schools of Odisha. The study conducted by OMSA (2016) also supports the finding that laboratories were not used regularly in the schools in Odisha. The study found that no group activities were conducted in Science classes. It was also found in the OMSA study that the rural schools possess inadequate space for group work. However, in a study conducted by Stroupe (2017), he concluded that a teacher's pedagogical preparation shape how they design classrooms as a place of Science. Therefore, effort must be geared towards strengthening teachers to transform the classroom space to an effective learning space by exploring various possibilities of child centric strategies. It is interesting to understand all the teachers appreciated the learner centric, activity based classroom. However, in the name of challenges, most of the teachers appear to be less optimistic about such a classroom. Most of the time they expressed that such classes are possible when students have strong pre-requisite knowledge. Therefore, many a times very less effort has been seen in asking any Higher Order Thinking question in the classroom. Neither they had taken extra effort to revert the challenges. The processes of Science such as observation, measurement, experimentation, argumentation etc were highly ignored. No group activity could be observed in any of the classes indicate that social construction of knowledge is not appreciated well by the teachers. This might be because of their less competency in creating collaborative learning space for students and their rigid belief system about Science and Science learning. Onsite mentoring or flipped training method could be adopted to develop their confidence in organising active learning situations.

Use of Science laboratories as learning resources is highly neglected in most of the schools. This finding is in agreement with

that of Zengele and Alemayehu (2016) who studied the status of Secondary School Science laboratory activities in case of Wolaita Zone, Southern Ethiopia and found that status of laboratory works in secondary schools is in a very low level where Science teaching learning process is not supported adequately by laboratory works. The most determinant constraints of laboratory activities in secondary schools include lack of laboratory rooms, inadequate supply of lab equipment and facilities, absence of trained laboratory assistants/teachers, lack of commitment and interest of teachers and lack of regular schedule for laboratory activities. Considering the conclusions by Hofstein and Lunetta (1982) when suitable activities are used in laboratories then effective development and promotion of logic, inquiry and skills for problem-solving might occur, focused initiatives are required from the Government to supply and provide suitable laboratory materials to each school. Teachers have not received specific capacity development programmes to integrate laboratory activities for quality Science education. Their confidence in handling a laboratory may help them to overcome the challenges and be more committed to develop improvised material and enrich laboratories in their respective schools.

Creating a healthy learning atmosphere for Science learning in schools is very significant wherein learners are motivated to explore nature in multiple ways. Unfortunately, in none of the schools, Science clubs are functional. Other pedagogic activities are delimited only to sending a few children to Science exhibition or Science quizzes, etc. However, most of the children are not part of these activities. The pedagogical processes in Science in Odisha doesn't give a very colourful picture. However, a few individual level initiatives had been seen. In very few cases, it is found that amongst the challenges, a few teachers try to make a difference in Science learning processes though the number is very few.

Multiple ways could be suggested to make a change in the process of learning Science, however, the initiatives suggested could be based on 'subjective reality' of teachers as well. It might not be conducive if teachers are considered as solely responsible for the not so good scenario of Science education. The overall learning environment in schools has to be improved by providing necessary facilities. Teachers should not be deputed for other official duties. Support system has to be strong enough to motivate teachers to make a change in the system by providing quality Science learning opportunities to students.

Educational Implications

The above findings reveal that Science is taught in our school as a traditional subject and follows a traditional pattern of teaching. Due to the demand of the society, in the context of national development, Science is considered as a core subject in the school curriculum. If Science learning is not properly facilitated in the schools and does not adopt a modern pedagogy there is a possibility of rote learning only the product aspects of Science-facts, concepts, laws, theories etc. Greater involvement of teachers and their commitment to the profession may lead to better planning of the lesson. In the process of planning, designing and developing pedagogical strategies, reflection of teachers is very significant. Therefore, effort has to be made to transform teachers from just being a 'transmitter of knowledge' into 'reflective practitioner'. For that, on-site support and mentoring has to be organised. Decentralised training programmes may help teachers to monitor their own professional practices and take well-informed decisions about pedagogical processes. More field based trainings must be organised to bring changes in the pedagogy. Since isolation of schools from community are felt, more involvement of community in pedagogical processes are to be brought in. Symbiotic relation between community and school could be appreciated. Government should take necessary steps to provide sufficient laboratory resources and materials so that activity based classrooms

could be encouraged. Teachers should work with students to prepare low cost improvised apparatus or materials and enrich Science laboratories. Initiatives are to be taken for preparing teachers to integrate ICT resources into the teaching-learning process. Teachers have to be oriented to develop e-content materials rather than solely depending on the readymade videos supplied by Government. Assessment system has to be more robust. There should be some bridge programme to improve the performance of students in Science. In addition, Science clubs and other learning resources are to be functional for developing scientific temper and motivate students to be responsible citizens of the country.

Conclusion

On the basis of the above findings, it is clear that the teachers are mostly adopting traditional methods of teaching Science. The observed classes are teacher dominated classrooms where teachers are not facilitated to ask questions, providing situation to think highly and following the methodology as per the convenience of the teachers. Students are not encouraged to develop their science process skills. The traditional strategies of teaching Science at school such as memorisation, textbook method, textbook reading and Science teaching without activities and experimentation were followed in the school. This is the most prominent issue of Science teaching in government secondary schools of Odisha and efforts are to be taken to revamp pedagogical processes in Science.

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Draft National Education Policy 2019: An Overview

Abstract

This paper gives a brief summary of the main issues and recommendations in the chapters on school education and teacher education of the draft NEP 2019. The paper extracts the crucial points that are the most important for the current times.

Introduction

After a long wait, the Draft National Education Policy 2019 was released on 31 May 2019. The Draft Policy, which is in the public domain at the time of writing for comments and suggestions till 30 June 2019, was developed by a nine-member Committee headed by Dr K. Kasturirangan.

The process of formulation of the National Education Policy was initiated long before this Committee was constituted, in May 2015 with ground level consultations (at the Panchayat, Cluster, Block and District levels) across States. These inputs were collated by the Ministry of Human Resource Development (to be referred to as 'Ministry' here on) by means of online entries of State level inputs.

In October 2015, the Ministry constituted the Committee for the Evolution of the National Education Policy chaired by Shri TSR Subramanian, a retired bureaucrat. The Committee submitted its report in April 2016. But, due to reasons in the public domain, the Report was not released by the Ministry. However, it was put up on the website of the National Institute of Educational Planning and Administration, which had acted as the Secretariat of the Committee. In June 2016, a document called 'Some Inputs for Draft National Education Policy 2016' was put up by the Ministry, and online feedback requested from States as well as individual citizens. This document also did not yield the National Education Policy.

In June 2017, the Ministry constituted the Committee for the Draft National Education Policy, chaired by the eminent scientist, former Chief of ISRO and Padma Vibhushan Dr. K. Kasturirangan. This Committee, as outlined by Dr Kasturirangan in the Preamble, evolved the Draft National Education Policy 2018 through discussions (with educators, researchers, policy makers, sector experts, industry, academies, community groups, engaged citizens and more) and consultations (held from July 2017 onwards with 70 ministries/organisations/institutions/associations and 217 eminent persons).

The Committee also drew on relevant work and knowledge base from the past, including the National Education Policies of 1968 and 1986 Modified in 1992, the TSR Subramanian Committee Report, the Inputs for Draft National Education Policy put up by MHRD, and inputs from the ground level consultations. The Draft Policy underwent peer review by seven academics and eminent citizens.

The Draft National Education Policy 2019 outlines the following vision for education in the country - *The National Education Policy 2019 envisions an India centred education system that contributes directly to transforming our nation sustainably into an*

equitable and vibrant knowledge society, by providing high quality education to all.

In adherence to this vision, the document goes on to address every stage and every facet of education in its 23 chapters, both school and higher education, as well as additional key focus areas. The document also has two addendums, outlining financial implications of actualising the vision, and the key actions necessary for implementation of policy actions and related timelines.

In the Preamble, the Chairperson states that 'Education must be delivered in a holistic manner and the education system must be responsive to the fast-changing environment and the needs of a knowledge society'. To this end, it proposes an apex body, the Rashtriya Shiksha Aayog/National Education Commission, to synchronise action towards the attainment of the vision. The Draft Policy also suggests renaming the Ministry of Human Resource Development as the Ministry of Education, 'in order to bring the focus back on education and learning'.

This paper outlines the key highlights of the Draft Policy, and then summarises key aspects related to school education, teachers and teacher education.

Overview of Key Policy Actions in the Draft National Education Policy 2019

The Draft Policy takes an 'integrated yet flexible approach to education', which implies looking at education at all levels as a whole, giving equal importance to all subject areas and student choice and mobility across streams and programmes. It also addresses the 'interconnectedness' of education, which means that it addresses education in a holistic manner, and seeks to 'incorporate continuity, coherence and processes to ultimately realise an end-to-end educational roadmap for the country'. These approaches-manifest in different ways across the document.

Given the persistence of the advantages of early childhood education throughout life, the Draft Policy emphasizes the criticality of the early years and sees early childhood education as an integral part of school education. To this end, it states that early childhood education will be under the purview of the Ministry of Education.

The Draft Policy also emphasises the criticality of achieving foundational numeracy and literacy for all learners in grade 5 and beyond within the next five years, as well as 100% literacy rate among youth and adults within a decade. It envisages a 100% Gross Enrolment Ratio for all school stages within a decade and that of 50% for higher education within the next decade and a half. It outlines various measures to ensure the inclusion of under-represented groups, in both school and higher education, with a special focus on access to quality institutions in socio-economically disadvantaged areas. The Draft Policy also envisages that the Right of Children to Free and Compulsory Education Act, 2009 will be extended to assure availability of free and compulsory education from pre-school to grade 12.

The Draft Policy proposes a new curricular and pedagogical structure for school education, that is in sync with a child's natural cognitive, emotional, social and physical development, thus being responsive and relevant to the needs and interests of learners at different stages of their development.

School complexes, comprising several geographically close schools that are not necessarily in the same campus, are suggested as pedagogically viable and optimal alternatives to the current practice of educationally suboptimal schools. These school complexes are seen as the basic unit of governance and administration.

The Draft Policy also suggests restructuring of higher education, both in terms of institutional architecture and approach. It is proposed that the current 800 universities and 40,000 colleges be consolidated into about 15,000 high quality institutions, each with a large student body. This is with the intent to remove the current

fragmentation of the higher education system, and the practice of establishing stand-alone institutions offering single programmes. The Draft Policy envisages multidisciplinary institutions, to change the current hard boundaries, and the early specialisation and streaming into disciplines.

The Draft Policy envisages three types of institutions, differentiated only by their focus – Type 1 will focus on research and teaching, Type 2 on teaching with significant contribution to research, and Type 3 mainly on undergraduate teaching. All institutions will be either universities or degree-granting autonomous colleges; the practice of affiliation will stop.

Pedagogy and curriculum in both school and higher education are dealt with in great depth. The emphasis is on doing away with rote memorisation and developing capacities which enable learners to deal with a variety of situations and to develop newer capacities as needed.

The Draft Policy proposes that the school curriculum be reduced to a few essential concepts in order to provide space for 'holistic, experiential, discussion, and analysis-based learning' so that essential learning and critical thinking are enhanced. The curriculum will be flexible to enable student choice, with equal emphasis given to all subjects, and 'no hard separation of curricular, co-curricular or extra-curricular areas', and with equal status given to vocational and academic streams. Assessment will be reformed to focus on formative assessment, and on core concepts and skills as well as higher order capacities. The Draft Policy emphasises the need to reduce student stress, and recommends specific changes in Board Examinations as well.

In higher education, the Draft Policy proposes that the current separation of professional and general education be removed. It states that 'The needs of the 21st century require that liberal broad-based multidisciplinary education become the basis for all higher education. This will help develop well-rounded individuals that possess critical 21st century capacities in fields across the arts, humanities, sciences, social sciences, and professional, technical, and vocational crafts, an ethic of social engagement, and rigorous specialisation in a chosen field or fields'. This broad-based liberal arts education at the undergraduate level will enable integrated, rigorous exposure to science, arts, humanities, mathematics and professional fields, through imaginative and flexible curricular structures, creative combinations of disciplines of study, and multiple exit and entry points.

The Draft Policy emphasises the importance of capable, motivated and professionally qualified teachers at all stages of school and higher education. It stresses the importance of appropriate working conditions, pupil-teacher ratios and professional development opportunities for all stages of education. Specifically, for school teachers, it proposes that teacher education be part of the higher education system. For higher education, it proposes a permanent employment (tenure) track system for all higher education institutions.

With respect to regulation and governance in school education, the Draft Policy stresses institutional autonomy, and the separation of functions of standard setting, funding, regulation and accreditation to completely eliminate conflict of interests. With this end in mind, it proposes a revamping of the structures of governance in school and higher education.

School complexes will be semi-autonomous and higher education institutions will be granted administrative, academic and financial autonomy. At the same time, The Draft Policy emphasises the importance of accreditation, which will also form the basis of regulation. Private and public institutions are to be regulated in the same manner.

The Draft Policy brings renewed focus to research through both structures and processes for catalysing and supporting research. To this end, the National Research Foundation, will be set up through an Act

of Parliament as an autonomous body of the Government of India. The Foundation will be given an annual grant of Rs.20,000 crore, to be increased progressively over the next decade. The work of the Foundation will include funding across the broad areas of science, technology, social sciences and the humanities, building research capacity, and recognising outstanding research.

The Draft Policy includes technology in education, vocational education, adult education, and promotion of Indian languages in additional key focus areas.

To oversee this transformation of the education system, the Draft Policy proposes that the Rashtriya Shiksha Aayog or National Education Commission, headed by the Prime Minister and comprising eminent educationists, researchers, Union Ministers, a representation of Chief Ministers of States and eminent professionals from various fields be set up as an apex body. The Aayog will facilitate coherent and synchronised implementation and review of education policy, with an integrated national vision of education, while catering to the diversity of our country. The Aayog will work closely with every State to ensure coordination and synergy. States may set up apex State level bodies for education which may be called the Rajya Shiksha Aayog or the State Education Commission.

Finally, in an Addendum, the Draft Policy 'envisions significant increase in public investment in education. This would go up from the current 10% of overall public expenditure in education to 20%, over a 10-year period'. It delineates priority areas and approximate figures to meet the demands of fulfilling policy actions in these areas.

Draft National Education Policy 2019 on School Education

Early Childhood Education

Citing evidence that 'over 85% of a child's cumulative brain-development occurs prior to the age of 6, indicating the critical importance of developmentally appropriate care and stimulation of the brain in a child's early years to promote sustained and healthy brain development and growth', the Draft Policy envisages early childhood education as an integral part of school education. At the same time, it takes care to point out that the care component, comprising attention to health and nutrition, not be compromised in any way. It also emphasises that existing Anganwadi Centres be strengthened, and outlines various modalities for ensuring access to early childhood education depending on feasibility of geography and infrastructure, with particular attention to socio-economically disadvantaged areas. These modalities include co-locating Angawadis and pre-schools in primary schools, and building stand-alone pre-schools.

The Draft Policy further states that 'no hard separation of ages' in the range of 3 to 8 years 'would be required for Anganwadis and pre-schools (including when they are co-located with primary schools), except as needed for social reasons or due to limitations of institutional infrastructure'.

All aspects of early childhood education will come under the purview of the Ministry of Education (the erstwhile Ministry of Human Resource Development) effectively linking early childhood education with the rest of school education; a transition plan will be finalised jointly by 2018 by the relevant Ministries.

Other initiatives to ensure quality of delivery will include instituting a regulatory system, high quality infrastructure and materials, professionalisation of educators for this stage, and a framework constituting a framework for 0-8 year olds with State and local contextualisation. Large scale advocacy efforts will be initiated to generate demand among stakeholders.

Ensuring Foundational Literacy and Numeracy Among All Children

The Draft Policy devotes an entire chapter to the 'severe learning crisis' with respect to foundational literacy and numeracy. Given the persistence of the effects of this deficit over the lives of learners, it proposes efforts of the nature of a national mission to address it.

Setting the objective 'By 2025, every student in Grade 5 and beyond has achieved foundational literacy and numeracy', the Draft Policy emphasises increased focus on these aspects in Grades 1-5, expansion of the mid-day meal programme, regular assessment, availability of quality materials and other aids, a national repository and expansion of public and school libraries to facilitate a culture of reading and communication, as well as ensuring a pupil teacher ratio of less than 30:1 in each school. In addition, starting 2019, all Grade 1 students will undergo a three-month long school preparation module.

Teacher training, both pre- and in-service will be re-designed with renewed emphasis on foundational literacy and numeracy, while teachers will be further facilitated through ensuring appropriate deployment and conditions. A pupil-teacher ratio under 30:1 will be ensured at the level of each school. Parental participation will be ensured through various means, and social workers and counsellors-recruited to help ensure retention and mental health of all children.

An important aspect will be mobilisation of the local community and volunteers. The National Tutors Programme (NTP) and the Remedial Instructional Aides Programme (RIAP) will be instituted, the former comprising peer tutors identified within the school, while the latter will be a 10-year project, drawing instructors from the community; these programmes will be managed by teachers.

Restructuring School Curriculum and Pedagogy

The Draft Policy relooks the current structure of schooling, proposing a new 5+3+3+4 curricular and pedagogical structure informed by current evidence of developmental needs of children at various stages. The first five years, called the Foundational stage will comprise the education of children aged 3-8 years, and the current grades 1 and 2. This restructuring is driven by the need to facilitate learning based on play and active discovery during this period. The next three years, for children aged 8-11 years, and the current grades 3-5, will be called the Preparatory stage, which will build on the Foundational stage to begin the transition to structured learning. Textbooks and more formal aspects of learning will be introduced. Next, the Middle stage will comprise three years, for children aged 11-14 years, and the current grades 6-8. This stage will involve more abstract thinking and learning of subjects. Experiential learning within each subject and relationships between subjects will be in focus.

The final stage, comprising four years, will replace the current grades 9-12, for children aged 14-18 years. Each year of the Secondary Stage will be divided into 2 semesters, for a total of 8 semesters. The notions of 'higher secondary or 'junior college' will be eliminated; Grades 11 and 12 will be considered an integral part of the secondary stage. This stage will offer students choice of multidisciplinary studies – each student will take up to 5-6 courses per semester, which will allow exposure to a multitude of subjects at differing levels. There will be some essential common subjects for all, while simultaneously there will be flexibility in selecting elective courses (including in the arts, vocational subjects, and physical education) so that all students can expand their horizons as they see fit and explore their individual interests and talents.

It must be noted that the physical infrastructure of schools need not necessarily be aligned with this pedagogical and curricular organisation.

Ensuring Universal Access and Retention to Education at All Levels

While noting the progress in enrollment, the Draft Policy expresses concern at our inability to retain children in school. It proposes that access gaps will be met through various strategies, including increasing intake in existing schools, developing new facilities in under/un-served locations, and school rationalisation, with support to learners through transport and hostel facilities, while ensuring safety of all students, particularly girls. Appropriate norms for the foregoing will be developed based on local reality, while ensuring proximate access in early years. If necessary, norms for school access maybe made flexible without compromising on access, quality, equity, and safety, thereby allowing multiple models. Also, credible mechanisms for redressal will be developed and a zero-tolerance policy towards breach of child rights adopted.

Further, participation and learning of all children will be ensured through tracking attendance and learning outcomes of enrolled children, and also tracking drop-outs and out-of-school children; social workers and counsellors will be included in this effort. In addition to the NTP and RIAP, programmes for long-term out-of-school adolescents will be instituted with equivalence to the mainstream school education system. Multiple pathways to learning, involving formal and non-formal modes, will be available with strengthening of the open and distance schooling, and technology platforms.

Inclusion of Under-Represented Groups

The Draft Policy has several concerted initiatives to ensure that no child loses any opportunity to learn and excel because of the circumstances of birth or background. Policy actions related to early childhood education, foundational literacy and numeracy, school access, enrolment and attendance will receive targeted attention and support for students from under-represented groups.

Special education zones will be set up in geographies with large representation of students from under-represented groups for targeted attention and support, with the Central government providing financial support in the ratio of 2:1 for every rupee spent by the State. Funding will also be provided for research on inclusive education.

Financial support will be provided to students through a National Fund created specifically for the purpose. Alternative means of support include recruitment into the NTP and the RIAP, breakfast in addition to the midday meal, and special internship opportunities.

Other key initiatives include capacity development of teachers and ongoing efforts to sensitise them, creating alternate pathways for recruitment of teachers from educationally under-represented groups, restricting the pupil-teacher ratio in schools with a high proportion of learners from educationally under-represented groups to not more than 25:1, creation of inclusive school environments through establishment of mechanisms which address harassment, intimidation and gender-based violence and eliminate exclusionary practices, as well as revising the curriculum to make it inclusive.

Up to date information for each student will be maintained in the National Repository of Educational Data, with data analysis undertaken by the Central Educational Statistics Division.

Transformation of Curriculum and Pedagogy

Reduced, Flexible and Integrated Curriculum

The Draft Policy sets the objective of transforming curriculum and pedagogy by 2022 'in order to minimise rote learning and instead encourage holistic development and 21st century skills such as critical thinking, creativity, scientific temper, communication, collaboration, multilingualism, problem solving, ethics, social responsibility, and digital literacy'.

The curriculum load will be reduced to 'key concepts and essential ideas', to allow for 'deeper and experiential learning'. However, all students must learn certain subjects and develop certain capacities. These include proficiency in languages; scientific temper; sense of aesthetics and art; languages; communication; ethical reasoning; digital literacy; knowledge of India; and knowledge of critical issues facing local communities, the country, and the world.

A flexible curriculum – with no hard separation of content in terms of curricular, co- or extra- curricular areas; nor of arts and sciences, and "vocational" and "academic" streams – will enable student choice particularly at the secondary school level; courses in physical education, the arts, and vocational crafts will be offered along with general courses.

Vocational exposure will begin early with all students taking a year-long survey course on vocational skills and crafts in Grades 7-8. In Grades 9-12, children will have access to vocational courses along with more traditional academic courses, with students having choice to 'mix and match'.

Indian contributions to knowledge and the historical contexts that led to them will be incorporated in an accurate and engaging manner, wherever relevant, into the existing school curriculum and textbooks. Topics will include Indian contributions to mathematics, astronomy, philosophy, psychology, yoga, architecture, medicine, as well as governance, polity, society and conservation.

Local and tribal knowledge systems will also be included in the curriculum and textbooks, in more detail in regions where such knowledge systems may hold a greater relevance with respect to local needs and customs.

Language

Education will be in the home language/ mother tongue at least till Grade 5 but preferably till Grade 8, with a flexible (bilingual) language approach where necessary. High quality textbooks will be made available in native languages as needed and feasible, and materials will be developed for students with hearing impairment.

The native language will continue be taught as a language after Grade 5/8; courses on languages of India, including classical languages, will also be included in the curriculum. Secondary school students can choose a foreign language as an elective; however, this will not be in lieu of the three-language formula.

The three-language formula will be implemented in spirit – promoting national integration, and raising the status of regional languages and literature. The intent will be to promote multilingual communicative abilities for a multilingual country. Special measures will be taken to develop and recruit language teachers.

Children will be immersed in three languages from pre-school stage with the aim of developing speaking proficiency and interaction, and the ability to recognise scripts and read basic text, in all three languages by Grade 3. In terms of writing, students will begin writing primarily in the medium of instruction until Grade 3, after which writing with additional scripts will also be introduced gradually. Students may choose to change any one or more of the three languages they are studying in grade 6 or 7.

Students whose medium of instruction is the native language will begin to learn science bilingually in Grade 8, so they can think about scientific concepts in more than one way, and talk about science in more than one language.

Indian sign language will be standardized; local sign languages will be respected and taught as well where possible.

Curriculum and Textbook Revision

The National Curriculum Framework (NCF) 2005 will be revisited and revised by

end-2020, and made available in all regional languages. In order to have local variations, State Councils of Educational Research and Training (SCERTs)in each State will be encouraged to develop textbooks which contain (i) NCERT core material, (ii) any NCERT supplementary material of interest to the State, and (iii) material/edits by SCERTs or at the district level to allow for local relevance and flavour. New textbooks will be developed by NCERT/SCERTs for additional subjects (e.g. music, literature).

High quality translations will be developed by the Indian Institute of Translation and Interpretation.

Public and private schemes will incentivise innovative textbook development to increase choice of textbooks in all States and all regional languages; at the same time, these textbooks will have to be approved by an autonomous body of experts.

Assessment Reforms

A new paradigm of assessment for learning and development, situated in formative assessments, will align to the revised NCF, with assessment resources being available for teachers. The focus will be on periodic assessment to optimise learning. All examinations including school, entrance, large scale achievement surveys, and for employment will test core concepts and skills, along with higher order capacities. Board examinations of Grades 10 and 12 will be restructured in alignment to this paradigm. In addition, State Census Examinations for Grades 3, 5 and 8 will help track student learning. Mechanisms such as multiple attempts will be in place to reduce psychological burden on students; assessment at all levels will move towards adaptive computerised testing.

From 2020 onwards, the autonomous National Testing Agency (NTA) will administer aptitude tests and tests in various subjects, which can be taken on multiple occasions during the year. These could be used for university and college admissions.

Nurturing Singular Interests and Talents

In order to nurture students with singular interests and talents, pedagogy will be such as to foster a diversity of abilities. Identification through Olympiads and competitions, and focussed clubs at various levels, along with residential programmes will further support this effort.

Safety And Security of Children in Schools

A framework and guidelines for ensuring school safety and security of children will be developed, and will be made a part of the eligibility conditions for recognition and registration of schools.

All principals and teachers will be sensitised, and mechanisms for redressal put in place. Adolescent education will be included in pre- and in-service education programmes of secondary school teachers, and counsellors and social workers will be trained to confidentially advise parents and teachers on adolescent problems faced by growing boys and girls.

Self-learning online programmes on child rights will be developed for the benefit of students, teachers, and parents.

School Complexes as the Unit of Governance

State governments will group schools into complexes according to population distribution, connectivity and other local considerations by 2023. The grouping exercise will also include review and consolidation of schools with very low enrolment (e.g. <20 students). Due care will be taken that access is not impacted in the process through measures such as provision of transport; proximate access during early years will be non-negotiable.

The school complex will be the primary administrative unit of the public school system, making school governance more local, effective and efficient.

Each school complex will be a semi-autonomous unit that will offer education from the Foundational stage till Grade 12. Each school complex will consist of one secondary school (Grade 9-12) and all the public (government) schools imparting preparatory and middle school education in its neighbourhood.

The grouping of schools into school complexes will enable sharing of resources across schools including subject teachers, sports, music and art teachers, counsellors and social workers. It will also make possible sharing of physical resources such as laboratories, libraries, ICT equipment, musical instruments, sports equipment, sports fields etc. leading to optimum utilisation of public resources and facilities.

The school complex will create a community of teachers and principals who can work together and support each other, academically and administratively. Each school complex will also be connected with institutions offering vocational education and adult education, teacher support institutions and higher education institutes in its geographical vicinity. Thus, school complexes will break the isolation of small schools through creating a coherent set of educational institutions in each geography.

The Principal of the secondary school will be the head of the school complex. Each school complex will have a School Complex Management Committee comprising representatives from all the schools in the complex, as well as other institutions attached to the complex. The Committee will be empowered to have a voice to intervene on behalf of the school with the State and its bodies. It will also play a central role in the performance management of teachers.

Individual schools will develop their plans, which will be used to evolve the plan of the school complex, which in turn will be endorsed by the Department of School Education. Each district will also have a District Education Council/Zilla Shiksha Parishad for both the oversight of the school system and to enable their functioning and empowerment.

Regulation of School Education

Regulation and operations of schools (service provision) will be carried out by separate bodies to eliminate conflicts of interest. There will be clear, separate systems for policy making, regulation, operations and academic matters.

An independent State-wide regulatory body called the State School Regulatory Authority, with a quasi-judicial status, will be created for each State, while the operations of the public schooling system of the whole State will be handled by the Directorate of School Education. The SCERT will be the academic authority while the Boards of Certification/Examination will have no role in determining curricula.

Regulation will be based on a system of accreditation informed by a School Quality Assessment and Accreditation Framework, which will be developed by the State Council of Educational Research and Training. The Framework will address only basic parameters, and in turn will inform the License to Start a School. Schools will use the School Quality Assessment and Accreditation Framework to self-accredit every three years, by giving details on their meeting all the basic parameters, and the relevant supporting documents. At the same time, a mechanism of audit will be set up. This process will apply to both public and private schools.

Private and public schools will be regulated on the same criteria, benchmarks and processes, ensuring that public spirited private schools are encouraged along with private philanthropic initiatives; at the same time, private operators who try to run schools as commercial enterprises will be stopped.

The sample-based National Achievement Survey of student learning levels will continue

to be carried out by the National Council of Educational Research and Training. States may also continue to conduct a census-based State Assessment Survey.

To track students' progress throughout their school experience, and not just at the end in Grade 10 and 12, all students will take State census examinations in Grades 3, 5, and 8 in addition to the Board Examinations in Grades 10 and 12.

Right of Children to Free and Compulsory Education Act, 2009

The Right of Children to Free and Compulsory Education Act, 2009 will be extended to assure availability of free and compulsory education for all children from pre-school through Grade 12. Its requirements will be made substantially less restrictive, while ensuring physical and psychological safety, access, inclusion, the non-profit nature of schools, and minimum standards for learning outcomes. This is to allow for local variations and alternative models, while making it easier for governmental and non-governmental organisations to start schools.

Draft National Education Policy 2019 on Teachers

Teacher Recruitment and Service Conditions

Recruitment of teachers will be done through a robust process based on comprehensive teacher requirement planning at all schools, with preference given to local teachers and those fluent in the local language, while ensuring diversity. The first step would be a redesigned Teacher Eligibility Test, followed by an interview and teaching demonstration.

Teachers will be recruited to the district and appointed to a school complex, and must ideally have a fixed tenure and rule-based transfers through a transparent technology-based system. They will be incentivised to teach in rural areas.

The practice of 'para-teachers' (unqualified, contract teachers) will be stopped across the country by 2022.

Merit-based scholarships will be instituted to enable outstanding students from underprivileged, rural or tribal areas to undertake the four-year integrated B.Ed. programme. In certain cases, employment will be guaranteed in their local areas. Female students will be targeted in particular.

All teachers must be able to teach with no interruptions in the form of non-teaching activities during school hours (e.g. cooking midday meals, procuring school supplies, etc.). In turn, teachers will be held accountable for being absent from school without cause or without being on approved leave.

Adequate physical infrastructure, facilities and learning resources, along with desired pupil-teacher ratio will be ensured to facilitate teachers' work. Remedial programmes will be established at all levels to help teachers ensure that all students learn.

All teachers will be able to move into either educational administration or teacher education after a minimum number of years of teaching experience. In the long term, all educational administrative positions will be reserved for outstanding teachers who are interested in administration.

Continuing Professional Development and Support

Rejuvenating Academic Support Institutions with a careful plan to strengthen all existing academic support institutions as well as sufficient academic resources (e.g. a good library) and availability of high quality material in Indian languages for teachers will be accorded priority.

Each head teacher and/or school principal will be responsible for building strong in-school development processes and a supportive school culture. The School Management Committee will be sensitised and officials of the Directorate of School Education will reorient their functioning to

support such a culture.

Continuous teacher professional development will be based upon a flexible and modular approach, with teachers choosing what they want to learn and how they want to learn it. Attention will be paid to induction of newly appointed teachers, and processes of mentoring put in place. States could adopt a technology-based system for enabling choice-based professional development and to track the professional trajectory of each teacher. There will be no centralised determination of the curriculum, no cascade-model training and no rigid norms. The resource people for delivering these programmes will be carefully selected, effectively trained and will have tenure in the role.

A comprehensive Teacher Development Plan will be drawn up for each school complex. Peer learning communities will be consciously developed and sustained through processes such as weekly meetings and teacher learning centres. In addition, other modes of continuing professional development will be provided, such as seminars, in-class mentoring, exposure visits, etc. The academic and teacher support system, including the District Institutes of Education and Training, and the Block and Cluster Resource Centres, will be aligned to the school complex system.

Teacher Accountability

The Draft Policy states that teachers are accountable to students, their parents, the community and the public at large for what they are doing or not doing for education in schools; this ensures professional integrity and transparency in the education system. The periodic (annual or higher frequency) performance appraisal of teachers based on professional standards for teachers developed by the State will form the basis for determining teacher accountability. However, it will always be important to remember that empowerment and autonomy are preconditions for true accountability.

Draft National Education Policy 2019 on Teacher Education

Teacher education will be a part of higher education and the four-year integrated Bachelor of Education programme, which will have a liberal education approach,will be the minimum qualification for all school teachers. This programme will be offered at multi-disciplinary institutions as an undergraduate programme of study, including both disciplinary and teacher preparation courses. It will be a stage-specific, subject-specific programme that will prepare teachers from pre-school to the senior secondary stage (Class 12) for all subjects including the arts and sports and those with a vocational education or a special education focus. It will be on par with other undergraduate degrees; students completing the programme will be eligible to take up a Masters degree programme in any discipline.

Good pre-service teacher preparation needs expertise across disciplines for rigorous theoretical understanding of educational perspectives, subject and pedagogy along with a strong theory-practice connect - this demands the availability of a range of experts in core areas of education (psychology, sociology, philosophy) and all other school subjects (sciences, social sciences, languages, mathematics, arts, sports). Thus, faculty of teacher education must be experts in diverse fields, both theoretical and practical.

The current two-year B.Ed. programme will continue till 2030. After 2030, only those institutions which offer a four-year teacher education program will run the two-year programme as well; these programmes will be offered to those with a graduate degree. No other kind of pre-service teacher preparation programmes will be offered after 2030.

Substandard and dysfunctional teacher education institutes will be shut down after due review through legal processes. Promoters of such institutions will be free to put their infrastructure to other productive uses, such as for vocational education.

Conclusion

In the thirty years since the last national education policy was formulated, the socio-economic environment in India and the world around has changed significantly. A major development has been the Right of Children to Free and Compulsory Education Act, 2009, which makes education for children aged 6-14 years a Fundamental Right. Technology has seen dramatic advances, changing the way in which people communicate and the very nature of processes and information. Globalisation along with this rapid growth of technology-require learners to prepare for jobs that don't exist at present.

While taking forward the unfinished agenda of the previous policies, the Draft National Education Policy 2019 responds to these changes, and in the words of Dr Kasturirangan in the Preamble to the document, 'The National Education Policy 2019 provides a framework for the transformation and reinvigoration of the education system in order to respond to the requirements of fast-changing, knowledge-based societies while taking into account the diversity of the Indian people, their traditions, cultures, and languages. It seeks to ensure that human capital, the most vital form of capital that would fuel the necessary transformation, is secured and strengthened'.

However, at the end, the question is of implementation-without dilution, or even mutation, of the spirit of the Draft Policy. Implementation requires, among other things, investment, political will and capacity. With the kind of changes this Draft Policy envisages, including the autonomy to persons and institutions, these become even more critical.

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Number Sense and Integers

Abstract

This paper argues that a lot can be understood about the difficulties children have in studying mathematics by looking at their responses to worksheets or other given tasks carefully. It suggests a programme of teaching that focuses on concepts and engagement with abstractions, problem solving, logic and other capabilities in an hierarchical manner as is required by mathematics.

Background

Mathematics as a subject is known for its hierarchical nature and linkages through a structured development of concepts. If we look at the example of place value from primary mathematics, then it can be seen that place value links with addition and subtraction, and if someone has learnt addition it helps in building understanding of multiplication of whole numbers for which it is in a sense, repetitive addition. It can also be extended by understanding division as the inverse of multiplication and for whole numbers also as repetitive subtraction. An ability to deal effectively with place value may indicate ability to deal with whole numbers and operations on them, but then the introduction of negative numbers and fractional numbers poses new challenges. All the rules about the linkages and generalised notions about how numbers behave seem to have been rewritten. This becomes a major stumbling block in the further learning of mathematics.

As we move towards secondary classes, the nature of dealing with numbers changes. From dealing largely with positive counting numbers and operations on them to yield one definite answer, we move on to numbers that are of a different nature such as negative numbers, rational numbers sets and multiple answers. The bringing in of negative numbers that are smaller than zero in the middle school means extending their schema. In addition to this operating on integers and interpreting them as answers involves abstraction. The notions related to these numbers become challenging due to the short cut methods which offer instant solutions. The pace at which they are introduced and the manner of their introduction also make them difficult to understand.

We also deal with numbers in general terms and think about properties that apply to all numbers in a certain categories. The sets of numbers that we deal with become more than odd and even, multiples and factors, etc. and the new sets also cut across the categories that had been created earlier. The high school programme helps us deal with these generalised sets of numbers (whole numbers, negative numbers, integers, fractional numbers, rational numbers and so on) and their properties. Each set has its own defining parameter and from that arises its properties. The work with these sets in generalised form as well as in terms of specific numerical calculations is part of the secondary school programme. These operations also get complex and abstract with the inclusion of literals. As these become more demanding, the struggle gets tougher and it is important to explore the various elements of this. One element in this is the sense of negative numbers and the operations on them.

In this article, we explore some of these gaps in learning and study the way children construct answers to questions around integers and rational numbers and what their answers tell us about their possible understanding.

Introduction

This work is based on the children participating in an intervention programme named 'Shiksha Sambal Programme' for secondary and higher secondary classes. The programme has been effective from year 2016, reaching over five districts of Rajasthan with 60 state government schools. The programme is aimed to facilitate children's understanding in three subjects: Mathematics, English and Science. The important aim is to identify the learning gaps of children and support them at such points so that they can create a path for themselves to clear the exams.

The Children and their Background

These children study in government schools. Most of them come from a low socio-economic background. These children were studying in secondary classes, i.e., 9 and 10 and many of them are first generation learners at secondary level education. These schools have a reasonable teacher- to- student ratio. The responses were collected with the knowledge of the school and the teacher and were a part of the process that was aimed at helping teachers understand children better and also recognise their difficulties. The set of questions in the sheet given to them were at different levels. Some were at the level of the upper primary classes while others were at the level of end of class VIII and IX. While the numbers used for the analysis are small, they are typical of a much larger data we have from all schools and are reflected in our interactions with children in individual conversations or classroom interactions. While we looked at the responses we also had a conversation with a few students about their answers and why they thought their answers were the correct ones.

What We Found...

As mentioned earlier the questions were constructed to help us gauge the level and get an understanding about the way children had constructed their mathematical ideas. We included in this exercise some foundation concepts that we think are essential for learning mathematics upto secondary classes. These include number sense, notion of equality, notion of identity, ratio and proportion, nature and properties of numbers and shapes, notion of letter numbers and equations, understanding data and its analysis, signed numbers and mathematical symbols and language. It has been pointed out by many authors that at the upper primary and secondary stage, some major stumbling blocks are ideas of what are letter numbers, variables, equations, operations with polynomials, understanding of algebraic identities or the reason formulas work, visualisation for geometry and proofs. But much before that integers or signed numbers are a major source of difficulty. They are the first blockage children face as they are contrary to instinct and intuitive understanding of quantity. For us building in children the understanding and capability to work with integers is a key step in moving forward in learning mathematics.

In the following, we present the responses of children to various problems linked to this. We have analysed the answers and tried to see in them a pattern that seems to be able to describe the responses. As said earlier Subsequently we met some of the learners and talked to them about their responses.

In this we analyse only a few of the questions. These questions;

1) Is '-2' a whole number or an integer? Why?
2) Is 3 an integer or a rational number? Why?
3) What is the value of 0-4?

4) What is the value of -6-(-10)?

The questions are addressing different elements of the understanding. They can be said to be at different stages of learning and confidence as well but together they would help the learner and the teacher get a sense of the understanding. Some of the questions like the first and second appear simple, but they have to be responded to with a reason for the answer. For the second question in particular the expectation is that when you give the reason you should be able to recognise that it is both an integer and a rational number. From a class IX student who understands number sets we should expect the answer that it is an integer and hence also a rational number as all integers are rational numbers as well. For the first question there were a variety of responses, from the 22 students of class 9, who were used to doing worksheets with mixed questions. From these, we have picked this question to analyse, as it is a simple one and basic to all that they need to learn in class 9 and later on. There were two students who gave the correct response and also were able to point out that it is an integer as negative numbers are not whole numbers. The rest of the answers can be classified into 3 broad categories. The reason for the response is given alongside.

(a) '-2' is a whole number because whole numbers range from – to + till infinity. A similar response was '-2 is a whole number, whole numbers range from– 1 to + till infinity. Integers are 0, 1,2,3,4..... till infinity. Whole numbers start from – and integers start from 0.

Fourteen students gave this response. The difficulty here seems to be the term for both these in Hindi. The terms are Purnank (Integer) and Purn Sankhya (whole number). Also, it seems the term whole number has somehow got linked to completeness and being divisible. The term पूर्ण संख्या may link to other associations of perfect squares and divisibility.

(b) It is an integer because it is a number which can be completely divided.

Two students gave this response. The sense here again being of completeness and hence of divisibility perhaps coming from complete divisibility. The way this can be understood is the use of the word purnank for integer. This word also indicates in some sense completeness and may have a sense of being composite in some sense.

(c) -2 is an integer. Those numbers that can be fully divided and written in the form of p/q are rational numbers. Those numbers which can't be fully divided and written in the form of p/q are irrational numbers. the response was those which can be fully divided and written in the form of p/q are rational numbers and those that can't be written in the form of p/q are irrational numbers. 0 is a whole number. -2 is an integer.

Five students gave this kind of response, a complex formulation involving all the terms that they have been taught to categorise numbers. There are confusions between all these terms and the manner of defining them and the relationships and results arising from the definitions. The responses are a mixture of all terms linked to what is rational number and what is its form. This response is however, triggered by negative numbers being different from counting numbers.

This second question indicates an interesting pattern also. From the 100 responses, 39 said 3 is an integer, 18 said it is a rational number and while 25 said it is both, the reason was appropriate only in the case of 4 responses. 9 students said it is irrational and 2 said it is irrational since it is integer and rational. Interestingly 7 said it is neither of the two. The reasons for the choices can be categorised in the following way:

(a) Not an integer. Because there are both positive and negative numbers in integer. Therefore, it is a rational number.

(b) It is an integer, and not a rational number because we can't write 3 in the form of p/q.

(c) It is an integer. It is a rational number also because it can be represented on a number line.

(d) 3 is an integer. Not a rational number because 3 is an integer.

(e) No. But 3 is a rational number because it can be written as 3/1.

The responses indicate again a struggle with the number and the definition of their elements. These are attempts to articulate the form p/q, the depiction on the number line and also the signage of the numbers. The attempts however get muddled in bringing out the implication of these for the number 3 and its category.

Operation on Integers

We also looked at responses for operations on integers. For that we analysed question 3 and 4. In question 3, only one third did the question correctly. While the original question did not ask for reason we asked some of the respondents of each category about the reason why they gave the answer they gave. The answers that are not correct can be categorised in the following manner;

(a) 0-4 = 0, because nothing can be subtracted from 0.

(b) It is 4-0 = 4, because we can't subtract a small number from a bigger one. Therefore, we subtract 0 from 4.

(c) 0-4 = 4, because subtracting anything with 0 leaves it unchanged.

(d) It is 10-4 = 6, because we can't subtract a small number from a bigger number therefore borrowing 1 and making it 10 to perform subtraction.

These answers show that the students have tried to construct answers from a framework of understanding that they use to respond to the tasks they get. These frameworks are alternative to the actual framework of understanding for conventional mathematics. Not being able to grapple with the idea of negative numbers most of the explanations attempt to find suitable response from within the understanding of properties and operations on natural numbers. These answers reflect the inability to relate to and accept the notion of negative numbers.

The data from various responses given by 100 students are as follows:

Response	4	-4	0	6	1
Frequency	48	32	14	5	1

In response (a), the child has a narrow understanding of positioning of 0 in number sets. Here it can be seen that there is no relational understanding of negative number 0 and the cognition negative numbers are less than 0. As you keep decreasing numbers from the right of the number line we can cross and then go on the other side and reach negative numbers. And as we move further the numbers become smaller and smaller further to the left.

The responses (b) and (c) are the same but the reasons given are different. In (b) the child is thinking that there is a problem with the expression, and that this can't be solved. Therefore, the recourse is to convert the situation according to his/her own understanding. In response (c) the child is thinking of 0 as the additive or subtractive identity where 0 makes no impact on the other number while operating.

The response (d) is the most striking as the child does not have even a sense of subtraction from a whole number because borrowing is not clear to the child. The rote memorisation of place value is dominating the estimation of numbers without recognising that there is only 0-4 and no place to borrow from.

It is alarming that almost 50% children are giving the wrong responses. Based on the above responses the following can be said;

(i) Children have a limited sense of zero.

(ii) They don't see the existence of negative numbers and that they are smaller than 0.

(iii) Children are following the place value similarly as they do in whole numbers. From where the borrowing of 10 is coming in response (d) is also making the understanding of operating whole numbers questionable.

The fourth question showed the following response pattern:

Response	4	-4	-60	-16	6	-6
Frequency	43	31	12	8	4	2

Less than the half of the children chose +4 as an option and that is interesting in itself. We will not discuss the first as the second is an error in understanding the sign that is important as well but the remaining show the real challenges. We But more interesting is considering the remaining responses and reasons given for the children for these questions when they were asked how they had got their answer. Some of these reasons are;

(a) -6(10) = - 60, because minus into minus is plus. So 10 is multiplied by 6 gives us 60 and because there was a minus with 6, the final answer will give -60. (based on the response in conversation with some of them)

(b) 6 + (-10) = -16, because 6 plus 10 gives us 16. We have minus and plus minus is minus hence -16.

(c) 16 – 10 = 6, because we can't subtract 10 from 6. Therefore, we have to borrow 1 to make it 16 to perform subtraction.

(d)-6 , because we cannot subtract 10 out of 6. Therefore, subtraction can't be performed and –6 will remain as the answer.

Clearly these responses indicate the difficulties with the manner in which students use shortcuts and quick guide clues that are given. The generalisations made by them from the techniques given to them for certain specific contexts lead them to use them in situations where the 'rule' is not valid. For example, for subtraction in the initial classes, the rule given is nothing can be subtracted from zero so borrow from the next column. So if there is no next column what do you do? You borrow from a column which you imagine and hence subtract 10 from 16 or in a similar manner you can say 0–4 is 4 as nothing can be subtracted from 0.

To illustrate one more confusion that is emerging clearly linked to two operations together.

(i) Meaning of rules like —,— is plus implies that when two numbers have — and —, then together it becomes + is suspect as its validity only for multiplication is not stated in the short cut. And the use of brackets is not understood but applied as a memorised BODMAS rule. And that often goes wrong due to mechanical application of it.

(ii) A similar mistake is choosing the addition operation first then, putting in the sign from —,— rule.

Clearly these arise from some of the typical rules for operations on signed numbers

+ + is + and – – is +

– + is – and+ – is –

These four combinations are intended to help the learner understand that multiplying two positive integers' leads to a +ve sign in the answer and a positive and negative multiplication leads to a –ve sign and so on. Another dictum is when the negative and positive numbers are 'together', the sign is of the bigger number. All these get mixed up as the rationale and the reason is not formulated by them. Receiving them as rules to be followed leaves the child in confusion and not only about the number but also about what sign it will retain. The rules given by the teacher suggest treating them as operations on whole numbers and adding the sign afterwards following the rule. Disconnected from the visualisation, quantity sense and understanding of negative numbers, they are recipes for trouble and erroneous generalisations.

To Summarize...

The development of abstraction, logic, perception, generalising, forming hypothesis is important to deal with the understanding of number sets. The children also tend to build their notions about the concepts. The teacher should be aware of these and address them to resolve misconceptions. The unclear understanding of operations on integers keeps on reflecting in the other concepts also such as algebra where the children are supposed to operate polynomials and solve equations.

Therefore, a clear and sustainable approach is needed to strengthen the concepts like negative numbers and their operations. Learning sign rules in isolation to operate integers is not helping children effectively. In this kind of scenario, mathematics will become confusing and torturous for children. This also leads them towards quitting the subject in the higher classes.

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Promoting the Development of Teacher Professional Knowledge: Integrating Content, Pedagogy and Technology while Teaching

Abstract

With the changing role of the teacher from a transmitter to a facilitator and advancement of technology in educational discourse, technological knowledge has become an integral part of teacher education programmes. Technology was introduced as an aid to teachers to support their instruction so that teachers can satisfy the diverse learning needs of today's inclusive classrooms. But acquisition of technological knowledge exclusively as a separate domain during pre-service or inservice teacher education fails to develop understanding of the applications of technology in integration with other basic knowledge domains of teachers' i.e. content knowledge and pedagogy knowledge. The current paper discusses knowledge structures of teachers and their integration to make science learning more meaningful and interesting. This paper presents the findings of a need based training programme conducted to study knowledge structure of teachers and its integration in the teaching-learning process. 27 in-service secondary school science teachers from 14 states of India participated in the study. Based on the identified needs, knowledge structures were strengthened providing scope for discussions, reflections along with hands on activities during the training. Pre-tests and post-tests were administered to find their knowledge base and confidence levels before and after training to see any improvement in their knowledge structures on integration of content, pedagogy and technology while teaching. Analysis reveals that there is a significant improvement in content knowledge, pedagogical knowledge, technological knowledge and integration of all these among the teachers. Further it was also found that there is a shift in the confidence level from moderately confident to extremely confident and reduction in number of individuals who are not confident when compared before and after training in the content, pedagogical, technological knowledge and their integration.

Introduction

Development of educational system is one of the most important concerns among stakeholders of education all over the world. Strength and effectiveness of any educational system is directly proportional to effectiveness and preparedness of its teachers. Teachers are the main driving force of an education system. They play a pivotal role in the process of teaching and learning. The question that arises here is, how and in which areas, one of the most important stakeholders of education (teachers) should be trained. One of the basic requirements is to keep them updated with recent developments in the field of teaching-learning, through professional trainings. Recent developments may include new developments in the content area or new teaching approach that has proved to be more effective through researches or any advancement made in technology which can be utilised to make teaching-learning more effective. Teachers if trained in these recent developments in segregation without establishing linkage of new knowledge with

their pre-existing knowledge and without building linkage of one form of knowledge with another will not lead to successful implementation of new knowledge in real classroom situations. Holistic/ integrated approach, where all knowledge structures of teachers are utilised in transaction of content can only satisfy the diverse classes of today's Inclusive era.

Merely imparting knowledge or providing instruction cannot be considered as teaching. According to Hirst (1975), teaching should involve consideration regarding people's feelings, experiences and needs. Understanding a student's feeling, knowing her/his cognitive level and then teaching everyone together in such a way that it satisfies every student's learning need scan only be possible, if the teacher integrates all his/her knowledge structures and approaches content in a holistic manner. Here a question arises what are the different knowledge structures of teachers and how they could be integrated for meaningful learning to take place.

Knowledge Structures in a Science Teacher

Researchers before 1982 majorly focussed on various general aspects of teaching, and rarely paid attention to role of content in teaching. Basically subject knowledge and teaching were considered to be two separate dimensions; and least attention was paid to understand how teachers understand the subject they teach. Since teacher education programmes treat teachers subject knowledge and pedagogical knowledge as separate domains, due to this exclusiveness, Shulman (1987) claimed that graduates were therefore ill-prepared for the cognitive complexities of teaching. In mid-1980, a new perspective has been brought to teacher's knowledge when Lee Shulman introduced an important domain of teacher knowledge that is "Pedagogical Content Knowledge" (or PCK). He emphasised integration of domain knowledge with appropriate pedagogy, so that meaningful learning can take place. Shulman considered knowledge base of teachers in content knowledge, pedagogical knowledge, curriculum knowledge, knowledge of learner and educational context and knowledge of educational outcomes, purposes and values (Evens, Elen & Depaepe, 2015). Later, many researchers echoed the same views and elaborated upon Shulman's initial framework. While Grossman studied PCK in context of language, Magnusson et. al., studied PCK in context of Science and developed a model in which they included 3 more components to Shulman's initial framework. These components were orientation to Science teaching, knowledge of Science curricula and assessment of Science literacy. Ball et al. studied PCK in context to Mathematics and developed a model which in addition to Shulman describes knowledge of Mathematical horizon (how separate mathematical concepts relate to each other) (Evens, Elen & Depaepe, 2015).

According to Koehler & Mishra (2005), teacher knowledge is extremely complex and multifaceted. It is considered to be dynamic, influenced by the social and cultural environment and usually situated in ill-defined contexts (Angeli & Valanides, 2009).

With the technology boom, educational technologies were deliberately made an integral part of 21st century classrooms and thus became an integral part of teacher education programmes. Despite technology inclusion in teaching-learning and emergence of technology knowledge as a critical attribute of 21st century teachers, there exists a limited understanding of the applications and conceptual grounding of theoretical frameworks in educational technology literature that aims to inform the pragmatics of teaching learning with technology (Phyfe & Vermette, 2012, Graham, 2011). Hechter & Vermette, 2012, also found it unfortunate that despite support, literature and community; in-service teachers still find it difficult to effectively integrate modern technology into their classrooms.

To meet this growing demand of technology in educational discourse and to improve teachers' effectiveness in integration

of ICT in teaching-learning, Mishra & Kohler, 2006, along with other researchers (Neiss, 20005, Angeli, 2005, Graham, 2011) emphasised extending Shulman's PCK with technology domain. Kohler and Mishra thus introduced a knowledge base for teachers to teach effectively by integrating technology with content and pedagogy. This knowledge base is known as Technological Pedagogical Content Knowledge (TPCK). TPCK comprises the integration of content, pedagogy and technology domain within educational contexts. It reveals how three knowledge domains intersect and can be integrated to facilitate and enhance teaching-learning in the classroom. According to Mishra & Kohler, 2006, TPCK framework presents a specific form of knowledge which has emerged from conjunction of the base components, these base components are at the core of the teaching profession, requiring an understanding of best pedagogical approaches and representations of concepts using suitable technology in relation to students' prior knowledge and learning difficulties.

Along with Kohler & Mishra, other researchers have also described the relationships between technology, pedagogy and content a few among them are Huges (2004); McCory (2004); and Niess (2005). Franklin, 2004 addressed this integrated knowledge as e-PCK, while Angeli & Valanides, 2005 gave ICT related PCK. All these frameworks basically focus on relationship between three domains of knowledge, i.e content, pedagogy and technology.

From literature review it is evident that in order to translate curricular expectations in general and learning outcomes in specific, every teacher utilises the content, pedagogy and technology knowledge structures along with the knowledge of their integration in their classroom processes. These knowledge structures find an important place in both pre-service and in-service teacher education programmes.

1. **Content Knowledge** includes knowledge of subject to be taught, understanding of nature of the subject, ability to identify different categories of content, understanding of organisation of content for its smooth transaction in class. It also involves knowledge of process skills to be developed among students, while teaching the subject, and development of right attitude and values that are essential for learning the subject.Content knowledge can be categorised into factual knowledge, conceptual knowledge, procedural knowledge and metacognitive knowledge. Different processes are involved in the formation of different content knowledge, like concepts can be formed by induction, wherein, the individuals observe specific objects or ideas, identify the common characteristic features, group and name the concepts. This involves the process of moving from specific examples to generalisations.
2. **Pedagogical Knowledge** includes knowledge of how to deal with the content, what will be the right approach to transact the content in the class, which strategy should be adopted so that learners are able to create knowledge of their own and are able to apply that knowledge in practical situations or to solve their problems. Pedagogical knowledge also includes application of different assessment strategies to assess learner's progress according to the objective of learning.
3. **Technological Knowledge** includes knowledge of resources both physical and digital, which could be utilised to make learning, interesting effective, meaningful and accessible for all. After implementation of PWD and RPWD Act, we could see learners with diverse abilities in present classrooms. To satisfy diverse cognitive and physical needs of students, and to make learning accessible for all, technology proves to be the best aid for teachers.

Technology supports teachers to create deep understanding of the subject, to make abstract concepts comprehensible, to visualise spatial arrangement of 3D structures and in arousing interest

among learners. Technology can be selected according to specific needs of learners, nature of content and strategy employed by the teacher.

During classroom situation, these knowledge structures as a separate entity do not prove to be sufficient as nature of content influences teaching method, like a fact cannot be proved by laboratory activity but generalisation can be. Similarly lecture method will not be effective enough to test presence of starch in potato. Likewise technology will not prove to be effectively used without considering nature of content and pedagogy being used. While teaching, these three basic knowledge domains interact and intersect, giving rise to four more knowledge structures of teachers which are as follows.

4. **Pedagogical Content Knowledge (PCK)** refers to content knowledge that deals with the teaching process (Shulman, 1986). It basically focuses on teaching a particular content, keeping in mind the learners' cognition level, abilities, learning difficulties and educational context. In diverse classrooms of the present era, teacher's have to satisfy students with different learning styles. In such situations, teachers knowledge about different pedagogical strategies and how to integrate this knowledge with their subject knowledge becomes essential for providing meaningful learning experience to 'All' students. Lecture and demonstration may not achieve all learning outcomes and satisfy every student's learning needs. There may be some kinesthetic learners for whom role play could serve the purpose, there may be some for whom hands on activities may be required for learning to take place. Understanding a learner's need, abilities and cognition level makes one of the most important aspects of pedagogical content knowledge.

Later Kohler & Mishra (2006) added three more knowledge structures giving emphasis to technological knowledge in a different perspective which include:-

5. **Technological Content Knowledge (TCK)** involves understanding of selection of appropriate technology that is best suited for the content to be transacted in class.
6. **Technology Pedagogical Knowledge (TPK)** involves understanding of selection of most suitable technology keeping in mind the constraints of pedagogy being used.

Then they explained how TPK, TCK and PCK also intersect with each other and give rise to a separate knowledge domain called **Technological Pedagogical Content Knowledge**. Keeping in mind the importance of these knowledge structures in teaching-learning, a training programme was conducted by the researcher to enhance teachers' knowledge structures required for integration of technology in teaching-learning.

The paper is built from the researchers' observations and findings of the conducted training programme.

Objectives of the Study

1. To study the difference in confidence levels of secondary school in-service Science teachers in integration of content, pedagogy and technology.
2. To study the difference in perception of teachers on integration of content, pedagogy and technology.
3. To study the difference in the knowledge structures of secondary school in-service Science teachers before and after the training.

Methodology

Design

This study was carried out to understand the knowledge structures of Science teachers and to strengthen them to integrate content, pedagogy and technology while teaching through a training programme. Training began with administration of pre-tests (test

on knowledge base and a confidence scale), followed by capacity building activities. Sessions were focussed on building conceptual clarity, skill development through hands on activities, concept mapping, demonstrations, group discussions, presentations and practical sessions. Part to whole method was tried out in a systematic way wherein the teachers were reminded of the structure of Science, Scientific methods, Science processes, Science related values as a first step. Then they were helped to recall various methods, their merits and demerits through various activities. Hands on experiences with various softwares/ technologies especially deliberations on why, when and how of using them in the classroom teaching were discussed. Focus was on equipping and strengthening the content knowledge, pedagogical knowledge and technological knowledge and then through various activities opportunities were created wherein the teachers tried to integrate them in developing lesson plans. The lesson plans were discussed, analysed, modified and implemented in a simulated situation during the training programme. Constructive feedback was provided by the resource persons and co-participants.

Scores of pre-test and post-test are compared to see the difference in knowledge base of teachers. Frequencies and percentages were calculated for the responses of the participants on confidence scale.

Contents of the Training Programme

1. Content Knowledge – nature, types, construction
2. Pedagogical Knowledge – methods, approaches, strategies
3. Technological Knowledge – nature, scope and importance, ICT tools in planning, implementation and assessment
4. Pedagogical Content Knowledge - alternate conceptions, assessment, etc.
5. Integration of technological knowledge with the other knowledge structures

Sample for the Study

A five day capacity building programme focusing on integration of content, pedagogy, assessment and technology was carried out wherein 27 in-service Science teachers from 14 different states of India participated.

Tools Developed and Used

1. **Need Assessment Format:** Need assessment has been carried out through a questionnaire, to identify the training needs of the Science teachers with respect to content, pedagogy, technology, assessment and their integration. It consists of 15 statements and participants responses were collected on two criteria, namely- "I am comfortable at" and "I hope to learn".
2. **Pre-test and Post-test for testing the Knowledge Structures:** Parallel forms of tests were developed with 26 situational testing questions testing content knowledge, pedagogical knowledge, technological knowledge and questions to test teachers ability to integrate these three domains including assessment while teaching. Each correct answer was assigned 1 mark. Total score was given out of 26.
3. **Confidence Scale**: It is a rating scale ranging from 'extremely confident' to 'not at all confident'. It encompasses 32 statements to see participant's entry and exit level confidence in above-mentioned knowledge structures.
4. **Reflection Forms:** It consists of 7 closed-ended questions on duration, reading material, interactivity, presentation and resourcefulness of training programmes. Reflection form also includes open-ended questions on knowledge or skills acquired during the session, positives and negatives of the session and scope of improvement in the area. Overall, perception of the teachers on the training programme were collected through these forms.

Analysis and Interpretation of Data

To study the confidence of secondary school in-service Science teachers in integration of content, pedagogy and technology before and after intervention, the frequencies and percentages of responses of teachers on confidence scale were calculated as given in Table 1:

Table 1: Frequencies of Responses on Confidence Scale Before and After the Training Programme:

S.No.	Statement	Before training			After training		
		EC* f(%)	MC* f(%)	NC* f(%)	EC* f(%)	MC* f(%)	NC* f(%)
Content Knowledge							
1.	Using various ways of constructing scientific knowledge among students	2(7.4%)	18(66.7%)	5(18.5%)	14(51.9%)	10(37.0%)	1(3.7%)
2.	Identifying various components of scientific knowledge	3(11.1%)	15(55.6%)	6(22.2%)	14(51.9%)	9(33.3%)	1(3.7%)
3.	Satisfying queries of my students on Science	3(11.1%)	18(66.7%)	4(14.8%)	15(55.6%)	8(29.6%)	1(3.7%)
Pedagogical knowledge							
4.	Using various methods of teaching Science	2(7.4%)	20(74.1%)	4(14.8%)	12(44.4%)	11(40.7%)	1(3.7%)
5.	Selecting methods based on their merits and demerits	3(11.1%)	18(66.7%)	5(18.5%)	15(55.6%)	8(29.6%)	1(3.7%)
6.	Adapting my teaching based on students current knowledge	7(25.9%)	15(55.6%)	4(14.8%)	16(59.3%)	6(22.2%)	2(7.4%)
7.	Managing efficiently the class in group activities.	7(25.9%)	17(63.0%)	2(7.4%)	15(55.6%)	5(18.5%)	3(11.1%)
8.	Motivating students through various pedagogical practices	6(22.2%)	18(66.7%)	2(7.4%)	14(51.9%)	7(25.9%)	3(11.1%)
9.	Engaging students with sustained involvement in the class	4(14.8%)	19(70.4%)	3(11.1%)	14(51.9%)	7(25.9%)	2(7.4%)
10.	Adapting my teaching style to the needs of diverse learners	5(18.5%)	14(51.9%)	7(25.9%)	11(40.7%)	10(37.0%)	2(7.4%)
Technological Knowledge							
11.	Using ICT tools in the teaching learning process	1(3.7%)	8(29.6%)	17(63.0%)	5(18.5%)	20(74.1%)	0(0.0%)
12.	Solving problems that arise while using technology in classroom	3(11.1%)	8(29.6%)	14(51.9%)	6(22.2%)	16(59.3%)	2(7.4%)
13.	Using ICT for assessing students' learning	2(7.4%)	10(37.0%)	14(51.9%)	8(29.6%)	13(48.1%)	3(11.1%)

14.	Using technology to report the students' progress to parents	0(0.0%)	9(33.3%)	17(63.0%)	7(25.9%)	14(51.9%)	3(11.1%)
15.	My rights and responsibilities in using digital resources and tools	3(11.1%)	12(44.4%)	11(40.7%)	10(37.0%)	14(51.9%)	0(0.0%)
16.	Using ICT to collaborate with colleagues	2(7.4%)	11(40.7%)	10(37.0%)	11(40.7%)	11(40.7%)	3(11.1%)
Integration of content, pedagogy and technology while teaching							
17.	Demonstrating understanding of safe, legal and ethical use of digital information and technologies	4(14.8%)	8(29.6%)	12(44.4%)	11(40.7%)	10(37.0%)	1(3.7%)
18.	Selecting appropriate approach or method or the content to be taught	1(3.7%)	13(48.1%)	13(48.1%)	7(25.9%)	15(55.6%)	1(3.7%)
19.	Treating facts, theories, concepts, laws with an appropriate method or strategy	1(3.7%)	13(48.1%)	13(48.1%)	9(33.3%)	13(48.1%)	1(3.7%)
20.	Designing the assessment formats based on the methods of teaching	2(7.4%)	11(40.7%)	13(48.1%)	7(25.9%)	15(55.6%)	0(0.0%)
21.	Re-organising the content and deciding the pedagogy accordingly	3(11.1%)	14(51.9%)	9(33.3%)	10(37.0%)	14(51.9%)	0(0.0%)
22.	Using different forms of assessment to check students' performance in a classroom	4(14.8%)	13(48.1%)	9(33.3%)	9(33.3%)	13(48.1%)	2(7.4%)
23.	Selecting technology that aids in constructing concepts, theories etc.	3(11.1%)	7(25.9%)	15(55.6%)	8(29.6%)	17(63.0%)	0(0.0%)
24.	Choosing technology to enhance the content for a lesson	1(3.7%)	12(44.4%)	12(44.4%)	10(37.0%)	15(55.6%)	0(0.0%)
25.	Selecting and using ICT tools to promote process skills among the students	2(7.4%)	10(37.0%)	13(48.1%)	8(29.6%)	17(63.0%)	0(0.0%)
26.	Using technologies that enhance my teaching approaches for a lesson	1(3.7%)	9(33.3%)	14(51.9%)	7(25.9%)	16(59.3%)	1(3.7%)
27.	Selecting and using ICT and teaching strategies to cater to diverse needs of learners	3(11.1%)	6(22.2%)	15(55.6%)	6(22.2%)	17(63.0%)	1(3.7%)
28.	Using ICT to assess, record and analyse student's data	0(0.0%)	8(29.6%)	16(59.3%)	6(22.2%)	16(59.3%)	2(7.4%)
29.	Designing activities to make learners active participants.	3(11.1%)	8(29.6%)	13(48.1%)	8(29.6%)	16(59.3%)	0(0.0%)
30.	Designing lesson plan and implement using ICT tools with the desired pedagogy	0(0.0%)	8(29.6%)	15(55.6%)	9(33.3%)	13(48.1%)	1(3.7%)

31.	Teaching lessons appropriately combining content, pedagogy and technology	0(0.0%)	13(48.1%)	12(44.4%)	12(44.4%)	11(40.7%)	2(7.4%)
32.	Managing the class when content, pedagogy and technology integrated lesson is implemented	0(0.0%)	5(18.5%)	20(74.1%)	8(29.6%)	16(59.3%)	1(3.7%)

*Note: EC: Extremely Confident
MC: Moderately Confident
NC: Not at all Confident

From the above table it is evident that there is increase in confidence level of teachers in integrating the content, pedagogy and technology while teaching. There is a shift in the confidence level from moderately confident to extremely confident and reduction in number of individuals who are not confident when compared before and after training in the content, pedagogical and technological knowledge. Among the three, the increase is more in technological knowledge of teachers after the training programme.

It is also observed that there is high number of teachers who were not confident in integrating content, pedagogy and technology while teaching before training, which came down to one to two persons on one side. Number of teachers who responded extremely confident increased after training on the other side. During the discussions, *many of the teachers informed that they were not aware of the softwares, free and open ICT tools that could be used to enhance the teaching learning process and also expressed that they took it for granted that it was too difficult to even learn them. Some who knew about some of the tools were not knowing* as to how to integrate them while teaching.

To study the difference in perception of teachers on integration of content, pedagogy and technology, a questionnaire was administered to all 27 participants online. It was evident from the responses of questionnaire that teachers were competent in their subject knowledge, they also had basic awareness about teaching processes. Teachers were found to possess lower level of awareness about educational tools available. Though some teachers were aware of a few digital tools, but none was found equipped enough in integration of three i.e. content, pedagogy and technology. Analysis also revealed that though the teachers had mastery over the content but they were not aware about the different categories of content and how each content category could be identified and how to select pedagogy keeping in mind the nature of content. Selection of teaching method according to content emerged as one of the challenging area. Similarly, lacuna was observed in teacher's knowledge related to selection of technology based on nature or category of content and teaching method used.

During training, reflection forms were given to participants after each session to collect their feedback on each session. Analysis of reflection forms and semi-structured interview with participants (held after training) reveals following changes in participant's perceptions towards content, pedagogy, technology and their integration in Science teaching-learning process:

- "I never analysed content before teaching. I understood why I was not able to select method to teach. Identifying various components of scientific knowledge and understanding the process of acquiring them, made selection of the method of teaching easy."
- "Importance of identifying misconceptions of students consciously was never a part of interventions. Now I understand that if I address those conceptions half the work is done. How to handle them also is now made clear in this training programme."
- "It was always difficult to manage the group activities within the class time. I

learnt planning and executing especially group activities within the time limit in these five days."

- "During the training programme using ICT in various activities gave me confidence and I am now comfortable to use it not only for improving teaching-learning but also for my professional growth and collaborating with colleagues."

Some teachers also expressed that they could understand safe, legal and ethical use of digital information and technologies. Now they are confident of using it the way it has to be.

- "Assessment for and of learning were known to us, but assessment as learning was new to us. We could understand that assessment surely helps us to understand ourselves better. We could design the assessment formats like rubrics, worksheets, portfolios based on the methods of teaching during the training programme."
- "Even though I know various free and open source, software, I was not sure of which one, when and how to use them to enhance the content and the method of teaching."
- "Employing ICT tools that are responsive to students learning styles is one of the point that I realised during this training programme. Consciously we were made to think of various activities through which process skills are promoted and ICT usage in the process."
- "How to make assessment an integral part of the lesson using ICT is a new thing which I learnt here. Added to this I also understood how ICT can make it convenient to record and analyse student's data."
- "Designing lesson plans with integration of content, teaching methods, assessment and technology gave a concrete experience due to which we are confident of using it in our future classes."
- "I realised when and where to use ICT. It is important to understand that if used judiciously ICT can really help us in substitution, augmentation, modification and also redefining the concepts."

To study the difference in the knowledge structures of secondary school in-service Science teachers before and after training, total score obtained on content knowledge, pedagogical knowledge, technological knowledge and integration of all these was calculated and a paired sample test was employed. The results of the test are tabulated below:

Table 2: Mean difference of knowledge structures of teachers before and after training

Knowledge structures		Mean	N	S.D.	T
Content Knowledge	Pre-test	3.39	31	1.667	*10.531
	Post-test	5.87	31	1.875	
Pedagogical knowledge	Pre-test	4.97	31	1.278	*9.613
	Post-test	6.94	31	1.769	
Technological knowledge	Pre-test	2.77	31	1.203	*8.563
	Post-test	4.90	31	1.446	
Integration of CK, PK, TK	Pre-test	1.61	31	0.919	*7.255
	Post-test	3.65	31	2.229	
Overall	Pre-test	12.77	31	3.008	*16.434
	Post-test	21.35	31	4.957	

* Significant at 0.05 level

From the above table it is evident that there is a significant improvement in content knowledge, pedagogical knowledge, technological knowledge and integration of all these among the teachers.

Discussion

Understanding of knowledge structures was not an easy task, nor developing the knowledge bases among teachers. It requires a comprehensive understanding of the core knowledge and interaction of the knowledge within the teaching context (Mishra & Koehler, 2006; Niess, 2005). Although pre-service teachers were confident about the complementary knowledge bases before field experience, their use of ICT during field experience was limited. It is all the more challenging with inservice teachers who had to unlearn and relearn certain aspects of teaching.

It was found that the inservice teachers were good in their subject matter, but were not understanding the structure of Science, and process of acquiring scientific knowledge. In turn they have a knowledge base of various methods/approaches of teaching, but again were not confident enough to decide when to use what. Technology is an area of interest to most of the teachers; what, where, when and how of integrating it is the most difficult task. What, why, when and how of integration were the buzz questions during the training programme.

Part to whole method was tried out in a systematic way wherein the teachers were reminded of the structure of science, scientific methods, Science processes, Science related values as a first step. These helped them recall various methods, their merits and demerits through various activities. Hands on experience with various softwares/ technologies especially deliberations on why, when and how of using them in the classroom teaching were discussed. As a result they were able to integrate them in making a lesson interesting and complete in its own sense.

Conclusion

Exposure, updation and practice would help in strengthening the knowledge base of teachers. Providing opportunity to share, explore and contemplate on the practices would improve their teaching learning process.

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Conceptualising Learning Outcomes in Science at the Upper Primary Stage and its Integration in Classroom Processes

Abstract

The paper discusses the conceptual ideas of learning outcomes in Science at the upper primary stage and how the learning outcomes are derived from the curriculum expectations. The paper also explains the broad nature of the learning outcome and how they are interdisciplinary in nature and involve crosscutting concepts. Further, the paper also illustrates some strategies to be adopted by teachers for integration of learning outcomes while transacting concepts in Science at the upper primary stage.

Introduction

The National Curriculum Framework (NCF) – 2005 clearly envisages quality education as a prime goal. It is expected that all children learn and have opportunities to become autonomous learners and acquire the knowledge and skills needed to become global citizens. This demands setting goals that are clear and measureable. Often teachers are not clear about what kind of learning is desired and the criteria against which it could be assessed. They use textbooks as the complete curriculum and assess children using questions and exercises given at the end of the unit.

The document "learning outcomes" at the Elementary Stage prepared by NCERT provides outcomes for each class subject wise. These learning outcomes are expected to help the teachers to direct their teaching learning in the desired manner and also make other stakeholders, especially the parents/ guardians, school management committee (SMC) members, community and the state functionaries responsible and alert towards their role for ensuring quality education.

Science Curriculum Expectations and Learning Outcomes at the Upper Primary Stage

Learning outcomes and curriculum expectations are closely related. Usually learning outcomes are derived from the curriculum expectations. Learning outcomes are statements that describe what the learners must know or have attained at the end of a course of study that is measurable in a qualitative or quantitative manner. The National Curriculum Framework (NCF-2005) recommends that at the upper primary stage, the child should be engaged in learning the principles of Science through familiar experiences, working with hands to design simple technological units and modules and continuing to learn more about the environment and health, including reproductive and sexual health. At the upper primary stage Science is introduced as a discipline for the first time. Science education at this stage should provide a gradual transition from Environmental Studies of the primary stage to elements of Science and Technology. Scientific concepts are mainly to

be arrived at from activities and experiments. Group activities, discussions with peers and teachers, surveys, organisation of data should be important components of pedagogy. Thus, if we want our children to learn principles of Science through familiar experience and working with hands to design simple technological modules, the learning outcome should necessarily reflect the expectation we have from children. Hence, it is important that the learning outcomes are in consonance with curriculum expectations (curriculum objectives).

The details of learning outcomes in Science to be achieved at the upper primary stage are listed in the Learning Outcome documents prepared by NCERT. A part of the learning outcomes in Science for Class VII is shown in Table 1 as an illustration. The right column lists the learning outcomes to be achieved and the left column outlines the suggested pedagogical processes. The learning outcomes and suggestied pedagogical processes are not in one to one correspondence.

Table 1: Class VII Science Learning Outcomes

Suggested Pedagogical Processes	Learning Outcomes
The learner is to be provided with opportunities in pairs/ groups/ individually in an inclusive setup and encouraged to — • Explore surroundings, natural processes, phenomena using senses viz. seeing, touching, tasting, smelling, hearing • Pose questions and find answers through reflection, discussion, designing and performing appropriate activities, role plays, debates, use of ICT, etc. • Record the observations during the activity, experiments, surveys, field trips, etc. • Analyse recorded data, interpret results and draw inference/ make generalisations and share findings with peers and adults. • Exhibit creativity presenting novel ideas, new designs/patterns, improvisation, etc. • Internalise, acquire and appreciate values such as co-operation, collaboration, honest reporting, judicious use of resources, etc.	The learner — • Identifies materials and organisms, such as, animal fibres; types of teeth; mirrors and lenses, on the basis of observable features, i.e., appearance, texture, functions, etc. • Differentiates materials and organisms such as, digestion in different organisms; unisexual and bisexual flowers; conductors and insulators of heat; acidic, basic and neutral substances; images formed by mirrors and lenses, etc. on the basis of their properties, structure and function. • Classifies materials and organisms based on properties/characteristics, e.g. plant and animal fibres; physical and chemical changes. • Conducts simple investigations to seek answers to queries, e.g. Can extract of coloured flowers be used as acid-base indicator? Do leaves other than green also carry out photosynthesis? Is white light composed of many colours? • Relates processes and phenomena with causes, e.g. wind speed with air pressure; crops grown with types of soil; depletion of water table with human activities, etc.

As mentioned in the earlier para, learning outcomes are those that are attained or acquired and that can be identified through certain assessment. This means that learning outcomes are products that are based on specific processes that produce the product. However; learning as a process of construction of knowledge also implies that during the process of acquiring a concept, structuring and restructuring of ideas take place and a number of interrelated concepts and learning outcomes emerged and they are to be tackled and integrated in the teaching learning process. These outcomes which emerge during the course of teaching learning process are also 'learning outcomes'. The classroom transaction is crucial in this context. For example, to help the children

learn the concept of certain materials dissolved in water, the teacher along with the children perform an activity/experiment. The teacher asks a child to drop a spoonful of sugar in a glass of water and stir. It is found that the solid sugar disappears (dissolves) in water. Subsequently, a child drops a few pebbles in another glass of water and stirs. The child finds that the pebbles remain in the water and do not disappear (insoluble). From the activity, it can be inferred that certain materials dissolve and some do not. The product (knowledge) that some materials dissolve and some do not is the 'outcome'. Of course the process of finding it is also an 'outcome'. It means the child has to demonstrate or illustrate the method of finding out that some materials dissolve and others do not.

The pedagogical processes are intended to give directions to teachers to design learning situations for students. In transacting a concept, the learners are actively engaged in the process of constructing knowledge. Learners construct their knowledge by connecting new ideas to the existing ideas on the basis of materials/activities presented to them. The process may include engaging learners with activities such as exploring surroundings, designing and performing appropriate experiments, recording observations during the experiment, etc. Therefore, teachers' understanding of learners' experiences and existing ideas are very important for designing teaching–learning situations. The teachers are also expected to design appropriate learning situations as per the availability of resources and local context. It is expected that the teacher will provide opportunities to the children to engage in the practice of Science and construction of scientific knowledge. Thus, it is also important to view the learning outcome as a part of the process of development and changes in the students' personality rather than being only the final product of specific inputs and processes. In actual classroom transaction, a number of learning outcomes may get touched upon in the course of transaction (it is discussed in illustration II). Further, many learning outcomes are also recursive. For example 'conducts simple investigations' as an outcome gets revisited while conducting activity/experiment during teaching learning of different concepts in Science. The teacher may take note of these learning outcomes and organise them in a logical sequence during the transaction process.

Illustration I: Leaning outcomes are broad and interdisciplinary in nature.

Let us take one learning outcome from class VII i.e *'differentiates materials such as conductors and insulators of heat; acidic, basic and neutral substances; images formed by mirrors and lenses, etc., on the basis of their properties, structure and function'*. When we talk of the learning outcome *'differentiates materials'* without giving any specific items for differentiation, we can assume that it is a general learning outcome because differentiating materials may involve a wide range of materials to be differentiated on the basis of their properties, structure, function, etc. and it gives no specific way to differentiate materials. However, when we say "differentiates materials on the basis of conductors and insulators of heat," it gives us a specific way to differentiate materials and it can be said that it is a specific learning outcome. Identifying the basis on which materials are to be differentiated is important so that appropriate activity can be designed for the learners. It is also to be remembered that examples given in learning outcome *'differentiates materials'* are only directional and are not exhaustive. It is expected that whenever the teacher teaches any concepts, the idea of differentiating materials may be applicable to those concepts also. The learning outcomes listed in the Learning Outcome document of the NCERT are broad and the examples listed for differentiating materials are only directional to achieve learning outcomes in the context of some specific items/situations.

Learning outcomes are also interdisciplinary in nature and involve crosscutting concepts that are intended to lead to a Science learning in a coherent way. For example, the learning outcome from Class VII Science "relates processes and phenomenon with causes" could be discussed in the context of core concepts of Science such as motion of an object or adaptation of animals and plants with their habitats or expansion of air on heating. The idea is also to make them appreciate the interconnections among concepts and integration of these crosscutting concepts with practices and day-to-day life. What is important here is the need to provide sustained opportunities to children to engage in practical applications of Science.

Illustration II. Incorporating learning outcomes in the teaching learning process:

Transfer of Heat

An example to integrate learning outcomes while transacting transfer of heat concept from NCERT Class VII Science textbook is discussed. This may be treated as one of the strategies while a teacher may have other ways of transacting the same concept. The key idea is that the adopted strategy should enable the learner to construct knowledge and incorporate learning outcomes in classroom processes. In the transaction of the concept of transfer of heat, learning outcomes such as **"***Conducts simple investigation; relates process and phenomena with causes; differentiates and classifies materials on the basis of their properties; applies learning of scientific concepts in day-to-day life; exhibits creativity in making use of available resources"* get interwoven during the course of the transaction of this concept.

Classroom Transaction

Think of a situation in which an object becomes hot. You might have witnessed various objects becoming hot, such as a frying pan becomes hot when kept on a flame.

In this process teacher may ask students to:

a) Share their experiences about objects becoming hot in their surroundings.

b) Make a list of situations in their surroundings in which transfer of heat is involved.

Let us try to explore how heat is transferred from one place to another. One way to explain it is by performing an activity or experiment. Let us perform the following activity.

Activity 1: To show transfer of heat in a metallic strip (The activity is to be performed by involving student)

Learning Outcomes: *Conduct simple experiments; relates process and phenomena with causes.*

The teacher may involve students in arranging materials for performing the activity and ask them to bring some of the material required for conducting the activity. The activity described below is one among the many activities that a teacher can perform.

Materials required: A metal rod, wax, and candle.

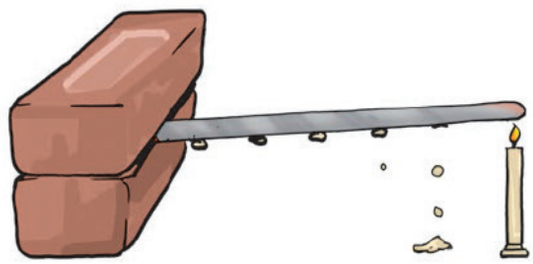

Figure 1: Flow of heat through a metallic strip.

- ✓ Take a rod or flat strip of a metal say of aluminium or iron.
- ✓ Fix a few small wax pieces on the rod. These pieces may be placed at nearly equal distances as shown in the figure 1.
- ✓ Clamp the rod to a stand. If you do not find a stand, you can put one end of the rod in between bricks.

- ✓ Now heat the other end of the rod for a while and observe.
- ✓ What happens to the wax pieces?

The teacher may initiate discussion and ask students: Do the wax pieces begin to fall? Which pieces fall first? Do you think that heat is transferred from the end nearest to the flame to the other end? Teacher may help students conclude that heat is transferred from a hotter place to a colder place and this process is known as conduction.

Thus, it may be concluded that the process in which heat is transferred from a hotter place to a colder place is called conduction.

Activity 2: The teacher facilitates a group activity by performing the following activity. The activity is also to be performed by students in small groups or individually.

Learning Outcomes: *Differentiates and classifies materials on the basis of their properties*

The teacher may ask students to perform the following activity in groups/individually. Students may be asked to bring some article such as a steel spoon, plastic scale, pencils, iron nails, etc.

- ✓ Some water is heated in a small pan or a beaker.
- ✓ One end of the articles such as a steel spoon, plastic scale, pencils, iron nails, etc. are dipped in hot water as shown in figure 2.
- ✓ After a few minutes touch the other end.
- ✓ What do you observe? Does the other end become hot?

Figure 2: Conduction of heat by different materials

Table 2

S. No	Article	Material which the article is made of	Does the other end become hot Yes/No
1	Iron nail	Metal	Yes
2	--------		
3			
4			

From table 2 teachers may help the student in arriving at the conclusion that materials which allow heat to pass through them easily are called conductors of heat. For example, steel spoon and iron nail. The materials which do not allow heat to pass through them easily are poor conductors of heat and they are known as insulators. For examples, plastic scales, wood, etc.

Assessment

Teacher may

a. Ask students to discuss among themselves and identify some of the applications of conductors and insulators of heat in their daily life.

b. Give opportunities to students to create utility items such as handle of a steel kettle, handle of a frying pan using available resources in the surroundings.

(Learning outcomes: exhibits creativity in making use of available resources, applies learning of scientific concepts in daily life)

Conclusion

The learning outcomes are derived from the curriculum expectations. It is important that learning outcomes are in consonance with curriculum expectations. The outcome based education demands teachers to direct their teaching learning in the desired manner and also make other stakeholders responsible and alert towards their role for ensuring quality education. During the process of acquiring a concept, structuring and restructuring of ideas takes place and a number of interrelated concepts and learning outcomes emerge

and they are to be identified, tackled and integrated in the teaching learning process. These outcomes which emerge during the course of teaching learning process are also 'learning outcomes'. Hence, it is necessary to incorporate learning outcomes during classroom transaction processes to achieve the desired learning in children.

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The Draft National Education Policy 2019 (Do we Really Learn from Past Experiences?)

Abstract

This article raises concern regarding lack of action on the recommendations of past policies and issues pertaining to teacher recruitment process. It presents recommendations of the draft NEP 2019 on some specific aspects on role of the teacher recruitment principles and procedures, professional and career development, their governance and management by the administration. It suggests developing a conducive school culture and environment, stressed on relieving teachers from non-teaching activities, emphasis on continuous professional development of teachers and career management to improve school education.

The National Education Policy 2019, which intends to bring broad reform in the field of education, was released for public scrutiny and feedback from June 1 to June 30, 2019 was extended to 31st July. It has presented a vision and plan of action to create a robust, sustainable, India-Centric Education keeping the global context in mind. The document is broadly divided into four parts and 23 chapters, which covers the issues ranging from school education, higher education, technology in education, vocational education, adult education, promotion of Indian languages, Rashtriya Shiksha Ayog, to the empirical aspect of policy implementation (addendum and appendices).

Chapter 'Five' of the policy document talks about issues related to school teachers. This chapter covers issues of teacher recruitment, deployment, school culture, professional development, career management and teacher education. It has been observed in the past that educational policy documents had given sound suggestions and recommendations to improve the educational system of the country, but either they could not be implemented in the same spirit as proposed or were unable to address the issues effectively. One of the cited reasons of failure of the policies is not being rooted in contemporary contextual realities and examine whether this policy is not making the same mistakes analogous to the past policy documents. This paper has focussed, on whether the drafting committee has learnt from past failures of policies? Does the document reflect the pragmatic aspects of policy implementation?

This paper has critically examined some of the issues discussed under the 'Teachers' (School Education) section of the policy document. This analysis is based on analysing some of the recommendations in the light of past policies and the author's experience as a former government school teacher, who is aware of grassroot realities of some rural schools. The purpose of analysis is to provide feedback for more nuanced, specific and contextual plan of action for implementing the policy, keeping the multi-dimensional, structural, functional constraints of the education system in mind. It is also important to highlight some ground realities in their simple and straight form. It can provide a different perspective for deliberation on some issues from the teacher's view point, as the drafting committee which consulted

217 eminent experts from the field did not include a single teacher from the 80 lakh teachers working in schools in the country as reported by *First post* (Anurag Kundu, June 19, 2019).

Before proceeding to discuss the different aspect of 'teachers', a brief idea about a 'school complex' which has been repeatedly discussed in the draft is needed. The idea of 'teacher: as a change agent' revolves around the 'school complex' in the document. According to the draft document-

> Each school complex will be a semi-autonomous unit that will offer education from the Foundational stage (age 3-8 years) till Grade 12 (age 18). The complex will consist of one secondary school (covering Grades 9-12) and all the public schools in its neighborhood that offer education from pre-primary till Grade 8. All the schools that are part of a complex will be chosen due to their proximity to each other, forming a logical geographical group. The school complexes will also have pre-school centres/Anganwadis, vocational education facilities, an Adult Education Centre (AEC), etc. associated with them. (draft NEP 2019, p169)

> ……the size and composition of the school complexes can vary, but the grouping must ensure convenience of access for students and families, administrative ease for the State government, and a support system for teachers and principals.

When we closely look into the proposed structural and functional design of a school complex, it is similar in many aspects to BRC/CRCs envisaged in SSA. "…the role of BRC/CRC is a mixed set of academic, supervisory, managerial, networking and creative activities; it goes beyond routine monitoring and supervision work as it encompasses providing support to schools and teachers through teacher training and teacher mentoring for their professional growth, strengthening community school linkage, providing resource support and carrying out action research (Tara, Kumar, Ramaswamy, 2010)". The structures and functions of BRCs and CRCs were well defined, but hardly able to bring effective change in teachers' quality. The new idea proposed of 'School complex' which is vague in many aspects of teacher development. How would it lead to improvement in quality of teachers? We would also look into some of the recommendations for teachers, these at many places seem either oblivious to the on-ground factual realities and are hypothetical in nature.

The paper is divided into four sections broadly to evaluate some of the recommendations on 'Teachers' of the school section. The first section covers issues related to recruitment and deployment while the second section talks about recommendations on school culture and environment. In the third section there is discussion regarding Continuous Professional Development and the fourth section highlights some of the recommendations on career development.

Effective Teacher Recruitment and Deployment

a) **Scholarship:** The draft policy says Merit based scholarship would be provided to the students to attract brilliant students for the profession. This scholarship will be funded and established in collaboration with governments, colleges universities and philanthropic organisations. This is basically meant to achieve two targets; one to meet the local requirements of the students (language barrier in communication) and providing employment to the candidates from under privileged background especially girls'. There is ambiguity regarding funding of this kind of scholarship. Who will fund and in what proportion? As far as private players are concerned, why will they fund such kind of programmes. What will be the share of respective governments in funding? Where will these students be

trained? Will those colleges be different from the usual B.Ed. colleges or all normal colleges? On all these issues suggestions need to be more specific in terms of implementation rather than ideal assumptions.

b) **Selection Process:** The policy states Rigorous and exhaustive selection process will be used for transparent recruitment of teachers. Selection test will involve comprehensive TET as first screening test, and second screening will be for testing teacher aptitude. This would involve an interview and a short 5-7 minute teaching demonstration. This second screening would take place at the local BRC, or in case that is not possible, via a phone call and a demonstration video sent electronically. For subject teachers, a separate NTA subject score would be counted. NTA score and TETs would be compulsory for private schools too. (draft NEP 2019, PP.121-122).

Some critical points in this section are, who will conduct these transparent examinations? At the state level corruption has loomed over almost all the examinations? The interview part is also somewhat problematic in many ways? Who will be the examiner at the BRC level, whether he or she will be efficient enough to gauge the teaching ability of a candidate? With rampant nepotism, and corruption; sanctity of demonstrations and interviews are seriously questionable. Keeping corruption in mind the Indian government had banned interviews from January 1, 2016 for Group D, C and B non-gazette posts in the central government, (Indian Express, October 25, 2015). Teacher recruitment falls under Group C of recruitment. Is there any data which suggests that culture of shifarish (recommendation) or corruption has ended? If not stopped then how will recruitment be transparent or impartial? Keeping the ground realities in mind, it has to be more specific and elaborate on transparent recruitment.

c) **Pupil-Teachers Ratio:** The Policy has emphasized maintaining desired pupil teacher ratio for which it suggests that 'The practice of assigning teachers to individual schools based on overall student-teacher ratios will be replaced by a much more careful assignment system based on the educational needs of the children. Given that teachers can be shared across the school complex, this will not cost as much as it would have to fulfill PTR ratios in each subject at the level of individual schools' (NEP 2019).

One aspect of this is that government do not want to put emphasis on making individual schools capable of all resources in the schools. As for deployment of a teacher is concerned, there are some regions or schools which have surplus teachers while others have very few teachers (as accepted in the draft). The basic question is why is there an acutely distorted distribution of teachers? Corruption, political and bureaucratic interference and mismanagement by the state and administration are some of the common reasons cited. Considering the school complex as a unit to count PTR may be sound on paper, but it will seriously distort PTR at school level. Policy of exchange of teachers will erase the accountability of government/ administrators to ensure PTR at school level. Those who will pay bribe or have approach will attach themselves to the complex and may not reach school or may permanently stay in the school complex which might be better resourced. This is what is happening already in the form of schools having surplus teachers, except some cases where student enrolment declined sharply leading to surplus teachers mostly there are reason extraneous to education. Schools having more teachers will be converted to single or a few teachers school. The *ad-hoc* teachers will come to teach in the school periodically making the alternative to fulfill PTR at school

level to manipulate it at school complex level. This recommendation will seriously affect the deployment, PTR and teaching learning environment in schools, if it is implemented in the form suggested i.e. school complex as a unit to consider and ensure PTR among many schools.

d) **Rural Areas:** The draft policy says incentives to teach in rural areas. These incentives will include, in particular, quality housing on or near the school premises, so that the frequent hurdles for teachers of procuring suitable housing close to schools in such areas are eliminated (NEP 2019). What mechanism will be adopted to implement this? Is the government going to develop teacher colonies? If they have to stay in the house of some villagers then HRA is already in the provision, what is new to the recommendation?

e) **In Service Training:** The draft policy suggests that in-service teacher training centres like the BRC, CRC, BITE, or DIET (recognised as CPD centre) that are associated with the school complex would have newly appointed teachers who will be inducted for professional development for two years. These two years would involved 80% workload compared to older teachers and collaborative learning (theoretical and practical aspects of teaching) in the school complex as well as training centres.

If the teachers are appointed according to the need of schools and only 80% workload will be given to them then, who will carry out the remaining 20% work? Will there be special mentors at schools and training centres to devise and facilitate programmes for such orientations? Do the teachers have enough free time to get involved and collaboratively work with the newly inducted teachers? If it is routine co-operative learning among new and old teachers then what is new in the proposal? There is need for operational reification of Continuous Professional Development programme with reference to two years induction programme of professional development.

In a similar kind of design and aspiration, it was recommended in NEP 1986 that 'each DIET was expected to adopt a part of the district as its "lab area" for direct work with schools' (Akai and Padma). The purpose was to select schools within the district for testing different ideas and solving problems of schools through theoretical brain-storming. These schools were supposed to serve as labs for teachers and educators to plan and test new ideas for how professional development of teachers. Is there any report which gives a clear picture of this noble-hypothetical idea would work ? During two years of pre-service training, I have never heard about it. Here, I would like to highlight that if we learn something from the failure of similar kind ideas in the policy we would have had a more serious comprehensive plan with action strategies to ensure Continuous Professional Development of teachers.

Conducive School Culture and Environment

a) **Infrastructure:** 'The draft policy says All schools will be provided with adequate physical infrastructure, facilities, and learning resources, either individually or within their school complex' (NPE 2019). The idea of having resource either in a school or jointly at the complex is problematic and impractical. It is not possible for a student of one school to go to another school for using the library, laboratory, playground, ICT facilities. Even though it is imagined that transport facility would be available within the complex, it won't be accessible to each schools easily. Beside who will be responsible for the trip. If the girls of the eighth standard are going for laboratory practice in the secondary school, even 3-4 kilometers away from then school and any misbehaviour takes place then who will take the responsibility? There are quite many possibilities where that either the teacher is beaten up by the community or suspended by the department among other outcomes. What about the time

involved in travelling from one place to another? Many other issues might make sharing of resources among schools difficult. There is one benefit in it that the government will not be blamed for not providing resources to every school.

b) **Caring and Inclusive School Culture:** Ideas suggested to make caring and inclusive school culture in the draft policy are superficial and requires serious rethinking. If also appears that ideas recommended in this context are contradictory in themselves. They are more didactic in nature rather concrete plans of action. At one place it is said that The School Management Committee (SMC) shall be sensitised about the need for creating a caring and inclusive school culture on a continuing basis and the officials of the will reorient Directorate of School Education (DSE) them about their functioning to support such a culture. This must be made explicit in their role expectations (NEP draft 2019, PP. 125-126). On the other hand the document itself has accepted that 'Over the past two decades, a large proportion of the socio-economic middle and upper middle class has moved its children to private schools. Thus, the parents of students in public schools are often those with relatively less political and economic influence - they have a smaller 'voice' in the socio-political sphere. This very unequal power equation also impacts the effectiveness of the SMCs and any other form of community engagement with the school. The DSEs across the States continue to manage and govern the schools, with only a secondary role to the SMCs' (Drfat NEP 2019, P. 172).

   The question thus arises, how can the sensitisation of toothless SMCs create a caring environment in the school? Provision for training and sensitisation is already in practice. If the old sensitisation did not work then how will the new provide fruitful result?

c) **Relieving teachers from non- teaching activities:** The draft policy states 'Aside from the minimal Supreme Court directives related to election duty and conducting surveys, teachers will not be requested nor allowed to participate in any non-teaching activities during school hours that affect their capacities as teachers and for any non-teaching jobs at schools, staff must be deployed as needed and shared across the school complex' (NEP 2019 P.126). Analogous to this recommendation, there was one made in RTE 2009 'No teachers shall be deployed for any non-educational purpose other than the decennial population census, disaster relief duties or duties relating to election to the local authority or the State Legislature or Parliament, as the cases may be' (Chapter 4).

Here, I am going to narrate one incident where the officials went to the extent of registering FIR to get the non-teaching duties to be completed. In Amethi District of UP, in the month of June 2017, District Magistrate (DM) ordered the deployment of teachers for verification of ration cards. This task could be done efficiently by someone who knows individuals in the village like the local revenue officer but it was given to the teachers due to pressure from the government to complete the work. This can involve political and social pressure to register wrong information in the ration card at local level to get the benefits from the government for which some person might not be eligible. Though the Teacher Union opposed it but the order was not taken back by the DM. Due to protest some teachers did not join the duty, while others joined out of fear. BEOs of the blocks were ordered to register FIR against the teachers, who did not joining duty. Later teachers were released after filing a case in Allahabad High Court, which quashed the DM's order for duty and FIR.

I would like to highlight that though guidelines are present since for a long time in different policy documents that teachers should not be employed in non-teaching tasks, yet they continue to be involved on a large scale. Is there any specific mechanism given

in the draft policy to effectively implement this regulation? Is there anybody apart from courts where teachers can complain when they are given non-teaching duties? There is need for a concrete mechanism to solve the issue because the educational system is extremely hierarchal and teachers are at the lowest rung of the strata. This practice has been inherent in the system from pre-independence and continues to date.

Emphasis on Continuous Professional Development

Emphasis is given in the draft policy for continuous education of teachers and following a modular approach. Teachers must be given the opportunity to move vertically in the educational chain as academic coordinators or supervisors in their school, master trainers, educational administrators or even as faculty in teacher education institutions.

The Policy proposes various ways to ensure the professional development of teachers like teachers should be allowed to attend short certified modular courses to accumulate credit which can be transferred into professional degrees. It also suggests self directed personal development of teachers using ICT and online courses. It also lays down that at the school level the head teacher/principal is responsible for building strong in-school teacher development processes and supportive school culture. The principal or head teacher in return can get the support from the community within the school complex.

Career Management

a) **Tenure track system of hiring teachers:** The draft Policy recommends that a tenure track system of hiring teachers across all level of schools will be established. Under this provision, teachers will be kept on three year probation and performance assessment would lead to confirmation of the teacher. Multifactor examination of performance which include peer review, dedication and classroom evaluation through multiple sources like review of peers, supervisors, and parents, and evidence of work would be incorporated. The system must be professionally rigorous and fair (P. 130).

Keeping in mind the complexity of grassroot, realities sources through which feedback to take decision can be obtained is not likely to be honest. This feedback would most probably operate on the factor of socio-political-power of participants, bribe, corruption, sympathy and manipulation of evidence. The policy suggests that this will not only be used in confirmation from a probationary position, but for all kind of promotions and increment of salary. Let me make my point more clear; in case of power relation, if the candidate is from a socially and economically strong background then those who are giving feedback cannot write a negative feedback. If it is negative then they will have to be ready to bear the brunt. Money passed across for writing positive feedback is well known and used most commonly. This does not mean everyone is corrupt and will take money and give a wrong feedback but the possibility, is there we see that bribe and money is common to solve issues of the teacher at different levels. Why I say mention sympathy in the list is because peers/parents would not give a negative, comment except some exceptional cases like personal enmity or extreme rustic behaviour. They would not see any direct monetary benefit for themselves, but direct monetary loss for others. One such example is, when pupil teachers from B.Ed. and D.Ed. /BTC colleges were deployed, many time they did not come to schools but wrote reports. Their work was hardly satisfactory, but the feedback reported in most cases was excellent. It was possible due to sympathy or personal or social relations.

Another point is data manipulation,

Lakhs of students are passing every year from elementary schools without learning to read or write a sentence (ASER and NAS reports), but when you look into records of schools, you will see marks entered for every listed activity and tests prescribed. In most cases marks recorded are used for promotion of student from one class to another, which can be basically again manipulated. This does not mean, I am blaming teachers and all going that they manipulate data but that quality of data which is to be used for assessment needs to be analysed. Another example I will give for U-DISE data regarding construction of toilets. Though this data reports a high number, getting real data of functional toilet with water facility gives a totally different picture. So use of evidence of work (there is quite a high probability that evidence can be manipulated though work is not done) for decision making of performance needs to be thought out contextually with all nitty-gritty's and appropriate evidences.

b) **Professional progression via promotions and salary increases**

The draft policy has also emphasised that there will be merit-based promotion and increment in the salary and outstanding performers will be recognised and rewarded. 'Independent of the stage of school education they are currently engaged with, teachers will be able to progress within that stage via merit-based promotions and salary increases. The aim will be to have a clearly-defined promotion-and-salary ladder to mark milestones in professional development and accomplishment, and therefore continuous incentives for conducting outstanding work as a teacher' (Draft NEP 2019, P-131). Performance indicators like PINDICS (Performance Indicators for Elementary School Teachers developed by NCERT can be a useful document and can be used at the initial stage.

c) **Periodic (annual or higher frequency) Performance Appraisal of Teachers**:

The draft policy say that Each state would develop State Professional Standard for Teachers (SPST), coordinated by the SCERT. These standards would be framework as well as specific guidelines for teacher career management, professional development efforts, salary increase, promotion and other recognition. 'Promotions and salary increases will not occur based on the length of tenure or seniority, but only on the basis of such appraisal' (draft NEP 2019). SPST also include the guidelines regarding autonomy and empowerment of teachers along with fixing their accountability. According to the draft policy performance appraisal done in a hierarchal manner. Head teachers would do for teachers within the school, head of school complexes would assess the head teachers of schools, while BEO, and DEO would in return assess the head of school complexes. They policy says 'All appraisals will be based on carefully recorded multiple sources of evidence, comprising minimally of school visits, school records and classroom observations, peer review, and feedback on progress of students. The appraisal must be endorsed by the SMC' (Draft NEP, P. 132).

There are two aspects, one is autonomy and other is accountability. Though it is important to ensure the accountability of teachers, but what about the structural constraints in which teachers work. If accountability of teachers must be stringently ensured, what about the accountability of bureaucrats, policy makers and planners and the state itself? The big mess created in the system is by the other rather than teachers. This mess never allows conducive teaching-learning environment in the schools. Like textbooks are supposed to be given in April (at commencement of session), they are distributed up to October. Sometimes, some books even in November. Distribution of free-bees and involvement of lot of formalities and paper work, allotment of different kind of duties in non-teaching activities is not due

to the teachers. It is someone else who need to be accountable for it. Rampant corruption in the system is more from other ends than teachers. There is more pressure on schools for mantar.... records. Thus record keeping hardly serves any purpose except as tool of manipulation at different level which is basically burdening than unburdening. Is the teacher accountable for all it? An area of extreme distortion in deployment of teachers. Policy makers many times suggest the ideas that are hardly implementable, Ideas like multi grade teaching in the schools are not possible for students who require more individualized attention given their socio-economic condition? Multi grade teaching sends both teachers and student in despair and finally teacher is teacher held accountable for poor performance of students. If there is need for accountability, this must be specifically ensured for every participant in the system.

Coming to autonomy and empowerment of teachers. The basic question is who takes away the autonomy of teachers or is dis-empowering them? And in what form and how is it perpetuated? The NCF 2005 said:

> **Currently, the system of administrative hierarchies and control, examinations, and centralised planning for curriculum reform, all constrain the autonomy of the headmaster and teacher. Even when there is curricular freedom, teachers do not feel confident that they can exercise it without being taken to task by the administration for doing things differently. It is therefore essential to enable and support them in exercising choice. As much as the classroom needs to nurture a democratic, flexible and accepting culture, so also the school institution and the bureaucratic structure need to do the same. Not only should the teacher receive orders and information, but equally the voice of the teacher should be heard by those higher up, who often take decisions that affect the immediate classroom life and culture in the school. (NCF 2005, page 98)**

Giving power to the bureaucrats to conduct performance appraisals along with other powers, would seriously further hamper the autonomy of teachers (as they are already in a dominant position in the system). The situation is so frightening that when inspections happen in the schools many times teachers shiver and feel completely helpless. Along with that giving power to decide salary increments and promotions would seriously affect the power relation between bureaucrats and teachers.

Conclusion

In the above discussion, we have discussed some of the critical issues related to the teachers that require serious, elaborate deliberation especially on part of operationalisation of the recommendations keeping in mind the convoluted, complex and extremely stratified social system in which the education system operates. It also highlighted how things are being operated by the system on the ground which has led to the failure of policies framed to impact and change the education system. There are contradictions at some points like role of SMCs, talking about autonomy simultaneously giving more power to bureaucrats, where policy needs to take a clear stand, what it exactly proposes. One of the key features of document is that it has identified the problems rightly, but the recommendations to improve the system need to be concrete, elaborate and contextualised, learning from past policy, programmes, failures and successes in them and considering the existing ground realities.

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SeasonWatch: Tracking Trees Through the Seasons

Abstract

The paper explains how flora changes during the year and points out that phenology of plants and animals can tell us a lot about our environment. It points out that the phenology (study of cyclic events) of plants also affects the animal phenology. The paper presents data received from volunteers from a survey in a segregated manner from across India.

Introduction

Phenology

Events such as flowering, fruiting, appearance of new leaves in plants, and hibernation and migration in animals, are cyclic. Phenology is the study of the timing of such cyclic events in relation to seasons and climate. For instance, every year, the Red Silk Cotton tree *Bombax ceiba* flowers in the cool dry season between December and February, and the Indian laburnum tree *Cassia fistula* flowers in the hot dry season between April and May. Although trees of these two species flower at different times compared to one another, they do so in sync with other trees of their own species. The Pied cuckoo, a handsome black and white bird, is believed to be the harbinger of rains in India. This bird becomes more common in some parts of India just before the monsoon arrives, and farmers use the sign of its appearance to plan their crops accordingly. Understanding the phenology of plants and animals can tell us a lot about our environment.

Seasonal Changes in Plants

In temperate parts of the world, flowering in trees is often induced by increasing temperatures immediately after the winter season. Some iconic temperate species such as the Japanese cherry blossom tree *Prunus jamasakura* have been blooming so predictably, at the same time each year, that humans have created entire cultural contexts around these events. Records on the timing and intensity of blooming in cherry blossom trees have existed for 1200 years now! Other temperate species, like the Oak tree *Quercus robur*, put out new leaves as soon as there is a desirable increase in temperature. We have very few, comparably documented changes in plant species of the tropical regions. In India especially, because of differences in temperature and monsoon regimes, even the same species of trees show varied behaviour across different regions. Local anecdotal evidence may hint at predictable patterns of change in culturally or economically valuable trees. Some of our cultural festivals such as Vishu (Malayali new year) in Kerala, Ugadi in Karnataka, and Holi in northern India are associated with the flowering phenology of Indian Laburnum *Cassia fistula,* Neem *Azadirachta indica,* and Flame-of-the-forest tree *Butea monosperma*, respectively.

Tree Phenology Affects Animal Phenology

Plants are primary producers and the lives of all consumers are dependent on them. The

seasonal changes that occur in plants are thus, valuable for all animal life dependent on the different emergent stages of plants. Take the example of crops - they are sown at a certain time of the year and harvested at another - both predictable, cyclic, and directly affect human beings. Similarly, the appearance of leaves, flowers and fruits on plants affects the life cycles of other species dependent on these for food and shelter. Let us consider the Oak tree again - as temperature rises at the end of the winter season, the tree puts out new leaves in a sudden spurt (called bud-burst). This bud-burst coincides with the hatching of the larvae of the winter moth which feed on the newly emerging leaves. The larvae, in-turn, are food for chicks of migratory insectivorous birds. Thus, the life cycles of winter moths and migratory insectivores are both linked to the phenology of the oak tree.

Climate Change Affects Tree Phenology

From scientific studies, there is enough evidence to suggest that phenological changes, especially in temperate species, is mostly driven by seasonal changes in temperature. A direct consequence of ongoing climate change due to global warming, has been the advancement or elongation of warmer seasons (like spring and summer). Consequently, plants have been leafing and flowering earlier and earlier each year. This has direct consequences, not only for the plant species, but all other species dependent on the plant. Take again, the example of the oak tree. With warming climate, bud-burst has advanced by several days. In order for the winter moth larvae to survive, they now need to hatch earlier out of their eggs. In order for migratory insectivores to be able to feed on these larvae, they need to migrate earlier than before or starve. These cascading effects of climate change on plant and animal phenology are more apparent in tightly-linked food chains. In the tropics, there is not enough information about such links between plant and animal phenology, much less the effects of climate change on these links. In short, we need more information about these links from lesser-known and unexplored regions of the world.

SeasonWatch program

The Need for Phenology Data

Maintaining phenology data can help us detect changes taking place in our local environment with respect to those occurring globally, as well as over time. Scientists can use the data to study the pace of such changes and predict future changes. Recording phenology data on plants and animals can help us understand which species are at risk due to climate change and which ones are adaptable. In addition to recording changes taking place in the lives of plants and animals, scientists also use phenology data to explore which climatic conditions such as temperature, precipitation or water availability etc. maybe responsible for these changes. This is valuable for not only local communities such as farmers and planters, who are directly affected by the changes in the plant and animal life around them that impact pollination, crop yield etc, but also us, as the changes in our environmental conditions such as water availability and temperature directly affect our lives.

Meticulously kept record of the Japanese cherry blossom over 1200 years, as we saw earlier, have shown that the blossoms that flowered between 10th and 20th April historically, have started flowering before 10th April in the last 50-60 years. And these changes coincide with the warming in our climate. Changes are happening in our environment and we may hear about these changes on television or read about them, making them appear distant and at times difficult to relate to. Phenology data, particularly in the tropical countries, is scarce leaving a gap in our understanding. Keeping phenological records on the lives of

plants and animals, provides an opportunity to observe these changes first hand, giving us a better understanding of what is happening in our own environments. However, the scale at which these data are required is often not attainable in a small research lab or by a few scientists working by themselves. This is where Citizen Science can come to the rescue!

Citizen Science

Citizen science is an umbrella term used for a variety of scientific projects where members of the public and scientists work together and co-create knowledge around a scientific topic or issue. Citizen volunteers help collect data over vast regions such as at the level of a country, or across the world which is not possible for an individual or a small group of scientists to do. The tools of scientific enquiry, as well as the information thus generated is co-created by and is available to a wider community within our society, instead of being restricted with a few scientists. A list of various Citizen Science projects is available onwww.citizenscience.org and www.scistarter.com. Projects such as eBird, see thousands of birders across the world, birding and uploading their observation into a common database every day, collecting valuable information on bird species distribution. Other projects such as 'iNaturalist' and 'India Biodiversity Portal' help collect data on the distribution of a whole range of plants and animals, globally and in India, respectively. While the above projects help document life around us, they usually require short-term engagement. Citizen science projects based on phenology usually require long-term engagement. For instance, the USA National Phenology Network, is dedicated to collecting long-term phenology data on the lives of hundreds of plants and animals in the USA. SeasonWatch is a similar project in India.

Season Watch

Started in 2010, SeasonWatch is a citizen science project monitoring phenology of over 100 common tree species across the country. SeasonWatch has the dual goal of taking children closer to nature, while gathering valuable scientific data on the phenology of trees. Participants - school children and interested citizens - observe trees in their neighbourhoods and report the appearance and quantity of flowers, fruits, and leaves. Contributors can adopt a tree for long-term monitoring or report quick, one-time observation on trees. The data help us understand patterns in flowering, fruiting, and leafing in tree species between different places, as well as from one year to the next. Although, anyone can participate, the bulk of the information is collected and contributed by school children. With the help of their teachers, students are observing and recording phenology data on trees in and around their schools, and in the process, learning about the changes in their own environment (see BOX for more on how you can participate as a school).

BOX: How to participate in SeasonWatch if you are a teacher

If you are a teacher interested in knowing how trees change with the seasons and wish to use this knowledge as a tool to teach children about trees, seasons and ecology, here are three easy steps to start:

1. Register with a valid email ID as a user with SeasonWatch at the website (www.seasonwatch.in) or using a freely downloadable Android app on your smart phone.
2. Once registered, you can register one or more trees for observation (see species list here: www.seasonwatch.in/species.php). You will need to provide some basic information about this tree - such as the species name and it's location. Once a tree is registered, you can assign children to observe the tree every week.
3. Upload information: children will be expected to observe the leaves, flowers and fruits on the registered tree and say whether they are absent ('None') or pres-

ent in less than 1/3rd of the tree canopy ('Few') or present in more than 1/3rd of the tree canopy ('Many'). Children can record this information on the SeasonWatch observation sheets. The observations can then be digitised by uploading on the website or phone app. Digitised data is stored on a database from where information on tree phenology is accessible to anyone interested in exploring and analysing these patterns (www.seasonwatch.in/explore.php).

Using SeasonWatch as a Teaching Tool

The act of observing trees can provide opportunities to observe ecological interactions in nature. The following ideas can be demonstrated using SeasonWatch observation protocols:

- IDEA 1 - Plants are producers, different animals feeding on plants are consumers: Go outdoors and encourage students to look at trees carefully - are the leaves entire? Does it have flowers? What kind of fruits do trees make? If a leaf looks eaten, look for the animal which could have caused this damage. Observe other animals that are feeding on flower nectar or fleshy fruits of trees. What are animals getting from eating parts of the tree? Thought experiment - What will happen if trees did not produce leaves, flowers or fruits?
- IDEA 2- Environment affects living things: Encourage students to adopt a tree and look at it often. Notice (or measure if possible), the changes in temperature and rainfall every time their tree shows a dramatic change in leaves, flowers or fruits. Does change in the environment reflect in a change in the tree? Thought experiment: What would happen to trees if 365 days in a year the temperature and rainfall stayed the same?
- Participate as your school in our quarterly bioblitz events – SeasonWatch Tree Quests - held in March, June, September and December by making one-time observations on as many trees as possible. It is an exciting challenge for children and a fun national-level race. Data from these events tell us about how trees change through 4 seasons. Use graphical outputs from these events (available in event report and on the website) to teach about seasonality in trees Contact: email - sw@seasonwatch.in, WhatsApp: +91 7349567602, website: www.seasonwatch.in, bioblitz: www.seasonwatch.in/events.php

Insights from Season Watch Participation

Till date, over 60,000 trees have been observed by students from 680 schools and by 900 individuals across India. Of these, 10,526 trees are registered for long-term observations, that is, participants adopt and observe the same tree for months, sometimes years. These repeated observations help us understand how the same tree behaves over months and years. The remaining 50,000 odd trees have been observed only once. These quick observations, gathered during bioblitz events (known as SeasonWatch Tree Quests, see BOX) capture snapshots of tree phenology across the country, giving an idea of how trees behave from one place to another. In all, there are over 3,00,000 observations in the SeasonWatch database including repeated and one-time observations. These are extremely valuable as they provide information on how tree phenology behaves over space and time.

Phenology Patterns from SeasonWatch Data

Since 2014, enough data has been collected to explore the phenology of a few very common species of trees, especially from the state of Kerala from where we also see maximum participation. Jackfruit tree *Artocarpus heterophyllus* is the most observed species from this state. We know from data collected

from SeasonWatch that, on an average, most Jackfruit trees have ripe fruits in the month of April and that new leaves are present almost throughout the year. Mango *Mangifera indica* is another widely observed tree; it flowers from December through March and fruits the most in the month of April in Kerala. In December 2018, countrywide observations on Mango showed that while in the south it had already started flowering and fruiting, the north of the country mostly had trees that had just about put out new leaves. Teak, Neem, Tamarind and Amla are some of the other common, most observed trees.

Data on some species seems to show evidence for advancing in some aspects of tree phenology. For example, the Indian Laburnum tree, which is expected to flower coinciding with the Malayalam new year of Vishu, has anecdotally been observed to flower at other times of the year. Data from SeasonWatch indicates that in Kerala, a small percentage of trees of this species were always flowering in the past 4 years and that peak flowering (when a large percentage of trees were in full flower) was happening many days before Vishu. SeasonWatch data thus provided quantitative evidence in favour of a pattern that people had been noticing in their neighbourhoods! If there is indeed a shift in the flowering time of Indian Laburnum trees, what environmental variables are causing this and what consequences does the shift have on insects, birds and mammals dependent on this tree - are the next pertinent questions to ask.

Collaborate with SeasonWatch!

In the coming years, we want to work towards gathering comprehensive phenology data across space and over the years for many more common species across the country. We also plan to capture how various species are responding to the changes in climatic conditions. Currently, a majority of the information comes from a handful of states, such as Kerala, Tamil Nadu, Meghalaya, Karnataka, Andhra Pradesh, Orissa, West Bengal, Uttarakhand. Trees from the rest of the country remain unreported. This creates large information gaps across India which SeasonWatch endeavours to fill in the coming years.

To this end, we seek the help of educators everywhere to take SeasonWatch to interested children in their schools. Hundreds of school students have watched trees in their school campuses each week, and learnt something new about their environment in doing so. Teachers of some of these students have reported positive attitudes towards trees, and curiosity about the plant and animal life around them. As we work on formalising an education framework to understand trees better, we invite educators to collaborate with us on this exciting scientific endeavour.

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School Education in the Draft National Education Policy 2019: A Preliminary Review

Abstract

This article is focussing on some specific aspects of school education, ECCE and teacher education of draft NEP 2019. It in turn tried to flag certain issues of learning gaps, conducting repeated assessments as a solution for that and expressed the need for decentralisation. The article also appreciates the importance placed on pre school education. Further the author expresses an urgent need to develop a comprehensive teacher management policy.

A lot of people have responded to the Draft National Education Policy 2019. At the outset, it is important to acknowledge the reality that policies are only as good as its implementation. Well drafted policies, with all the right concepts and phrases are meaningless if they remain on paper. We, in India, have drafted excellent policies since the early fifties. Often, we say the same things over and over again. For example, the idea of school complexes, parity of pay and status among teachers, reducing the accent on memorisation and so on. In what way is this policy different — if it is indeed seen as a departure from 1968 and 1986? This brief article is not a comprehensive commentary on the draft NEP. It is selective, and focusses on some specific aspects of *school education, ECCE and teachers*.

The first "departure" that strikes the reader is the concept of the foundational stage and the inclusion of 3 to 6 years into it. This is indeed a welcome recommendation. Researchers and people working with young children have pointed out over and over again – through innumerable evaluations on ICDS and also on primary school – that the pre-school education component is weak in ICDS and in many states it is ignored on the ground. There is also considerable research based scientific evidence on the importance of the early years in cognitive development of children. Not withstanding compelling evidence and agreement across the board, the long-standing turf battle between the two ministries – namely Department of Women and Child and Department/Ministry of Education – has kept different stages in a young child's life in silos. If this policy is to make a dent, then this turf issue needs to be sorted out by the government on a priority basis. Children cannot and should not be held hostage to bureaucratic turfs and departmental budgets.

The content of pre-school education as it is being delivered both in government as well as private sector needs serious attention. Exposing children to mindless repetition of alphabets and numbers and expecting them to write alphabets and words needs to be discontinued. Equally, while handing over the mandate to NCERT/SCERT is welcome, what these institution need is an injection of new ideas and people who have demonstrated ability in this field. India has a rich resource pool of Montessori system based and other child-focussed experiential learning practitioners. Tapping into this

network would be essential to break out of the current system of pre-school education that is prevalent in many parts of India today.

When I was discussing the draft policy with colleagues in Mobile Crèche – they reminded me that health and nutrition of children of 3 to 6 years should not suffer. The ICDS programme has to continue to provide nutrition and monitor the health of children up to the age of 6. Inter-departmental consultations are essential to work on the details of how pre-school education would be provided in schools and health and nutrition continues to be monitored by the ICDS worker. This mechanism – if done with care – should ensure that children of 3-6 years get breakfast and lunch, additional supplementary nutrition to those who need it, regular growth monitoring, deworming and other health related interventions from the ICDS programme. There is a danger of this falling between the cracks if ground level coordination mechanism is not worked out and any departmental issues related to budget, staff management and prioritisation are not ironed out.

The part on foundational literacy and numeracy of the draft policy has attracted a great deal of attention – not only among the educational community, but also among ordinary people and in the media. Why is this so? Since the early 2000, and especially since 2005 (when ASER's first survey was done) the debate on what and how much are our children learning has been polarised. The NAS done by NCERT evinced a great deal of interest and the findings were taken quite seriously by many state governments. Similarly, assessments done in private schools by Educational Initiatives also turned the spotlight on the "learning crisis" in India – not only in government schools but in all kinds of private, aided and government schools. The tragedy is that administrators and teachers often blame the children, their family background, their irregularity and their overall health status for poor learning. We need to move beyond blame game and try to understand why learning remains a challenge in India (and indeed in many other countries across the world).

The draft policy gives four reasons for the "learning crisis" – namely lack of school preparedness, little focus on foundational literacy and numeracy, teacher capacity, teacher deployment and poor health and nutrition. While, as a start, the above points may tell us something about the issue; the hard reality is that these reasons (or excuses) ignore what is happening inside our schools. My own work spanning over 30 years has taught me that all children, regardless of economic status or location or community or gender will learn if they are taught at their own pace and if we start at their level. Therefore, it is high time we acknowledged that it is our own inability to teach children at the right level, starting from where they are, is the most important factor affecting learning. This is well known and we have seen so many different initiatives in the country where children are taught in small groups at their pace and starting from where they are. Several state governments tried their hand at the Rishi Valley inspired activity based learning – like Nali Kali in Karnataka and ABL in Tamil Nadu. But many of them either abandoned it very soon or reverted to time tested textbook driven methods. Equally, as pointed out by many researchers and practitioners (especially teachers) – rushing to finish the curriculum takes precedence, thereby leaving many children behind.

What constitutes foundational skills/ knowledge? Is this only limited to language and arithmetic or does this also include other dimensions of "foundational skills"?It is important to articulate what this constitutes and how it would be integrated into the curriculum of pre-school education and Classes 1 to 3. The value of music, games, art, environmental studies and most importantly, appreciating diversity and differences.

How will we – a diverse country – drive the change? Can NCERT and their sisters SCERT do it all? Or will we – finally – involve teachers

to drive the change. The idea of school complexes as the basic unit for planning, training, monitoring and experimentation – needs a massive push. It is almost as radical as the PRI amendment that was set in motion in the 1990s. Yes, it is high time we handed over / delegated sufficient authority, responsibility, budget and other resources to school complexes. Let institutions like SCERT, DIET, BRC, CRC, IASE, CTE and similar bodies support and respond to the needs of school complexes. Empower them with resources so that they can access the best expertise and the best resources. One national template has not worked and will not work in the future. Specific challenges faced among migrant communities, street/ working children, multi-lingual classrooms (especially in urban / peri urban areas, tribal areas) in border areas (between states) need context and situation specific strategies. Empowered school complexes can provide space for much needed contextual planning.

Since the mid 1990s, when DPEP was launched alongside many other state specific basic education programmes; community participation has been the magical buzzword. Yes, parental participation is important; however, we need to keep in mind that schools located in poor areas / among disadvantages communities may not be able to access resources the way schools in high end areas where high fee-paying parents are located. The educational status, financial abilities and other social capital related resources are unequally distributed. Qualitative research done by me over the last 30 years reveals the limited impact parents have on monitoring/supporting learning in schools. They may be able to monitor teacher regularity, infrastructure related issues and to some extent overall school environment – but parents support to teaching and learning has been quite limited. Therefore, the policy should acknowledge the need for additional support – either through local non-governmental organisations / philanthropic groups, retired teachers etc. – in resource poor areas.

Let's now turn our attention to dropouts and the challenge of reintegrating children into formal stream of education. This is a welcome addition to a policy document – many children continue to drop out at different levels and an even more serious problem is that enrolled children may not actually attend school or attend irregularly. Governments need to be aware of the magnitude of the problem across all levels, geographic areas, as also the social groups/ communities which have a larger share of drop-outs. Migration has been known to contribute to both long absence as well as dropping out.

The concept of bridge courses (residential as well as non-residential), accelerated learning programmes have been with us since the early 1990s and reached its pinnacle during the DPEP programme. However, with the coming of Samagra Shiksha Abhiyan (an amalgamation of SSA, RMSA, etc.) budgetary allocation for bridge courses was withdrawn and the RTE mandated special classes (for age appropriate admission) were introduced. The special classes have not taken off as there is no clarity on who will do it and how it would be done. Even schools / hostels catering to the most disadvantaged (like street children, ex-child workers, children who have been victims of violence / abuse) have not been allocated resources for long-duration (12 to 18 months) bridge courses to help them reach their age appropriate class. A mention needs to be made to ensure flexible funding for situation specific programmes to reintegrate dropouts.

There is a wide variety of learning needs of children who wish to get back into the formal educational stream. For example – a child who dropped out in early primary and is now 11 or 12 years, would need at least a 12 to 18 months "bridge" programme; on the other hand, a child who dropped out for just one year may need a shorter programme before she re-enters the formal stream. There cannot be any one template for a model.

KGBV under SSA was envisioned as an accelerated programme (now popularly

renamed as second chance) for girls who had dropped out during the primary cycle. However, recent evidence points to the utilisation of KGBV as yet another residential school for high achievers. Some states even conduct entrance examinations for entry into KGBV. The KGBV programme needs to be restored to its original design and could become an important vehicle for reintegrating dropout girls.

Another serious issue has to do with the idea of a national programme for tutors – one that will draw upon the student community, parents and others in the community. Segregating students on the basis of "bright" and "poor" goes against the basic ideals of equality and the purpose of school to enhance the self-esteem and self-confidence of children. What is needed is a well thought out multi-level teaching pedagogy in every school to cater to the learning needs of children who may be at different levels. Some may need support on a regular basis before or after school hours and there may be those who might need a short term bridge course to enable them to "catch up" with their peers. Some others may need more intensive inputs over a longer duration – especially if they did not attend school – for example street children and children who were working / in bondage and so on. Giving this responsibility to peers (other students), parents or volunteers need to be seriously reconsidered. The teaching community has to take primary responsibility for learning and not volunteers. Yes, peer learning and peer support is very valuable but that should not become the mainstay for remedial education.

Assessment, something which NCERT is closely involved with, has been both a magic bullet propagated by the large scale assessment industry as well as a bad word among the progressive education community. Both ends of the spectrum of views agree that assessment has to shift away from memorisation. The recent debate on no-detention policy is illustrative of how little we know about learning and the misconception about examinations as the only sure way to promote learning. We are a long way away from developing a new paradigm (as recommended in the draft NEP). May be India should seriously look at global experiences carefully and also the assessments done in schools that follow a different approach. One agency – the NCERT alone cannot pull this off. Wider consultation is needed to bring on board the wealth of ground level experiences in India.

The draft policy explains that NCERT will continue to conduct NAS and that "*the cycle of assessment will be a minimum of 3 years. The assessment will cover the entire range of curricular and learning domains, including knowledge and skills that are specific to disciplines, and generic capacities… This survey will provide an educational 'health check-up' of the system and thereby should be based on a sample and should not venture into a full-scale census assessment…*" Yet in another part of the same draft, there is a mention of Census-based assessment. The draft clarifies that "*States may conduct a census-based assessment of student learning at the class and school level similar to the NAS periodically – called the State Assessment Survey (SAS). This may be considered for Grades 3, 5, and 8…"* Why is it necessary to have so many assessments?

Assessments are valuable only when teachers are able to see the answer papers of the children, analyse them and understand what and how their students are learning. A national assessment to create a data bank may be desirable as a health-check-up; but we should keep in mind that assessment data cannot change anything – until and unless we follow it up with concrete interventions. Assessment makes sense only when they inform ground level practices of teachers, HM and the school complex. While the draft has recommended a vibrant school complex that would be the basic unit for teacher deployment; it needs to be a holistic space that is the fulcrum for teacher capacity building, student assessments and informed strategies to enable all children to learn at their own pace.

Policies related to teachers – their preparation, their deployment, academic support for them, professional growth, career advancement and teacher appraisal have remained highly contentious issues in India. Most valuable recommendations related to teachers made in 1968 and 1986 policies have remained unimplemented. Equally, many practices have crept in that have had no policy level sanction. The system of contract teachers / para teachers; centralised training regime using one template or all (and the infamous hot spot approach), ad hoc teacher recruitment and deployment practices, multiple salary scales among teachers, restrictions on mobility of some teachers (women, SC or ST) to posts of head teachers or educational administrators – all these have been highlighted in the media over the last three decades. Similarly, the mushrooming of poor quality teacher education institutions since 2003 has received the attention of the government as well as the media. The fact is that the exiting teacher related systems and practices need to be overhauled.

What does the new draft policy say about teachers?

At the out-set I wholeheartedly welcome the opening statement regarding teachers and the sorry state of teacher preparation, recruitment, deployment, service conditions and teacher agency / empowerment. This is also extended to the unequivocal statement regarding removal of the unequal system of contract teachers / para-teachers at all levels, from primary right up to colleges and universities. The document also recognises the need to unburden teachers of non-educational duties, facilitating vibrant professional communities and giving them more autonomy in the classroom. The draft NEP acknowledges the dire state of our teacher education institutions and the presence of poor quality institutions that have mushroomed over the years.

I am happy that this draft policy reiterates many of the valuable recommendations of earlier policies, the Justice Verma Commission report and recent committee reports on teacher education. The last decade has also seen a number of state-level initiatives to enhance the professional capabilities of teachers and also foster learning communities. While some of the learning of earlier policies / committee and commission reports find mention in this draft policy – we need to acknowledge that these ideas and suggestions were not implemented because we did not have a road map to transform the way teachers are positioned in the education system. Equally distressing is the fact that teacher related reforms have not attracted the attention of political leaders and administrators.

Each and every state government needs to develop a comprehensive teacher management policy, one that includes a clearly laid out recruitment protocol, transfer regime, and clear guidelines for related matters, like teacher deputation to non-education administrative positions, education-related duties (such as working with the District Institute of Education and Training (DIET), Cluster Resource Centre (CRC), or Block Resource Centre (BRC), as a key resource person) and promotion (as headmaster or head teacher). In some states there is an unwritten practice of not promoting women as headteachers / headmistresses in boys' schools / co-educational schools. Such discriminatory practices need to be reviewed and abolished. A comprehensive policy is not enough; it needs to be supported by structures that allow practice to be followed in a transparent manner, reducing the stress, delays, and confusion associated with non-transparent processes. This is essential to enhance the morale of teachers and address the overall motivational levels of teachers and remove deep rooted prejudices and stereotypes about teachers in the minds of administrators, political leaders and the larger community.

One issue that has remained unaddressed is to do with shortage of qualified teachers, especially women, in Science, Mathematics and Economics / Commerce. Since the time

of the Kothari Commission report of 1965 – successive policies and committee reports have recommended a time-bound and intensive programme to enhance the pool of teachers in the Sciences/Mathematics; among women, among tribal communities and in resource poor areas.

If we are serious about encouraging teachers to work in rural / remote areas – the recurring recommendations of earlier policies (1965, 1896) to provide accommodation needs to be implemented seriously. Equally, it is also necessary to incentive teachers by giving them a rural / remote area stipend as well as transport allowance (instead of a city compensatory allowance). I have interacted with teachers over the years and the hard reality is that majority of them commute from urban / peri-urban centres to rural schools. Given the aspirations of the middle classes, this is not likely to change. Therefore, offering transport allowance could encourage them to work in difficult to reach areas.

Subject knowledge of teachers has been a contentious issue – many studies show that (given the pool from which teachers are drawn) mastery over basic concepts, facility with language of instruction and overall academic competence – needs serious attention. In this context, making sure subject mastery is made an integral part of the 4-year bachelor's degree is a welcome step. This emphasis needs to continue even at the master's level, so that teachers who are being trained for secondary and higher secondary levels are able to hone their subject knowledge.

Needless to add, empowering and strengthening school complexes as the unit for ongoing teacher education and teacher professional support needs to be ensured. For this to become a reality – sweeping administrative reform is called for. This idea has been resisted for many decades now and the government would not be able to manage the transition to decentralised educational planning and administration without strong political will.

Integrating the teacher education institutions into higher education centres (universities and colleges) is a positive step. However, given that majority of government and private teacher education institutions stand alone or are linked to other similar institutions; a lot of careful (state-specific) planning is necessary to decide on the accreditation /affiliation / integration. This should not be done in a hurry and the NCTE alone should not be given the mandate to restructure the teacher education system.

Reforming teacher recruitment is urgently required – as stated in the draft policy. Most states in India do not have a clearly laid out policy to select the right teachers for the right schools. While the TET (national and state) has introduced academic standards, final confirmation through Block level interviews is being suggested. The draft policy suggests appointment of teachers to specific schools / school complexes – so that the time-tested transfer/posting lobby is neutralised. If teachers are not interested in working in rural areas, they could be eliminated at the interview stage. The silver lining is that – with rapid improvement in infrastructure and better connectivity – the rural school may be more attractive with special allowances to serve in rural / remote areas.

School complex level estimation of teachers required by subject needs to be done rigorously. Equally important is to ensure women teachers are appointed to every single school. My own work on secondary schools in several north-Indian states reveal that this is a big issue and needs to be addressed urgently.

For teachers to perform effectively, they must know that there are systems in place to protect their professional interests and aspirations. The Government – state as well as central – could initiate a nationwide dialogue on grievance redressal mechanisms by drawing on good practices in the states, and encourage states to adopt these good practices.

Teacher appraisal is, perhaps, the most underdeveloped but also the largest missing piece in state systems of teacher management. What is expected of a teacher

remains ambiguous. In the absence of clear expectations by way of teaching-learning processes, learning outcomes, and nurturing a non-discriminatory environment for children (among others), teacher appraisal remains an undefined and weak area. The lack of an effective appraisal system means that teachers get no feedback on how they are performing and, thus, no guidance on what their professional development needs are; and system administrators cannot design or contract for necessary training programmes. An appraisal system would also enable promotions to be a reward for good performance rather than simply time served.

Another important requirement is a robust teacher information system that could address several issues, namely (a) delays in promotions, increments, and transfers due to administrative inefficiencies, like maintenance of service books and teacher records; and (b) deputing teachers for training on the basis of their needs and past training experience. The system could also enable the government to include information that could be used for teacher appraisal, thereby bringing more clarity to whom and what teachers are accountable.

Gender issues are presented – rightly so – as a cross cutting theme in the draft policy. Similarly, "promoting" inclusion is also discussed. While social / cultural mind-set is a serious issue; the government needs to adopt a positive and proactive approach to promote inclusion and foster equality at all levels. Yes, it is important to enhance representation in educational administration and it is also important to ensure curriculum and textbooks give space to regional / linguistic / community identities in the textbooks. This draft policy document – like its predecessor 1986 policy – says a lot. The challenge has been in the realisation of well-intentioned policies.

Acknowledging the persistence of caste / gender / community based discrimination is the first step towards addressing it. All teachers and educational administrators need to adhere to the constitutional mandate of non-discrimination. Any violation of this in practice has to lead to action – either through administrative channels or through the justice system. Sexual abuse of boys and girls inside schools, verbal abuse using caste / community slurs; physical abuse in the form of corporal punishment; exclusion from touching water sources or during meal times – all these needs to be brought into a code that is prominently displayed in all schools / colleges / universities. This public display of a code should be accompanied by phone numbers / address for complaints and also provide students the opportunity to register complaints in confidence. Beautiful statements in policies mean little unless they are followed up with concrete administrative measures with a robust grievance redressal mechanism.

There is a need for a systematic induction programme for teachers and educational administrators – where they not only learn about their roles and responsibilities, but are made aware of the importance to adhere to constitutional values of equality and non-discrimination. Teachers who are already working need to go through a special module on inclusion, gender and equity. This needs to be done by each state in the school complexes – with a clear message that discrimination / abuse / violence will not be tolerated in any educational institution.

The draft policy would perhaps go through several iterations before it is finalised. Judging from articles in magazines and newspapers, many people and organisations have come forward with their comments and suggestions. On the whole, the response has been cautiously positive. I am worried about the silences – especially on the private (for-profit) sector which has been growing rapidly at all levels. It would be valuable to include a clear articulation of government's policy on the private (for profit) sector, how it would be regulated and monitored. We are all aware of the grim situation with respect to private teacher education institutions that mushroomed in the 2000s. While I am

not blindly anti-private sector, ensuring adherence to basic quality indicators should be non-negotiable. Equally, children from poor households / communities need a robust scholarship system to enable them to access the next education that we have. As it stands today, the five star private universities, colleges and schools remain out of bounds for the poor. Ensuring a level playing field for all children is a must.

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भारत में दिव्यांगजनों की शिक्षा : स्थिति, चुनौतियाँ एवं समाधान

सार

किसी भी राष्ट्र का संपूर्ण विकास तभी संभव है, जब उस राष्ट्र के प्रत्येक व्यक्ति का सर्वांगीण विकास हो तथा प्रत्येक व्यक्ति राष्ट्र के निर्माण में अपना व्यक्तिगत योगदान दे सके। भारत जैसे विविधता वाले देश में सरकार दिव्यांगजनों के शैक्षिक स्तर में उत्थान के लिए समय-समय पर अनेक नीतियों तथा योजनाओं का निर्माण करती रही है। इसके साथ ही शिक्षा के सभी स्तरों पर दिव्यांगजनों को समान अवसर प्रदान करने के लिए वि. भन्न कदम भी उठाती रही है, इसके बावजूद दिव्यांगजनों को शिक्षा प्राप्ति के पथ में कई चुनौतियों का सामना करना पड़ता है। प्रस्तुत शोध कार्य के दो प्रमुख उद्देश्य हैं: (1) भारत में दिव्यांगजनों की साक्षरता दर को आधार मानते हुए इनकी शैक्षिक स्थिति को जानना तथा (2) दिव्यांगजनों की शिक्षा में आने वाली चुनौतियों एवं इनके निराकरण का अध्ययन करना था। प्रथम उद्देश्य की प्राप्ति के लिए शोधार्थियों ने भारत की जनगणना 2011 से संबंधित दस्तावेज तथा दिव्यांगजनों की शिक्षा से संबंधित अन्य प्रतिवेदनों का विषयवस्तु विश्लेषण किया। द्वितीय उद्देश्य की प्राप्ति के लिए शिक्षा के विभिन्न स्तरों पर अध्ययनरत 22 दिव्यांग विद्यार्थियों तथा 10 विशिष्ट शिक्षकों का अर्ध-संरचित साक्षात्कार लिया। शोध कार्य में विषयवस्तु के विश्लेषण तथा अर्ध-संरचित साक्षात्कार से प्राप्त आंकड़ों के विश्लेषण उपरांत पाया गया कि भारत में दिव्यांगजनों की शैक्षिक स्थिति संतोषजनक नहीं है। दिव्यांगजनों की शिक्षा में माता-पिता तथा समाज की जागरूकता की कमी है, अनुचित पाठ्यक्रम है व अनुकूलन और समेकित शिक्षा के प्रति शिक्षकों तथा प्रशासनिक मददगार नहीं हैं अधिका. रियों, माता-पिता, साथियों एवं नीति निर्धारकों की ऐसी अभिवृत्ति संवेदनपूर्ण नहीं है। साथ ही विद्यालय का अधिगम वातावरण, पारिवारिक सहयोग में कमी है तथा अनेक शैक्षणिक तथा प्रशासनिक चुनौतियाँ हैं, जो दिव्यांगजनों की शैक्षिक स्थिति तथा उनकी साक्षरता दर की प्रगति में बाधक सिद्ध होती हैं।

प्रमुख शब्दावली: दिव्यांगजन, समावेशी शिक्षा, शैक्षिक स्थिति, साक्षरता दर, शैक्षिक चुनौतियाँ।

प्रस्तावना

समावेशी शिक्षा, शिक्षण की एक ऐसी प्रणाली है जिसमें विशेष आवश्यकता वाले बच्चों को सामान्य बच्चों के साथ मुख्यधारा के विद्यालयों में पठन-पाठन और आत्मनिर्भर बनने का अवसर मिलता है। लक्ष्य यह है कि इससे वे समाज की मुख्यधारा में शामिल हो सकेंगे। इसके तहत पठन-पाठन के अलावा दिव्यांग बच्चों के लिए बाधा रहित विद्यालयी माहौल का निर्माण कार्य भी किया जाता है। समावेशी शिक्षा कि धारणा कि ऐसी शिक्षा प्रणाली को संदर्भित करती है जो सभी बच्चों को उनकी शारीरिक, बौद्धिक, सामाजिक, भावात्मक, भाषायी तथा अन्य स्थितियों की परवाह किए बिना समायोजित करता है। वर्ष 1948 में संयुक्त राष्ट्र द्वारा 'मानव अधिकारों के सार्वभौम घोषणा पत्र' को स्वीकार किया गया, जिसमें समस्त मानवों के हितों को ध्यान में रखते हुए उनके लिए कुछ मूलभूत अधिकारों को सम्मिलित किया गया। वर्ष 1975 में संयुक्त राष्ट्र द्वारा विकलांग व्यक्तियों के अधिकारों के घोषणा पत्र को प्रस्तुत किया गया जिसमें विकलांग व्यक्तियों के अधिकारों की चर्चा की गई और विभिन्न राष्ट्रों ने इस घोषणा पत्र को अंगीकार किया। मार्च, 1990 में थाईलैंड के जॉमटीन शहर में 'सभी के लिए शिक्षा' विषय पर विश्व सम्मेलन में भाग ले रहे 155 देशों के प्रतिनिधि एवं करीब 150 से अधिक सरकारी तथा गैर-सरकारी संगठनों के प्रतिनिधियों ने वर्ष 2000 तक अपने-अपने देश के सभी बच्चों को प्राथमिक शिक्षा मुहैया कराने एवं उनके बीच की निरक्षरता को कम करने की दिशा में ठोस कदम उठाने पर सहमति जाहिर की। सन् 1993 में यूनेस्को द्वारा दिल्ली में 'सभी के लिए शिक्षा' विषय पर एक शिखर सम्मेलन का आयोजन किया गया। इसमें चीन, ब्राजील, बांग्लादेश, मिस्र, इंडोनेशिया, भारत, पाकिस्तान एवं मैक्सिको सहित कुल 9

देशों ने भाग लिया। इन देशों ने दिव्यांगों की शिक्षा से सम्बंधित 8 लक्ष्यों का निर्धारण किया गया और उनको सन् 2000 तक प्राप्त करने की घोषणा की गई (संजीव, 2008)।

भारत में दिव्यांगजनों की शिक्षा का विकास

26 जनवरी, 1950 को भारतीय संविधान लागू किया गया जिसमें शिक्षा को मानव की बुनियादी आवश्यकता माना गया है। अनुच्छेद 29 (1) में कहा गया है कि 'कोई भी नागरिक धर्म, मूल, जाति एवं भाषाई आधार पर राज्य निधि से सहायता प्राप्त संस्थाओं में नामांकन से वंचित नहीं हो सकता।' कालांतर में समय-समय पर होने वाले विभिन्न संविधान संशोधनों के द्वारा बच्चों की शिक्षा संबंधी नए प्रावधानों को भी संविधान में समिल्लित किया गया।

राष्ट्रीय शिक्षा आयोग (1964-66) पहला वैधानिक निकाय था जिसने यह सुझाव दिया कि दिव्यांग बच्चों की शिक्षा का आयोजन केवल मानवीय दया भावना के आधार पर नहीं बल्कि एकता तथा समावेशी आधार पर किया जाना चाहिए। इस आयोग के गठन के समय भारत में विशिष्ट विद्यालयों की संख्या 250 से भी कम थी (लाल तथा शर्मा, 2014)। आयोग ने अपने प्रतिवेदन में यह भी स्पष्ट किया कि यद्यपि भारतीय संविधान में दिव्यांग बच्चों की शिक्षा सहित सभी बच्चों की शिक्षा सम्बन्धी कई प्रावधान सुनिश्चित किए गए हैं, परंतु फिर भी इस दिशा में किए गए कार्य संतोषजनक नहीं है। आयोग ने यह माना कि दिव्यांगों की शिक्षा सामान्य विद्यालय का एक अविभाज्य हिस्सा होना चाहिए। आयोग ने दिव्यांगजनों की शिक्षा से सम्बंधित अपने सुझाव में कहा कि सरकार द्वारा वर्ष 1986 तक लगभग 15% दृष्टि बधित, श्रवण बधित एवं विकृत अंगों वाले बच्चों और 5% बौद्धिक रूप से दिव्यांग बच्चों की शिक्षा की व्यवस्था की जानी चाहिए। जिसके अन्तर्गत प्रत्येक जिले में विकलांग बच्चों की शिक्षा के लिए कम से कम एक अच्छी संस्था होनी चाहिए (मिश्र, 2013)।

कोठारी आयोग की सिफ़ारिश पर ही सामाजिक न्याय तथा रोज़गार मंत्रालय (सामाजिक न्याय तथा सशक्तिकरण मंत्रालय) भारत सरकार द्वारा सन् 1974 में 'विकलांग बच्चों के लिए समेकित शिक्षा' (आई. ई. डी. सी.) नामक अति महत्वाकांक्षी योजना का आरंभ किया गया। जिसके अंतर्गत चयनित सामान्य स्कूलों के दिव्यांग बच्चों को सामान्य बच्चों के साथ शिक्षा प्रदान करने का प्रावधान किया गया। इस योजना के अंतर्गत चयनित स्कूलों के दिव्यांग विद्यार्थियों को पुस्तकें एवं लेखन सामग्री, स्कूल-वर्दी, परिवहन भत्ता, शैक्षिक उपकरण, और नेत्रहीन विद्यार्थियों को पढ़ने के लिए भत्ता व दिव्यांग विद्यार्थियों को पढ़ाने के लिए नियुक्त शिक्षकों के वेतन आदि की सुविधा प्रदान करने के लिए वित्तीय सहायता प्रदान की जाने लगी। कालांतर में यह योजना 'इंटीग्रेटेड एजुकेशन फॉर चिल्ड्रन एंड यूथ विद डिसेबिलिटी' (आई. ई. सी. वाई. डी.) के नाम से जानी जाने लगी (सिंह, 2016)।

वर्ष 1981 को अंतर्राष्ट्रीय विकलांग वर्ष घोषित किया गया। केंद्रीय समाज कल्याण विभाग ने वर्ष 1984 में 4 राष्ट्रीय विकलांग संस्थान स्थापित किए- राष्ट्रीय दृष्टि विकलांग संस्थान, देहरादून, राष्ट्रीय अस्थि रचना विकलांग संस्थान, कोलकाता, राष्ट्रीय श्रवण विकलांग संस्थान, मुंबई तथा राष्ट्रीय मानसिक विकलांग संस्थान सिकंदराबाद। ये संस्थान दिव्यांगों की शिक्षा, व्यवसाय प्रशिक्षण एवं उनके लिए रोजगार व्यवस्था का कार्य करते हैं, साथ ही दिव्यांगों की शिक्षा और रोजगार संबंधी समस्याओं के क्षेत्र में शोध कार्य करते हैं और संबंधित साहित्य का प्रकाशन भी करते हैं (लाल तथा शर्मा, 2014)।

राष्ट्रीय शिक्षा नीति (1986) तथा संशोधित राष्ट्रीय शिक्षा नीति (1992) में स्पष्ट किया गया है कि सभी सरकारी सहायता प्राप्त विद्यालयों में बिना किसी भेदभाव के गतिविषयक दिव्यांगता तथा प्रमस्तिष्क घात दिव्यांगता वाले बच्चों को पढ़ने का अवसर प्रदान किया जाए। इस नीति में यह भी स्पष्ट किया गया है कि प्राथमिक शिक्षक प्रशिक्षण कार्यक्रमों का पुनर्गठन इस प्रकार किया जाए कि प्रशिक्षण प्राप्त शिक्षक, दिव्यांग विद्यार्थियों के साथ उचित व्यवहार करके उनके विकास में सक्रिय योगदान दे सकें (मिश्र, 2013)। सन् 1987 में मानव संसाधन विकास मंत्रालय ने अंतरराष्ट्रीय बाल आपातकालीन कोष (यूनीसेफ) तथा राष्ट्रीय शैक्षिक अनुसंधान एवं प्रशिक्षण परिषद (एन. सी. ई. आर. टी.) के सहयोग से दिव्यांगजनों के लिए 'एकीकृत शिक्षा परियोजना' का आरंभ किया। इस योजना का मुख्य उद्देश्य इंटीग्रेटेड एजुकेशन फॉर चिल्ड्रन एंड यूथ विद डिसेबिलिटी (आई. ई. सी. वाई. डी.) के कार्यान्वयन को मजबूत करना था। सन् 1994 में भारत सरकार द्वारा जिला प्राथमिक शिक्षा योजना को लागू किया गया, जिसका उद्देश्य प्राथमिक स्तर पर नामांकित बच्चों के अपव्यय को कम करना तथा उनकी उपलब्धि स्तर को बढ़ाना था। लक्ष्य दिव्यांग बच्चों के साथ अन्य सभी बच्चों को प्राथमिक शिक्षा प्रदान करना था (जुलका, 2007)।

दिव्यांगजनों के पुनर्वास को ध्यान में रखते हुए भारत सरकार ने वर्ष 1986 में सोसाइटी रजिस्ट्रेशन अधिनियम, 1986 के अंतर्गत भारतीय पुनर्वास परिषद की स्थापना एक रजिस्टर्ड सोसायटी के रूप में की इसे 31 जुलाई, 1993 से प्रभावी भारतीय पुनर्वास परिषद अधिनियम के अंतर्गत एक संवैधानिक निकाय के रूप में मान्यता प्रदान की गई। यह परिषद नई दिल्ली

में है, और दिव्यांग व्यक्तियों के पुनर्वास के क्षेत्र में प्रशिक्षण नीतियों तथा पाठ्यक्रमों का विनियमयन, करती है। यह सोसाइटी दिव्यांग विद्यार्थियों के पुनर्वास के क्षेत्र में स्नातकोत्तर, स्नातक, स्नातकोत्तर डिप्लोमा, डिप्लोमा तथा प्रमाणपत्र पाठ्यक्रम चलाने वाली संस्थाओं एवं विद्यालयों को मान्यता प्रदान करती है। यह विभिन्न संगठनों के द्वारा पुनर्वास और विशेष शिक्षा के क्षेत्र में अनुवर्ती शिक्षा को प्रोत्साहित करती है (आर.सी.आई., 2015)।

सन् 1995 में भारत सरकार ने दिव्यांगजनों के अधिकारों को ध्यान में रखते हुए नि:शक्त जन अधिनियम 'समान अवसर, अधिकारों का संरक्षण तथा पूर्ण भागीदारी-1995' पारित किया। इसे 7 फरवरी, 1996 को लागू किया गया। नि:शक्त जन अधिनियम-1995 में 7 तरह की दिव्यांगताओं (अंधता, दृष्टि ह्रास, कुष्ठरोग मुक्त व्यक्त, श्रवण-बधिर, गतिविषयक विकलांगता, मानसिकता रुग्णता तथा मानसिक विकलांगता) को वर्गीकृत किया गया। यह अधिनियम दिव्यांग व्यक्तियों के लिए समान अवसरों की प्राप्ति हेतु उठाया जाने वाला महत्वपूर्ण कदम था। यह अधिनियम दिव्यांगों के लिए स्वइच्छित रोजगार, आरक्षण, शोध, सशक्तिकरण तथा व्यावसायिक प्रशिक्षण को बढ़ावा देने के साथ ही उनके उचित पुनर्वास का भी उल्लेख करता है। इस अधिनियम के अध्याय 5 की धारा 26 में नि:शक्त बच्चों के लिए नि:शुल्क शिक्षा की व्यवस्था किए जाने का प्रावधान है (कोहमा, 2012)।

राष्ट्रीय न्यास अधिनियम-1999 - राष्ट्रीय स्व:परायणता, प्रमस्तिष्क घात, मानसिक मंदता तथा बहुनि:शक्तता ग्रस्त व्यक्ति कल्याण न्यास-1999, का उद्देश्य नि:शक्त व्यक्तियों के परिवारों को सशक्त बनाना है, ताकि वे नि:शक्त व्यक्तियों को परिवार में ही रख सकें। यह न्यास हाशिए पर रह रहे दिव्यांग व्यक्तियों के अधिकारों की रक्षा करता है और उनके लिए बाधा रहित वातावरण का निर्माण कर उनके कौशल विकास को बढ़ावा देता है।

राष्ट्रीय विकलांगजन नीति (2006) का मानना है कि नि:शक्त व्यक्ति देश के महत्वपूर्ण संसाधन हैं। इस नीति में समाज में ऐसा वातावरण सृजित करने का आग्रह किया गया है, जिसमें नि:शक्त जनों को समान अवसर प्रदान कर उनके अधिकारों का संरक्षण और समाज में उनकी पूर्ण भागीदारी को सुनिश्चित किया जा सके। इस नीति में नि:शक्त व्यक्तियों के लिए शिक्षा, सरकारी प्रतिष्ठानों में रोजगार के मौके, स्वरोजगार, संभावना, सामाजिक सुरक्षा आदि में सुधार करने तथा इससे संबंधित सहायता प्रदान करने की बात कही गई है। इसके अतिरिक्त इस दस्तावेज में नि:शक्त व्यक्तियों के आर्थिक पुनर्वास तथा नि:शक्त बच्चों की शिक्षा के लिए अन्य प्रावधानों का भी उल्लेख किया गया है।

संयुक्त राष्ट्र की महासभा ने 2006 में दिव्यांग व्यक्तियों के अधिकारों के बारे में संयुक्त राष्ट्र समझौता (UNCRPD) अपनाया। इसे दिव्यांगता समझौता भी कहते हैं। यह समझौता दिव्यांग लोगों के मानवाधिकारों को स्पष्ट करता है। इस समझौते में यह कहा गया है कि दिव्यांग लोगों को मानवाधिकारों पर वह पहुँच प्राप्त नहीं है जो अन्य लोगों को है। भारत सहित अन्य कई देशों ने इस समझौते पर हस्ताक्षर कर अपने देश के सभी दिव्यांगजनों तक मानवाधिकारों को पहुँचाने की बात कही। यूएनसीआरपीडी का अनुच्छेद 24 शिक्षा के सभी स्तरों के लिए पहली पसंद के रूप में समावेशी तंत्र को रेखांकित करता है। यूएनसीआरपीडी तथा नि:शक्त जन अधिनियम (समान अवसर, अधिकारों का संरक्षण तथा पूर्ण भागीदारी)-1995 को आधार बनाते हुए भारत सरकार ने दिव्यांगजन अधिकार अधिनियम-2016 बनाया है। इस अधिनियम में राज्य सरकार द्वारा दिव्यांगों की स्थानीय समस्याओं के निवारण हेतु जिला स्तरीय कमेटी का निर्माण किए जाने की बात की गई है। दिव्यांगजन अधिकार अधिनियम-2016 में शारीरिक समस्याओं की प्रकृति, शरीर के अंगों तथा शारीरिक प्रणाली में कठिनाई के आधार पर विनिर्दिष्ट दिव्यांगता को इक्कीस श्रेणियों में वर्गीकृत किया गया। दिव्यांगजन अधिकार अधिनियम-2016 के अध्याय 3 (शिक्षा) की धारा 16, 17 तथा 18 में दिव्यांगजनों की शिक्षा हेतु कई प्रावधान सुनिश्चित किए गए हैं। धारा 16 में यह स्पष्ट किया गया है कि सरकार और स्थानीय प्राधिकारी प्रयास करेंगें कि उनके द्वारा वित्तपोषित व मान्यता प्राप्त शिक्षण संस्थाएं, दिव्यांग बालकों के लिए समावेशी शिक्षा प्रदान करें। इसके लिए इस धारा में कुल 8 प्रावधानों को समिल्लित किया गया है। धारा 17 में इस बात को स्पष्ट किया गया है कि धारा 16 के प्रावधानों अर्थात् समावेशी शिक्षा को संवर्धित करने और सुगम बनाने के लिए विनिर्दिष्ट उपाय करना अनिवार्य है। समावेशी शिक्षा को संवर्धित करने और सुगम बनाने के लिए पर्याप्त कुल 11 प्रावधाान हैं। इनमें संख्या में शिक्षण प्रशिक्षण संस्थाओं को स्थापित करना, शिक्षकों को ब्रेल और सांकेतिक भाषा में प्रशिक्षित तथा नियोजित करना, संदर्भित दिव्यांग विद्यार्थियों को अठारह वर्ष की आयु तक पुस्तकें, अन्य विद्या सामग्री और समुचित सहायक युक्तियाँ उपलब्ध करना, संदर्भित दिव्यांग विद्यार्थियों को समुचित मामलों में छात्रवृत्ति प्रदान करना, स्कूली शिक्षा के सभी स्तरों पर समिल्लित शिक्षा में सहायता करने के लिए वृत्तिकों और कर्मचारिवृन्द को प्रशिक्षित करना आदि शामिल हैं। इस अधिनियम के अध्याय 3 (शिक्षा) की धारा 18 में यह स्पष्ट किया गया है कि समुचित सरकार या स्थानीय प्राधिकारी प्रौढ़ शिक्षा में दिव्यांगजनों की भागीदारी को संवर्धित, संरक्षित और सुनिश्चित करने के लिए अन्य व्यक्तियों के साथ समान शिक्षा कार्यक्रम जारी रखने के उपाय करेंगे।

राष्ट्रीय शिक्षा नीति (2019) के प्रारूप के भाग 1 क्रमांक 6.8 (विशेष आवश्यकता वाले बच्चों की शिक्षा) में इस बात का उल्लेख किया गया है कि विशेष आवश्यकता वाले बच्चों (दिव्यांग) को भी अन्य बच्चों के समान गुणवत्तापूर्ण शिक्षा हासिल करने के समान अवसर उपलब्ध होने चाहिए और विशेष आवश्यकता वाले बच्चों को सामान्य विद्यालयों में समावेशन सम्बंधित शिक्षा कार्यक्रमों की प्राथमिकता बनी रहेगी। विशेष आवश्यकता वाले बच्चों की शिक्षा प्रयासों को आर्थिक सहयोग प्रदान किया जाएगा। विशेष आवश्यकता वाले बच्चों की विद्यालय में पहुँच को सुनिश्चित करने के लिए स्कूल में बाधा रहित संरचनाएं, जैसे रैंप, रेलिंग, विशेष अनुकूल शौचालय और आवागमन की उचित व्यवस्था उपलब्ध करायी जाएगी। यह बच्चे अपने अपने सहपाठियों के साथ सहज रूप से कक्षा में भागीदारी कर सकें, इस हेतु सहायक यंत्र, उपयुक्त प्रौद्योगिकी आधारित उपकरण, भाषा की दृष्टि से उपयुक्त पठन-पाठन सामग्री (जैसे ब्रेल और बड़े अक्षरों में छपी सरल प्रारूप वाली पाठ्यपुस्तकें) उपलब्ध करायी जाएँगी। साथ ही गंभीर दिव्यांगता वाले बच्चे जो स्कूल में नहीं जा सकते, उनके लिए घर पर ही शिक्षा की व्यवस्था की जाएगी, जिससे वे राष्ट्रीय मुक्त विद्यालय जैसी सुविधा के जरिए स्कूली शिक्षा पूरी कर सकें। श्रवण बाधित बच्चों की शिक्षा के लिए राष्ट्रीय मुक्त विद्यालयी शिक्षा संस्थान, अंतर्राष्ट्रीय सांकेतिक भाषा के द्वारा विभिन्न बुनियादी विषयों के शिक्षण के लिए उच्च गुणवत्ता के मॉड्यूल विकसित करेगा। शिक्षक सभी विद्यार्थियों की जरुरत को पूरा कर सकें, इस हेतु प्रत्येक स्कूल काम्प्लेक्स में पर्याप्त संख्या में क्रॉस डिसेबिलिटी प्रशिक्षण प्राप्त शिक्षक नियुक्त होंगे। साथ ही विशेष आवश्यकता वाले बच्चों की शिक्षा में भागीदारी बढ़ाने के लिए प्रतिभावान विद्यार्थियों के लिए छात्रवृत्तियाँ प्रदान की जाएंगी।

संबंधित साहित्य की समीक्षा

कोल (2005) ने, अपने लेख 'सोशल एजुकेशनल नीड, इनक्लूशन एंड री-कांसेप्चुलाईज़ेशन ऑफ द रोल ऑफ सेनको इन इंग्लैंड एंड वेल्स' में, बताया कि शिक्षा में समावेशन एक महत्वपूर्ण प्रक्रिया है। जिसमें सामान्य विद्यालयों में दिव्यांग बच्चों को अन्य बच्चों के साथ सीखने के अवसर प्रदान किए जाते हैं। सेनको (Special Education Needs Coordination) SENCO, इंग्लैंड के वेल्स शहर में समावेशी शिक्षा में कार्य करने वाली संस्था है। अपने शोध कार्य में इन्होंने समावेशी शिक्षा के लिए कार्य करने वाले सेनको समूह की भूमिका तथा योगदान का विश्लेषणात्मक अध्ययन किया। एकत्रित आंकड़ों के विश्लेषण के पश्चात इन्होंने पाया कि शिक्षा में दिव्यांग विद्यार्थियों के समावेशन के लिए सेनको महत्वपूर्ण भूमिका निभाता है।

तकाला, प्रीतिमा तथा टोरमेनन (2009) ने इंक्लूसिव स्पेशल एजुकेशन : द रोल ऑफ स्पेशल एजुकेशन टीचर इन फिनलैंड विषय पर अध्ययन किया। इनके शोध का प्रमुख उद्देश्य फिनलैंड के सामान्य विद्यालय में पढ़ाने वाले विशिष्ट शिक्षकों की भूमिका का अध्ययन करना था। शोध कार्य के परिणामों के रूप में शोधार्थी ने पाया कि विद्यालय द्वारा निर्धारित समय दिव्यांग बच्चों को सिखाने के लिए पर्याप्त नहीं हैं साथ ही शिक्षकों का मानना था दिव्यांग बच्चों की शिक्षा को आगे बढ़ाने के लिए विद्यालय स्तर पर विशेष शैक्षणिक प्रावधानों को सम्मिलित किया जाना चाहिए तथा समावेशन के लिए विद्यालयों, माता पिता एवं समाज को सहयोगात्मक नीति अपनानी चाहिए।

चौधरी (2010) ने 'दी टीचिंग-लर्निंग कंडिशन्स फॉर क्वालिटी एजुकेशन इन इंक्लूसिव स्कूल्स' विषय पर अध्ययन किया। इनके अध्ययन का प्रमुख उद्देश्य भारतीय सन्दर्भ में गुणवत्तापूर्ण शिक्षा तथा समावेशन के संप्रत्ययों को स्पष्ट करते हुए ऐसे विद्यालयों का अध्ययन करना था, जहाँ समावेशी शिक्षा के प्रावधानों को कक्षा-कक्ष की शिक्षण-अधिगम प्रक्रिया में व्यवहार में लाया जा रहा था। अपने अध्ययन के उपरांत इन्होंने पाया कि वर्तमान विद्यालयों में अध्यापन करने वाले शिक्षकों को शिक्षण के अतिरिक्त अन्य शिक्षणेतर कार्य करने पड़ते हैं, जिनका सीधा असर समावेशी शिक्षा की गुणवत्ता पर पड़ता है। कक्षा में शिक्षक-छात्र अनुपात के मानकों का ध्यान नहीं रखा जाता है, परिणामस्वरूप शिक्षक दिव्यांग विद्यार्थियों पर अतिरिक्त ध्यान नहीं दे पाते हैं। विद्यालयों में प्रशिक्षित शिक्षकों की कमी तथा कार्यरत सामान्य शिक्षकों को समावेशी शिक्षा से सम्बंधित पर्याप्त प्रशिक्षण न मिलने के कारण भी गुणवत्तापूर्ण समावेशी शिक्षा पर नकारात्मक प्रभाव पड़ता है।

दास, क्योनि तथा देसाई (2013) ने 'इंक्लूसिव एजुकेशन इन इंडिया: आर द टीचर प्रिपेयर्ड?' विषय पर अध्ययन किया। इनके शोध का प्रमुख उद्देश्य दिल्ली के प्राथमिक तथा माध्यमिक स्तर पर कार्यरत नियमित शिक्षकों में दिव्यांग बच्चों के अध्यापन के कौशलों का अध्ययन करना था। शोध के निष्कर्ष के रूप में यह पाया गया कि दिल्ली के प्राथमिक तथा माध्यमिक स्कूल के नियमित शिक्षकों में से लगभग 70 प्रतिशत शिक्षकों ने न तो किसी भी प्रकार की विशेष शिक्षा में प्रशिक्षण प्राप्त किया है और न ही उन्हें दिव्यांग विद्यार्थियों को पढ़ाने का कोई अनुभव है। इसके अलावा लगभग 87% शिक्षक अपनी कक्षाओं में दिव्यांग विद्यार्थियों को पढ़ाने के लिए किसी भी प्रकार की

उपकरणों का उपयोग नहीं करते उन्होंने कहा कि इस गंभीर समस्या के निराकरण के लिए सरकार को अधिक से अधिक शिक्षकों के लिए विशिष्ट शिक्षा संबंधी प्रशिक्षण का प्रबंध करना चाहिए और साथ ही विद्यालयों को शैक्षिक उपकरण उपलब्ध करवाने चाहिए, जिससे शिक्षक कक्षाओं में अधिगम वातावरण स्थापित कर सकें।

इयोमा तथा तोयांसी (2017) ने 'टीचर एटीटड्यूड टुवर्डस् स्पेशल नीड स्टूडेंट्स इन सेकेंडरी स्कूल्स इन नॉर्थ सेनेटोरियल डिस्ट्रिक्ट ऑफ इंडो स्टेट, नियाग्रा' विषय पर अध्ययन किया। इनके शोध का प्रमुख उद्देश्य माध्यमिक स्तर पर कार्यरत शिक्षकों की विशेष आवश्यकता वाले विद्यार्थियों के प्रति अभिवृत्ति का अध्ययन करना था। शोधार्थी ने अपने शोध के परिणामों में पाया कि जेंडर के आधार पर महिला तथा पुरुष शिक्षकों की विशेष आवश्यकता वाले विद्यार्थियों के प्रति अभिवृत्ति में कोई सार्थक अंतर नहीं है, जबकि शैक्षिक प्रवीणता एवं अनुभव की समयावधि के आधार पर शिक्षकों की अभिवृत्ति में सार्थक अंतर है।

राज (2018) ने इंक्लूसिव एजुकेशन इन इंडिया: चैलेन्जिज एंड प्रोस्पेक्टस विषय पर शोध कार्य किया। इनके शोध का प्रमुख उद्देश्य भारत में समावेशी शिक्षा में आने वाली समस्याओं का अध्ययन करना था। अपने शोध कार्य के निष्कर्ष में इन्होंने पाया कि आजादी के 70 वर्ष बाद भी हमारे सामने अनेक ऐसी समस्याएँ यथा- अपर्याप्त प्रशिक्षित शिक्षक, विद्यालयों का भौतिक स्वरूप, समुदाय का पर्याप्त सहयोग न मिलना आदि हैं, जो समावेशी शिक्षा को विद्यालयी परिस्थितियों में अपनाने में बाधक सिद्ध होती हैं।

वर्तमान स्थिति एक संक्षिप्त अध्ययन

इन्हीं पहलूओं के अध्ययन के लिए हमने भारत की जनगणना रिपोर्ट 2011 को आधर माने हुए 22 दिव्यांग विद्यार्थियों और 10 विशेष शिक्षकों के साथ अर्धसंरचित साक्षत्कार किए। इन चचाओं में कई रोचक पहलू सामने आए। इस अध्ययन में निम्नलिखित शोध उद्देश्यों को समिल्लित किया गया-

1. साक्षरता दर को आधार मानते हुए भारत में दिव्यांगजनों की शैक्षिक स्थिति का अध्ययन करना।
2. दिव्यांगजनों को शिक्षा प्राप्त करने में आने वाली चुनौतियों का अध्ययन कर इनके प्रभावी निराकरण हेतु उठाए जाने वाले कदमों का अध्ययन करना।

शोध क्रियाविधि तथा आंकड़ों की प्रकृति

प्रस्तुत शोध कार्य दो चरणों में पूरा किया गया उद्देश्यों की प्रकृति को ध्यान में रखते हुए शोध कार्य में प्राथमिक तथा द्वितीयक दोनों प्रकार के आंकड़ों का संग्रहण, विश्लेषण तथा उपयोग किया गया-

प्रथम चरण (साक्षरता दर को आधार मानते हुए भारत में दिव्यांगजनों की शैक्षिक स्थिति)

भारत में दिव्यांगजनों की शैक्षिक स्थिति के अध्ययन हेतु शोधार्थी द्वारा भारत की जनगणना-2011 से संबंधित दस्तावेज, दिव्यांगजनों की शिक्षा से सम्बंधित विभिन्न शोध पत्रों तथा प्रतिवेदनों का अध्ययन कर उनका विषय वस्तु विश्लेषण किया गया।

द्वितीय चरण (दिव्यांगजनों की शिक्षा में आने वाली चुनौतियाँ तथा इनके निराकरण हेतु उठाए जाने वाले कदम)

शोध के द्वितीय चरण दिव्यांगजनों की शिक्षा में आने वाली चुनौतियों को जानने के लिए शोधार्थी द्वारा शिक्षा के विभिन्न स्तरों पर अध्ययनरत 22 दिव्यांग विद्यार्थियों तथा 10 विशिष्ट शिक्षकों का अर्थ-संरचित साक्षात्कार लिया गया तथा प्राप्त आंकड़ों को प्रसंग (थीम्स) में विभक्त करके उनका विश्लेषण कर परिणामों को प्राप्त किया गया।

आंकड़ों का विश्लेषण, शोध परिणाम, निर्वचन तथा परिचर्चा

भारत की जनगणना-2011 के दस्तावेजों, दिव्यांगजनों की शिक्षा से सम्बंधित विभिन्न शोध पत्रों तथा प्रतिवेदनों का विषय वस्तु विश्लेषण करने पर भारत में दिव्यांगजनों की संख्या तथा उनके प्रतिशत संबंधित प्राप्त परिणामोंका विवरण तालिका क्रमांक 1 में प्रस्तुत किया गया है-

तालिका क्रमांक 1: भारत में दिव्यांगजनों की जनसंख्या (2011)

भारत की कुल जनसंख्या (2011)			दिव्यांगजनों की कुल जनसंख्या (2011)			निवास परिवेश के अनुसार दिव्यांग. जनों की कुल जनसंख्या (2011)	
कुल जनसंख्या	पुरुष	महिलाएं	कुल जनसंख्या	पुरुष	महिलाएं	ग्रामीण	शहरी
121.08 करोड़	62.32 करोड़	58.76 करोड़	2.68 करोड़	1.5 करोड़	1.18 करोड़	1.86 करोड	0.82 करोड़

स्रोत: डिसएबिल्ड पर्सन्स इन इंडिया: ए स्टैस्टिकल प्रोफाइल, 2016 (Website: http://mospi.gov.in)

2011 की जनगणना के अनुसार भारत में 2.68 करोड़ व्यक्ति दिव्यांगजन हैं। इन कुल दिव्यांगजनों में से 56 प्रतिशत पुरुष तथा 44 प्रतिशत महिलाएं दिव्यांग हैं। आंकड़ों के विश्लेषण से यह भी ज्ञात होता है कि कुल दिव्यांग व्यक्तियों का लगभग 69 प्रतिशत दिव्यांग ग्रामीण परिवेश में तथा 31 प्रतिशत दिव्यांग शहरी हैं।

तालिका क्रमांक-2: भारत में दिव्यांगजनों का शैक्षिक स्तर (जनगणना, 2011 के अनुसार)

शैक्षिक स्तर	दिव्यांगजनों की कुल संख्या		
	कुल संख्या	पुरुष	महिलाएं
कुल अशिक्षित	1,21,96,641	56,40,240	65,56,401
कुल शिक्षित	1,46,18,353	93,48,353	52,70,000
योग	2,68,14,994	1,49,88,593	1,18,26,401
साक्षर लेकिन प्राथमिक स्तर से कम	28,40,345	17,06,441	11,33,904
प्राथमिक स्तर	35,54,858	21,95,933	13,58,925
उच्च प्राथमिक स्तर	24,48,070	16,16,539	8,31,531
माध्यमिक स्तर	34,48,650	23,30,080	11,18,570
स्नातक तथा उसके अधिक	12,46,857	8,39,702	4,07,155

स्रोत: डिसएबिल्ड पर्सन्स इन इंडिया: ए स्टैस्टिकल प्रोफाइल, 2016 (Website: http://mospi.nic.in)

तालिका क्रमांक-2 के अध्ययन से यह स्पष्ट होता है कि दिव्यांगजनों की कुल जनसंख्या का लगभग 54.52 प्रतिशत (1.46 करोड़) भाग अशिक्षित हैं, जिसमें से लगभग 55 प्रतिशत पुरूष तथा 45 प्रतिशत महिलाएं हैं। तालिका के अध्ययन से यह भी स्पष्ट होता है कि शिक्षित दिव्यांगजनों का 19.42 प्रतिशत प्राथमिक स्तर से कम साक्षर, 41.06 प्रतिशत प्राथमिक स्तर तक, 23.59 प्रतिशत माध्यमिक स्तर तक साथ ही 8.52 प्रतिशत स्नातक या इससे अधिक साक्षर हैं। कुल दिव्यांग पुरुष जनसंख्या का लगभग 62.37 प्रतिशत भाग शिक्षित तथा 37.63 प्रतिशत अशिक्षित है। शिक्षित दिव्यांग पुरुषों का 18.25 प्रतिशत प्राथमिक स्तर से कम साक्षर, 40.78 प्रतिशत प्राथमिक स्तर तक, 24.92 प्रतिशत माध्यमिक स्तर तक साथ ही 8.98 प्रतिशत स्नातक या इससे अधिक शिक्षित है। कुल दिव्यांग महिला जनसंख्या का लगभग 44.56 प्रतिशत भाग शिक्षित तथा 55.43 प्रतिशत अशिक्षित है। शिक्षित दिव्यांग महिलाओं का 21.51 प्रतिशत प्राथमिक स्तर से कम साक्षर, 41.56 प्रतिशत प्राथमिक स्तर तक, 21.22 प्रतिशत माध्यमिक स्तर तक साथ ही 7.72 प्रतिशत स्नातक या इससे अधिक साक्षर है। साक्षर दिव्यांगजनों का लगभग 33 प्रतिशत भाग ग्रामीण परिवेश में जबकि 67 प्रतिशत भाग शहरी क्षेत्र में निवास करता है।

तालिका क्रमांक-3 : राज्य तथा संघ शासित प्रदेशों में दिव्यांग व्यक्तियों की संख्या तथा उनकी साक्षरता दर (भारत की जनगणना-2011)

क्रमसंख्या	राज्य	दिव्यांगजनों की कुल संख्या	दिव्यांगजनों की साक्षरता दर	कुल जनसंख्या की साक्षरता दर
1.	आंध्रप्रदेश	22,66,607	48.33	67.66
2	अरुणाचल प्रदेश	26,734	38.75	66.95
3.	असम	4,80,065	48.25	73.18
4.	बिहार	23,31,009	47.30	63.82
5.	छत्तीसगढ़	6,24,937	48.53	71.04
6.	गोवा	33,012	70.31	87.40
7.	गुजरात	10,92,302	62.84	79.31

8.	हरियाणा	5,46,374	54.51	76.64
9.	हिमाचल प्रदेश	1,53,316	55.97	83.78
10.	जम्मू-कश्मीर	3,61,153	41.80	68.74
11.	झारखण्ड	7,69,980	46.93	67.63
12.	कर्नाटक	13,24,202	59.45	75.60
13.	केरल	76,18,443	70.79	93.91
14.	मध्यप्रदेश	15,51,931	52.54	70.63
15.	महाराष्ट्र	29,63,392	67.64	89.91
16.	मणिपुर	58,547	58.64	79.85
17.	मेघालय	44,317	47.71	75.48
18.	मिज़ोरम	15,160	61.92	91.58
19.	नागालैंड	29,631	43.55	80.11
20.	उड़ीसा	12,44,402	53.17	73.54
21.	पंजाब	6,54,063	56.62	76.68
22.	राजस्थान	15,63,694	40.16	67.06
23.	सिक्किम	18,187	45.51	82.20
24.	तमिलनाडु	11,79,963	66.66	80.33
25.	त्रिपुरा	64,346	66.25	87.75
26.	उत्तर प्रदेश	41,57,514	52.54	69.72
27.	उत्तराखण्ड	1,85,272	55.59	69.72
28.	पश्चिम बंगाल	20,17,406	57.34	77.08
29.	अण्डमान तथा निकोबार द्वीप समूह	6,660	65.45	86.27
30.	चंडीगढ़	14,796	67.66	86.43
31.	दिल्ली	2,34,882	65.32	86.34
32.	दादर तथा नगर हवेली	3,296	50.76	77.65
33.	दमन तथा दीव	2,196	62.02	87.07
34.	लक्षद्वीप	1,615	66.25	92.28
35.	पुदुचेरी (पाण्डचेरी)	30,189	63.09	86.55

स्रोत: डिसएबिल्ड पर्सन्स इन इंडिया: ए स्टैस्टिकल प्रोफाइल, 2016 (Website: http://mospi.gov.in)

उपरोक्त तालिका क्रमांक 3 के अध्ययन से यह स्पष्ट होता है कि भारत की जनगणना-2011 के अनुसार भारत में दिव्यांगजनों की साक्षरता दर सबसे कम अरुणाचल प्रदेश, राजस्थान, जम्मू-कश्मीर, नागालैंड तथा सिक्किम में है। जबकि दिव्यांगजनों की सर्वाधिक साक्षरता दर केरल, गोवा, चंडीगढ़, महाराष्ट्र तथा तमिलनाडु में है। उपरोक्त तालिका के अवलोकन से यह भी स्पष्ट होता है कि राज्य की कुल जनसंख्या की साक्षरता दर की तुलना में दिव्यांगजनों की साक्षरता दर के मध्य सर्वाधिक अंतर अरुणाचल प्रदेश में जबकि सर्वाधिक कम अंतर केरल राज्य में देखने को मिलता है।

भारत की जनगणना 2001 को देखने पर पता चलता है कि यद्यपि दिव्यांगजनों की साक्षरता दर में वर्ष 2001 की तुलना में वर्ष 2011 में वृद्धि हुई है परन्तु फिर भी यह वृद्धि संतोषजनक नहीं है।

भारत में दिव्यांगजनों की शिक्षा में आने वाली चुनौतियाँ तथा इनके समाधान को जानने के लिए शोधार्थी द्वारा शिक्षा के विभिन्न स्तरों पर अध्ययनरत 22 दिव्यांग विद्यार्थियों तथा 10 विशिष्ट शिक्षकों का अर्थ-संरक्षित साक्षात्कार लेकर आंकड़ों को प्रसंगों (थीम्स) में विभाजित करके उनका विश्लेषण किया गया। आंकड़ों के विश्लेषण के उपरांत शोधार्थी ने पाया कि

भारत जैसे विविधतापूर्ण देश में दिव्यांगजनों को शिक्षा के क्षेत्र में अनेक चुनौतियों का सामना करना पड़ता, प्राप्त आंकड़ों के आधार पर ज्ञात चुनौतियों तथा इनके समाधान हेतु उठाए जाने वाले कदमों को निम्नलिखित शीर्षकों के अंतर्गत समझा जा सकता है:

(1) **सामान्य शिक्षकों में दिव्यांग बच्चों की समस्याओं के प्रति जागरूकता की कमी**

शोधार्थी द्वारा प्रस्तुत शोध से सम्बंधित आंकड़ें एकत्रित करते समय अधिकांश शिक्षकों ने बताया कि शिक्षा के प्रत्येक स्तर पर सामान्य शिक्षकों में दिव्यांग बच्चों की समस्याओं के प्रति जागरूकता की कमी है। दिव्यांगों के प्रति शिक्षकों का अपना सामाजिक तथा सांस्कृतिक नजरिया होता है, लेकिन इनमें दिव्यांगता के प्रति वैज्ञानिक तथा शैक्षिक ज्ञान तथा इससे संबंधित जागरूकता का अभाव होता है। जिसके चलते ऐसे शिक्षक दिव्यांग बच्चों की समस्याओं को गहराई से नहीं समझ पाते, परिणामस्वरूप दिव्यांग विद्यार्थियों के लिए उचित अधिगम अनुकूल वातावरण का निर्माण नहीं कर पाते। एक शिक्षक से बात करते हुए उसने बताया कि हमारे विद्यालय में 3 दिव्यांग विद्यार्थी हैं चूँकि मैंने कभी भी दिव्यांग विद्यार्थियों को पढ़ाने का औपचारिक और विशिष्ट प्रशिक्षण नहीं लिया जिसके कारण मैं स्वयं को दिव्यांग विद्यार्थियों की जरूरतों को सही से समझ पाने में असमर्थ पाता हूँ। अत: इस समस्या के निराकरण के लिए शिक्षा के सभी स्तरों पर शिक्षकों को विभिन्न माध्यमों तथा कार्यक्रमों से दिव्यांगता तथा दिव्यांग व्यक्तियों की समस्याओं के लिए जागरूक करने का प्रयास करना चाहिए।

(2) **अनुचित पाठ्यक्रम अनुकूलन**

साक्षात्कार के दौरान एक शिक्षिका ने बताया कि कि उसके विषय की पाठ्य पुस्तक में एक भी पाठ ऐसा नहीं था जिसमें दिव्यांग बच्चों से सम्बंधित विषय-वस्तु हो साथ ही पुस्तक में प्रयुक्त उदाहरणों में दिव्यांग बच्चों का कहीं भी जिक्र नहीं है पुस्तक के विभिन्न पाठों में दिए गये चित्रों में भी दिव्यांग विद्यार्थियों का प्रतिनिधित्व बहुत कम है अत: दिव्यांग विद्यार्थी ऐसी विषय-वस्तु में स्वयं को उपेक्षित पाते हैं आधुनिक शिक्षा व्यवस्था में समावेशी पाठ्यक्रम की आवश्यकता है जिसमें दिव्यांग विद्यार्थी स्वयं को भावात्मक रूप से जोड़ते हुए नवीन ज्ञान को सीख सकें। परंतु वर्तमान शिक्षा व्यवस्था में इस प्रकार का पाठ्यक्रम प्राय: कम ही देखने को मिलता है, अत: वर्तमान पाठ्यक्रम के स्वरूप में सुधार करते हुए 'यूनिवर्सल डिज़ाइन ऑफ लर्निंग' जैसी अवधारणा को विकसित कर पाठ्यक्रम में सम्मिलित किया जाना चाहिए, साथ ही मनोवैज्ञानिक विधियों पर आधारित शिक्षण उपकरणों को पाठ्यक्रम में शामिल करके उसे समावेशी पाठ्यक्रम बनाया जाना चाहिए।

(3) **प्रशिक्षित शिक्षकों की कमी**

शोध कार्य से सम्बंधित आंकड़ों के एकत्रीकरण के दौरान जब शोधार्थी ने दिव्यांग विद्यार्थियों से बात की तो उनमें से अधिकांश विद्यार्थियों ने बताया कि उनके विद्यालय में उनको पढ़ाने के लिए कोई भी प्रशिक्षित शिक्षक नहीं है उनको सभी विषयों की शिक्षा उनके विद्यालय में नियुक्त सामान्य शिक्षक ही देते हैं इस सन्दर्भ में जब शिक्षकों से बात की गई तो उन्होंने बताया कि जनसंख्या, विद्यालयों की संख्या और विद्यार्थियों की संख्या की तुलना में ऐसे संस्थानों की संख्या बहुत कम है जहाँ शिक्षकों को विशिष्ट बालकों को पढ़ाने के लिए प्रशिक्षित किया जाता हो परिणामस्वरूप सामान्य विद्यालयों में प्रशिक्षित शिक्षकों का आभाव है। लाल तथा शर्मा (2014)ने भी स्पष्ट किया है कि वर्तमान में हमारे देश में दिव्यांग बच्चों के लिए अलग से लगभग 2,000 विद्यालय तथा केंद्र हैं, इनमें भी प्रशिक्षित शिक्षकों की कमी है।

(4) **समावेशी शिक्षा तथा दिव्यांगता के प्रति शिक्षकों, विद्यालय प्रशासकों, अभिभावकों तथा समूह के साथियों का उचित दृष्टिकोण न होना**

वर्तमान समय में भी कई मामलों में समावेशी शिक्षा तथा दिव्यांगता के प्रति शिक्षकों, विद्यालय प्रशासकों, अभिभावकों, समूह के साथियों तथा नीति-नियोजकों का उचित दृष्टिकोण देखने को नहीं मिलता है। दिव्यांग विद्यार्थियों का साक्षात्कार करते समय माध्यमिक स्तर की दो छात्राओं ने शोधार्थी को बताया कि उनके विद्यालय के कुछ शिक्षकों का उनके प्रति रवैया सकारात्मक नहीं है, जिसके कारण कभी-कभी उन्हें नवीन ज्ञान को सीखने में समस्यों का सामना करना पड़ता है। कक्षा 10 के एक विद्यार्थी ने बताया कि जब वह कक्षा 6 में प्रवेश लेने के लिए एक निजी विद्यालय में गया तब उस विद्यालय के प्रबंधक ने उसके माता-पिता से कहा कि हमारे विद्यालय में आपके बच्चों की जरुरत के अनुसार न तो कोई प्रशिक्षित शिक्षक है और न ही पर्याप्त साधन। एक छात्रा ने बताया कि जब भी किसी नई गतिविधि को करने के लिए वह कक्षा में आगे आना चाहती है तो एक-दो शिक्षक उसको ऐसा करने के लिए प्रोत्साहित करने की जगह यह बोलते हैं कि बेटा तुम यह कैसे कर पाओगी? शोधार्थी को अलग अलग विद्यालयों के उच्च प्राथमिक स्तर के 3 विद्यार्थियों ने यह भी बताया कि कक्षा के कुछ विद्यार्थियों का उनके

प्रति दृष्टिकोण सकारात्मक नहीं है, कुछ विद्यार्थी उनकों चिढ़ाते हैं।

शोध के आंकड़ों के एकत्रीकरण के दौरान विशिष्ट शिक्षा के कुछ शिक्षकों ने बताया कि कुछ दिव्यांग बच्चों के माता-पिता का उनकी शिक्षा के प्रति सकारात्मक नजरिया देखने को नहीं मिलता है। जब हम उनको यह समझाते हैं कि आप अपने बच्चे को पढ़ने के लिए नजदीक के किसी भी सामान्य विद्यालय में नाम लिखवाएँ तो वो कहते हैं कि ''हमारा बच्चा तो दिव्यांग है यह तो पढ़ ही नहीं पाएगा ऐसे में उसको विद्यालय भेजने का क्या फायदा? इससे तो बेहतर यह है कि वह किसी अन्य काम को सीख ले, जो कम से कम आगे चलकर उसकी जीविका का माध्यम तो बनेगा।'' अत: शिक्षकों, विद्यालय प्रशासकों, अभिभावकों, समूह के साथियों का समावेशी शिक्षा तथा दिव्यांगता के प्रति सकारात्मक दृष्टिकोण एक स्वस्थ समाज के निर्माण में सहायक होगा। जिससे दिव्यांग व्यक्ति शिक्षा प्राप्त करके अपने व्यक्तित्व का विकास कर सफल राष्ट्र के निर्माण में अपनी महत्वपूर्ण भूमिका निभा सकते हैं।

(5) **विद्यालय में उचित अधिगम वातावरण का न होना**

शोधार्थी से बात करते हुए कई विद्यार्थियों ने बताया कि विद्यालय का अधिगम वातावरण समावेशी शिक्षा के मूलभूत सिद्धांतों के अनुरूप नहीं है। जिसके कारण उन्हें अधिगम में कठिनाइयों का सामना करना पड़ता है। कुछ दिव्यांग विद्यार्थियों ने बताया कि हमारे विद्यालय में वभिन्न प्रकार के क्रिया आधारित विषयों जैसे- विज्ञान एवं चित्रकला को सीखने के लिए सहायक सामग्री एवं उचित अधिगम उपकरणों का आभाव है। जिसके कारण इन विषयों को सीखने के लिए हमें व्यक्तिगत तौर पर कठिनाइयों का सामना करना पड़ता है। इस समस्या को दूर करने के लिए विद्यालय प्रबंधकों तथा शिक्षकों को मिलकर विद्यालय का वातावरण अधिगम केंद्र तथा समावेशी शिक्षा के अनुकूल बनाने का प्रयास करना चाहिए।

(6) **पारिवारिक सदस्यों के सहयोग में कमी**

शोधार्थी द्वारा विशेष शिक्षा वाले शिक्षकों से ज्ञात हुआ कि दिव्यांग बच्चों की शिक्षा में पारिवारिक सदस्यों के सहयोग में कमी है। विद्यालय में बच्चों के नामांकन के लिए परिवार के सदस्यों को आगे आना चाहिए परंतु ऐसा देखने को नहीं मिलता, क्योंकि कई सारे अभिभावक अपने निजी/आर्थिक कारणों के चलते अपने बालकों की शिक्षा पर ध्यान नहीं देते। ऐसी परिस्थिति में परिवार के सदस्यों को बालकों के भविष्य को ध्यान में रखते हुए उनका सहयोग करना चाहिए। इसीलिए समावेशन तभी संभव होगा जब परिवार को इस प्रक्रिया के लिए प्रोत्साहित कर उसे इसमें सम्मिलित किया जाए।

(7) **शैक्षणिक तथा प्रशासनिक समस्याएं**

विशिष्ट शिक्षा के कुछ शिक्षकों ने शोधार्थी को बताया की यद्यपि भारत सरकार दिव्यांगजनों की शिक्षा के लिए पर्याप्त कार्य करती है परन्तु वास्तव में लाभार्थियों को उसका पूरा-पूरा लाभ नहीं मिल पता इसका सबसे बड़ा कारण योजनाओं का सही से क्रियान्वयन न होना है। स्नातक स्तर के कुछ दिव्यांग विद्यार्थियों ने भी शोधार्थी को बताया कि 'कुछ प्रशासनिक अधिकारी, दिव्यांगजनों के शैक्षिक सुधार के लिए चलायी जा रही योजनाओं को न तो सही तरीके से क्रियान्वित करते हैं और न ही अच्छे से मॉनीटरिंग जिसके कारण उन तक इन योजनाओं का पूरा लाभ नहीं पहुँच पाता'। वर्तमान समय में भारत में दिव्यांगों की शिक्षा से संबंधित अनेक कार्यक्रम चलाए जा रहे हैं, परंतु फिर भी इन कार्यक्रमों का लाभ बहुत कम दिव्यांग व्यक्तियों को मिल पा रहा है। भारत सरकार समय-समय पर दिव्यांगों की शिक्षा के लिए बहुत सारी नीतियों तथा योजनाओं का निर्माण करती है। लेकिन उचित प्रशासन न हो पाने के कारण इन नीतियों तथा योजनाओं को सही तरीके से प्रशासित नहीं किया जाता फलस्वरूप आशानुकूल परिणाम प्राप्त नहीं होते। प्रशासनिक अधिकारियों को सकारात्मक दृष्टिकोण को अपनाते हुए इन नीतियों तथा योजनाओं का प्रभावी क्रियान्वयन करना चाहिए।

निष्कर्ष

उपरोक्त शोध कार्य का यह निष्कर्ष प्राप्त होता है कि विभिन्न दिव्यांग बच्चों को अक्सर पूर्वाग्रह तथा भेदभाव पूर्ण व्यवहार का सामना करना पड़ता है दास, क्योनि तथा देसाई, (2013) ने भी अपने शोध कार्य में यह स्वीकार करते हैं कि सामान्य विद्यालयों में अध्यापन करने वाले शिक्षक और वहां पढ़ने वाले सामान्य विद्यार्थी, दिव्यांग विद्यार्थियों के प्रति विभिन्न पूर्वाग्रहों से ग्रसित होते हैं जिसके फलस्वरूप दिव्यांग विद्यार्थी सामान्य विद्यालयों में स्वयं को अलग- अलग महसूस करने लगता है जो उसके सर्वांगीण विकास में रूकावट का कार्य करता है। शिक्षा किसी भी लोकतांत्रिक समाज में सबसे बुनियादी आवश्यकता है, फिर भी अनेक जगह दिव्यांग बच्चों को इससे वंचित रहना पड़ता है। यदि दिव्यांग बच्चे सामान्य विद्यालयों में प्रवेश ले भी लेते हैं तो उन्हें सामाजिक, शारीरिक तथा अन्य सीमाओं के कारण

विभिन्न शैक्षणिक तथा गैर शैक्षणिक गतिविधियों में भाग लेना मुश्किल हो जाता है जो उनमें हीन भावना उत्पन्न करने का एक प्रमुख कारण बनता है। उपरोक्त शोध अध्ययन के निष्कर्ष पहले से मौजूद शोध साहित्य के अनुरूप है जिसमें कहा गया है कि शिक्षकों का अपर्याप्त प्रशिक्षण, शिक्षण सामग्री का अभाव, उचित शैक्षिक वातावरण का निर्माण न हो पाना, माता-पिता का उदासीन रवैया तथा उचित प्रशासनिक कार्यान्वयन का न होना दिव्यांगों की शिक्षा के समक्ष चुनौतियाँ हैं। शोधार्थी द्वारा प्राप्त शोध परिणाम की पुष्टि अन्य शोध अध्ययनों द्वारा प्राप्त परिणामों से होती है, जिसमें कहा गया है कि दिव्यांग बच्चों को समाज में उचित स्थान प्रदान कराने हेतु उनकी शिक्षा संबंधी चुनौतियों को दूर करने का प्रयास करना चाहिए तथा सभी विद्यालयों को समावेशी बनाना चाहिए (पुरी तथा अब्राहिम, 2004; बिंदल तथा शर्मा, 2010; दास तथा कुटूमुरी, 2010; दास, क्योनि तथा देसाई, 2013; सिंह तथा अग्रवाल, 2015 एवं कौर तथा पद्मनाभन, 2017)। इसीलिए हमें शिक्षा प्रणाली की समस्याओं को समझकर उनको दूर करने पर जोर देना चाहिए जिससे समावेशी शिक्षा को मूर्त रूप प्रदान कर दिव्यांगजनों को शिक्षित करके उन्हें समाज की मुख्यधारा में जोड़कर राष्ट्र का सर्वांगीण विकास किया जा सके।

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