

ISSN 0019-4700 (Print)
ISSN 0972-561X (Online)

Indian Educational Review

Volume 59 and 60 Number 2 and 1 July 2021 to January 2022

RESEARCH REVIEW ARTICLES

Research on Gender Concerns in School Education:
A Trend Report

Continuous Professional Development (CPD) of In-Service
School Teachers in India: A Systematic Review

RESEARCH PAPERS

Small Group Learning in Science: Perspective towards
Classroom Engagement

Mathematical Thinking and Teaching Practice of School
Teachers at Upper Primary Level

Effectiveness of ICT Teaching Approach in Education
Sector

SUMMARY OF ERIC PROJECT

A Comparative Study of Status of Awareness of RPwD
Act 2016 for Inclusive Education in Government and
Private Schools of Chandigarh, Panchkula and Mohali

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ISSN 0019-4700 (Print)
ISSN 0972-561X (Online)



HALF-YEARLY JOURNAL OF EDUCATIONAL RESEARCH
INDIAN EDUCATIONAL REVIEW

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EDITORIAL

The current issue of *Indian Educational Review (IER)* is brought out by combining two issues of journal; Volume 59, Issue no. 2 with Volume 60, Issue no. 1. This includes two research review articles, three research papers and a summary of ERIC and NCERT funded research project.

The first article of this issue presents a systematic review on gender concerns in school education. Mona Yadav, Mily Roy Anand and Anannya Chatterjee worked collectively on broad themes of gender concerns, and illuminated the gaps on gender access, gender and marginalisation, gender and socialisation and curriculum. In another article, Ratikant Senapati and Sunil Kumar Singh, systematically reviewed on continuous professional development of in-service school teachers in India. They figured out the gaps between the policies framed during post-independent India and current practice of continuous professional development for school teachers.

Biswajit Behera in his research study explored small-group learning in science to convey perspectives towards classroom engagement. He found that small group learning facilitates student interaction, sharing of experiences, insights and questioning. Classroom engagement in a group learning resulted in deep understanding, interpersonal skills and team work among students. In the second paper, Ashutosh Prabhakar and Ittira Poovaiah Gowramma studied mathematical thinking and teaching practice of school teachers at upper primary level. They argued that teachers with mathematical thinking skills examine the material, employ mathematical process and decipher what the learners are trying to convey through their answers. Lastly, the paper by R. Arulmurugan titled, 'Effectiveness of ICT Teaching Approach in Education Sector' describes the various innovative approaches for the teaching-learning process using Information Communication Technology (ICT) tools. These approaches are poll based learning, automatic grade sheet generation, mind-map approach, online quiz, virtual laboratory approach and brain storm approach. These approaches reveal the learners' understanding level.

The summary of a completed ERIC project by Sneh Bansal titled, 'A Comparative Study of Status of Awareness of RPwD Act 2016 for Inclusive Education in Government and Private Schools of Chandigarh, Panchkula and Mohali' has been included in this

issue. The study examined a comparative status of awareness of RPwD act for inclusive education in the above three regions of government and private schools. It was found that the schools' adaptation of RPwD Act 2016 is less. However, some schools implemented healthy pedagogical practices to teach children with disabilities.

The *Indian Educational Review* focuses on enriching the discipline of education by disseminating findings of educational research, providing opportunities for exchanging research experience among fellow researchers, motivating academicians and providing inputs to all those involved in policy making and planning. Contributions of academicians, researchers and freelancers are cordially invited for this journal. We seek your suggestions and views on the improvement of this journal.

Academic Editor

INDIAN EDUCATIONAL REVIEW

The *Indian Educational Review* is a bi-annual journal, brought out by the National Council of Educational Research and Training (NCERT), New Delhi. The journal publishes articles and researches on educational policies and practices and values material that is useful to practitioners in the contemporary times. The journal also provides a forum for teachers to share their experiences and concerns about schooling processes, curriculum, textbooks, teaching-learning and assessment practices.

The views expressed by individual authors are their own and do not necessarily reflect the policies of the NCERT, or the views of the editor.

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Single Copy: ₹ 50.00
Annual Subscription: ₹ 100.00

*Printed in September 2024

Research on Gender Concerns in School Education A Trend Report

MONA YADAV*, MILY ROY ANAND** AND
ANANNYA CHATTERJEE***

ABSTRACT

A systematic review of the research studies in the field of Gender Concerns in School Education was taken up with the objective of identifying broad themes and trends of educational researches during the period of 2001–2020. The review helped in identifying gaps in research and through critical discussion on such gaps, prompted new research projects to be conducted. The themes that came up frequently in the research analysed for this report are: Gender and Accessibility, Marginalisation, Gender and Marginalisation in Education, Gender and Curriculum, Gender and Socialisation in Schools and Policy making and their Implementation for Women Education. Each theme was further divided into sub-themes that demonstrated the diversity of researches done to understand gender and education. The report suggests the existing gaps in educational research done on gender and areas of research that can be undertaken in future by researchers working on gender and education.

Keywords: *School Education, Gender, Systematic Review*

Introduction

A discussion on the education of girls and women in India need to be placed in the context of a complex social structure of India that constantly grapples with the interface of modernity and tradition on

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the one hand, and economic and social realities on the other. Gender does not manifest in isolation but is determined by various other socio-political and economic factors. Several structural inequalities as well as regional variations compound the problem of building a comprehensive theoretical premise on the condition of education for women and children. Further, with the constant dynamism of social norms and practices alongside, rapid economic and political changes in the country, gendered conditions and situations shift from one form to another. Social inequalities and differences interact with each other across geographical regions and terrains, social, cultural and religious communities, advantaged and disadvantaged communities based on caste, class, sexuality, wealth, occupations and locations. This makes it essential for researchers to have discussion on gender and education within a specific social context.

The recognition of inter-linkages and themes of research that social scientists, and researchers contribute to the vast body of research literature is of paramount importance. It allows to identify the specific standpoints and lenses that researchers use to look at the problem of gender and education. Such recognition brings with it an acknowledgment of gaps in the research on gender and education as well. It will not only pave the path for further researches but also inform the methodology and lens used, ideologies employed in the theoretical analyses, etc.

It is with such objective that a systematic review of the research studies done in the field of gender concerns in school education was taken up. It presents themes in the existing body of research literature and trends that could be identified, making way to look at gaps in the existing research and a critical discussion around the same. The following broad themes were discerned from the reviewed literature: Access to education, gender and marginalisation in education, gender and school curriculum, socialisation of gender in schools, and policies and schemes for girls' education. Each theme is further, divided into sub-themes that demonstrate the diversity of researches done to understand gender and education within that particular theme.

Objectives

This review was conducted with the following objectives:

1. To identify the broad themes and trends of researches in the area of gender concerns in education conducted during the period 2001–2020 in the Indian context, and

2. To identify and discuss the gaps in researches in the area of gender concerns in education.

Method

A thorough analysis of the texts was undertaken from the gender lens. The materials, resources for the present review were collected based on the following criteria:

- Research conducted, articles published or presented during 2001–2020.
- Studies and published articles related to education of girls either directly or indirectly.
- Ph.D. and M. Phil. dissertations.
- Institutional research reports, books, articles published in journals and documents (International and National).

Historical Overview

In India, discussions around gender and education can be traced back to the pre-independence period that looked at education as a tool to enhance one's social status. The visibility of women into the formal education system began in the mid-nineteenth century but it got wider acceptance only in the mid-twentieth century. The push of including women in the educational system was from social reformers and revivalists whose concerns were on gender education that sought to reiterate rather than creating challenge on gender social relations. Mazumdar and Sharma (1979) points out at how the main purpose of social revivalists in educating women was not to make them active participant in the socio-economic and political spheres but it was rather to make them more capable of fulfilling their traditional roles in society as wives and mothers. However, in the post-independence era the values of equality and equity helped to shape the ideological basis of women and girls' education. There was an expansion of the school system and infrastructure and various means were adopted to bring girls into the ambit of formal education. The Constitution of the Indian Republic introduced in 1950 imbibed various such principles within it. It aided for an equitable approach towards education. Article 45 specifically, requires that the States should endeavour to ensure free and compulsory education up to the age of 14 years, while Article 16 imposed non-discrimination on the ground of sex in public employment and Article 15(3) empowered the State to

make special provisions for the welfare and development of women and children that hastened access to education for girls at all levels.

It is important to trace the history of various developments on gender and education. After Independence, the University Education Commission or the Radhakrishnan Commission (1949) dedicated an entire chapter on women education. Interestingly, the views of the Commission were still steeped in the idea that a woman education is primarily to uplift her as a more capable domestic worker, who can be competent in her domestic, familial responsibilities towards the family. The following statement is quite revealing of the above made comment, “The Commission believes that a well-ordered home helps to make well-ordered men. The mother who is inquisitive and alert, well-informed and familiar with subjects such as history and literature, and who lives and works with her children at homes, will be the best teacher in the world of both character and intelligence”. Further, while the Commission elaborated on the fact that, women and men are equally capable to endure educational thoroughness and quality but it added that, it did not encourage similarity in men and women education in all aspects.

Secondary Education Commission (Mudaliar Commission) of 1953, however, made a departure from such perceptions and iterated that in a democratic country such a difference, which may lead to variations in the standard of intellectual development achieved by boys and girls, and cannot be envisaged.

One of the most significant committees formed to look particularly, into the question of women’s education was the National Committee on Women’s Education (1958–59) popularly, known as Durgabai Deshmukh Committee on Women’s Education. The committee made recommendations to the government in cognizance with the various hindrances that girls face in educational attainment.

Hansa Mehta Committee on Differentiation of Curricula for Boys and Girls (1962) took an unequivocal stand against curricular differentiation. It stated that the existing gaps between education of boys and girls in the country are rooted in the patriarchal, socio-cultural notions that deem girls inferior than boys in their intellect, aptitude and physique. Hence, any push towards a differentiated curriculum for boys and girls will only lead to a blatant reiteration of such gender bias and the continuation of gendered power dynamics. Besides, recommending co-education

at the elementary and secondary education, the committee also provided various vocational courses to both boys and girls.

The Kothari Commission (1964–66), endorsed the views of Hansa Mehta Committee and Durgabai Deshmukh Committee and observed that women's education needs to equip women for responsibilities that lie outside of the domestic sphere of the family and that 'equal partnership will have to continue in the fight against hunger, ignorance and ill-health'.

However, none of the above-mentioned developments critiqued the situation of women's education as radically as the Committee on the Status of Women in India in 1971 did. In a nuanced report termed *Towards Equality* (1975), it recapitulated the urgency of catering to the question of women education and many socio-cultural inequalities that hindered it. It established a direct causation between educational discrepancies and the patriarchal subordination of women in an Indian society. The report significantly affected government policy in context of promoting women welfare and empowerment. On the other hand, the findings crucially influenced a section of Indian Academia in their research and training, pushing them away from the old-approach where role of women was mainly focused on family well-being and therefore, towards a critical issue (Desai and Thakkar, 2001).

Educational Policies and its Implications on Girls' Education and Gender

Education of girls is a major concern in national agenda since Independence. Special commissions and committees were set up to assess the progress of girls' education from time to time and to propose suitable interventions, to promote their educational participation. Several strategies were adopted to promote education of girls as an integral part of the planned socio-economic development of the country.

A major conceptual shift can be noticed in the last decade in an approach to the education of girls and women. Education of girls is increasingly being seen as a basic human right and a crucial input into national development. Investment in female education is now considered a development imperative rather than a plain moral commitment. Thus, lifting it from the plain of pure ethics to that of sound economics. The National Policies are designed to reach out to girls and other disadvantaged groups in rural remote areas (Nayar, 2000).

The culmination of all the government efforts was the formulation of the National Policy on Education (1986), which made a radical statement about the transformative potential of education. The policy mentioned that education will be used as an agent of basic change in the status of women. In order to neutralise the accumulative distortions of the past, there will be a well-conceived edge in favour of women. The National Education System will play a positive, interventionist role in the empowerment of women.

This policy further acknowledges the need to address the roots of gender marginalisation to realise gender equity in education. Such commitment led to the formulation of a fascinating programme for women equality called *Mahila Samakhyain* (1987), which sought to create empowering conditions for poor women to ensure education for themselves and their daughters. National Literacy Mission also gained momentum in the country in the early 1990s and assisted in an increase in the literacy levels of women across the country. From the early 1990s, the drive for universal primary education through the District Primary Education Programme (DPEP) brought gender issues to the fore in curriculum and textbook revision, gender sensitisation of teachers and community mobilisation on girls' education.

The recent formulation of the National Education Policy (2020) has given direction to the whole education system right from preparatory to higher education. It aims to achieve the overall development goals of the country. Gender equality being one of the Sustainable Development Goals (SDGs) was focused by the policy. National Education Policy (2020) directs the government to equip individuals to realise their dreams and to enable all students irrespective of their place of residence, a quality education system with particular focus on historically marginalised, disadvantaged and under-represented groups. Education is a great lever and is the best tool for achieving economic and social mobility, inclusion and equality. Initiatives must be in place to ensure that all students from such groups despite, inherent obstacles are provided various targeted opportunities to enter and excel in the educational system. It is also important to note that the policy specifically, recognises 'transgender person' a gender category, among the Socio-Economically Disadvantaged Groups (SEDGs) (in Chapter 6 on Equitable and Inclusive Education) has been historically under-represented in education. Thus, it takes gender and

other social groups into historically marginalised sections and also incorporates a specific section on curbing the dropout rate (Section 3, p.10; titled '*Curtailling Dropout Rates and Ensuring Universal Access to Education at All Levels*').

Further, National Education Policy (2020) considered sensitisation as a crucial aspect of the education system and therefore, emphasised on the sensitisations of all participants in the education system. Considering the systematic marginalisation of social groups like gender, the policy directs the school curriculum to integrate different aspects of human values, inter alia gender equality, non-violence and detailed knowledge about gender identities (section 6.20, pg. 28). In Chapter 6, 'Equitable and Inclusive Education: Learning for All' under twenty sub-sections, the policy makes specific mention of transgender individuals and puts them under SEDGs as it states, 'Socio-Economically Disadvantaged Groups (SEdGs) can be broadly categorised based on gender identities (particularly female and transgender individuals)'. All the provisions made in the policy for SEDGs is also applicable for the transgender students. The need is to sensitise officers and personnel in the education system to take necessary steps for transgender children under these provisions to benefit them. The policy also recommends implementation of various provisions for different gender identities and directs the creation of a gender inclusion fund for these activities.

Goal 4 of the Sustainable Development Goals (SDGs, 2015) is about ensuring inclusive and quality education for all and promoting lifelong learning. The target to be achieved by 2030, is to eliminate gender disparities in education and ensure equal access to all the levels of education and vocational training. Further, Goal 5 is about achieving gender equality and empowering all the women and girls. Keeping the SDGs in mind, Agrawal et al. (2019) conducted the study that analysed the policies on education and skill development in India and Korea. Findings of the study highlighted that in India, several strategies have been adopted to promote girls' education as an integral part of the planned socio-economic development of the country. In Korea, education has played a pivotal role in the progress of Korea as a developed country. Based on the analysis of existing policies, specific recommendations were made for both the countries and also individually for India and Korea. For example, to combat

the effects of patriarchy and gender-role expectations, Korea has made Home Science course compulsory for boys in schools. Such an initiative in schools in India can be very beneficial. Similarly, more focus on gender issues in education in the teacher education programmes and in recognition of education as a basic tool to transform society was suggested for Korea. One of the recommendations that is of immense relevance for both India and Korea is to make schools zero-tolerance zones against any form of gender violence.

Nakray (2018) presented a critique of the policies in place to supplement girls education and targeted gender disparity. It discussed the constraints of such policies pertaining to issues related to girls of marginalised communities. It critiqued policies such as Conditional Cash Transfer (CCT) that was created to address the problem of gender inequality without keeping in mind, the complex and multifaceted contexts that arises on the question of girls' education in India. The author examined the constraints of Indian education policies in addressing issues pertaining to the education of girls from marginalised communities, drawing on feminist and intersectionality perspectives. Using the theoretical framework of knowledge transfer and power, the author discusses in great detail how policies borrowed from the western context evaporated before reaching the ground leaving young girls with little or no support in terms of educational benefits. The CCT policy in the western countries such as in Brazil and Mexico have worked unlike in India, where the efficacy of cash transfer in addressing early marriage, improved enrolment or learning outcomes has been rather chequered and failed to reinforce the global evidence. Such papers which constructively critique the existing policies at the national level are of immense importance to understand the trend of the kind of researches that has been done with respect to gender and educational policies.

Formation of the Discipline of Women and Gender Studies

The simultaneous formation of the academic discipline of Women Studies needs to be discussed to understand the various ways in which concerns around gender and education have transformed over time, and space. The earliest impetus of setting up Women Studies in the Indian context came from a generation of social scientists, who critically became more aware of their location in higher education. A shift was initiated from women as subjects to

be educated to 'women' as new subjects of investigation and study. Mazumdar and Sharma (1979) produced the first discussion on the scope of Women Studies that focused on the large-scale neglect of women in social science. The discipline spread to India much rapidly following the UN Mid-Decade Conference held in Copenhagen in 1980. Indian Association of Women Studies (IAWS) established in 1981 became an institution that involved in research and training of academicians and researchers in the field of gender and marked the first step towards institutionalisation of women's studies.

Women studies scholars sought to critically enquire into the structural and cultural bases that characterise the maintenance and reproduction of patriarchy in India at the familial, community and state levels. Gaining institutional support in the 1980s, women studies gained momentum by pointing towards various forms of exclusions and invisibility, recovering women voices from the margins and constantly unveiling and exploring the complex relationship between power and knowledge. There was a growing unrest due to the fact that, while organisations such as National Commission on Labour (1969), Expert Committee on Unemployment Estimates (1971) and the Report on the Committee on Unemployment (1973) were undergoing researches that highlighted issues such as unemployment, wage discrimination and general oppression of women but still no active effort was carried out in that area. The *Towards Equality Report* (1975) was the first to catalyse the growth of researches around specific issues related to gender as well as became the foundation on which the discipline of Women Studies built itself. The findings of the report led the Indian Council of Social Science Research (ICSSR) to fund research projects in Universities related to gender, gender oppression, etc. In 1974, a unit for research on women was set up in the SNDT Women's University, Bombay, officially becoming a centre in 1985. In 1981, the first National Conference on Women Studies was organised by SNDT Women University for incorporation of women experiences and women roles in academic studies, while the women movement concentrated on organisational issues and addressed issues of violence, the women studies meeting emphasised on agendas of research and the critique of syllabi (John, 2008).

In 1986, UGC brought out the guidelines for Development of Women Studies, formalising the discipline and the centres of gender research. Thus, academic centres as well as non-academic

centres were established. Institute of Social Studies Trust, Centre for Women Development Studies (CWDS), the Institute of Social Studies Trust in Delhi, the Anveshi Research Centre for Women Studies in Hyderabad and Chetna in Ahmedabad are some of the earliest ones.

The *Towards Equality Report* (1975) further, had a profound impact on the way that Women Studies defined its concern and the linkages that it sought with the women movement. Issues of development, violence, legal rights, and economic and political participation became central arenas of research and intervention.

However, the mandate of Women Studies has undergone various changes since, its inception. Feminist scholars challenged its limitations of treating women as a homogenous group and urged to broaden its spectrum with an emphasis on inclusivity to encapsulate gender non-normative persons, transgender people, queer and other groups. Masculinities and femininities were marginalised on the basis of their identities and sexual orientation. Feminist scholars further, pushed for the recognition on how gender oppression operates along with class differentiation and caste discrimination in the Indian society. The contribution of Indian feminists has highlighted the predicament of women multiple and overlapping marginalisation in the complex interplay of caste, class, gender, ethnicity and religion. Thus, in late 1990s, there was a gradual shift in terms of the discipline itself and thus, from Women Studies, many centres shifted to Gender Studies.

However, gender studies scholars have been extensively examining the gendered access to educational facilities, sexism in school textbooks and reconstruction of stereotypes in schools. Feminist scholarships around women education have developed deeper into the phenomena of gender bias, discrimination, exclusion, violence and the different ways they affect the access to education. They have also pushed forth theories such as the critical theories around education as a socialising agent, as well as theories of feminist pedagogies that guide many researches done today on education in India.

International Scenario

Gender equality and equity in education is a matter of concern for more than a century. Earlier, when the right to schooling was introduced, single-sex schools dominated the educational landscape in many countries. Subjects taught to male and female students differed, reflecting the expected course of life of these

children. Consequently, various subjects aimed at a certain gender group such as cooking was associated with girls (Trueman, 2015). Nowadays, fairly equal opportunities to learning have been established in the vast majority of countries for female and male students. However, the traditional patterns keep influencing the life course of male and female students in very powerful ways. For example, girls as opposed to boys still opt more for professions within the social sector and less often for sectors related to the so-called STEM (Science, Technology, Engineering and Mathematics) subjects. These patterns can be observed with career and study choices prior to entering the work force (UNESCO, 2017).

At the international level, gender equality has been given much importance, which has led UNESCO to declare gender equality as one of the most important goal for education (UNESCO, 2015) and this aim has been incorporated within the framework of sustainable development goals (United Nations, 2018). International comparative research addressed the issue of gender differences continuously and the topic is prominent in many recently conducted international large-scale assessments in education. For example, 2015 TIMSS and PISA cycles (Mullis et al., 2016a; Mullis et al., 2016b; OECD, 2016).

One aspect of gender differences receiving high attention is related to STEM education. UNESCO (2017) report on girls and women education in STEM finds that, till date, girls are still under-represented in choosing STEM disciplines for studying and as their career paths. Also, international comparative studies observe a similar pattern. The IEA TIMSS-Advanced study on upper secondary students studying advanced mathematics and science conducted in 2015 found (far) more male students in these advanced courses in most of the participating countries (Mullis et al., 2016c). Further, male students on an average, achieved significantly higher than girls in again, most of the countries.

Scholarship in recent decades reflects scholars' simultaneous mobilisation of diverse theoretical and methodological tools to explore gendered dynamics in a range of sites and explored the expansive reach of gendered analyses of varied locations, practices, policies and processes that has broadened the understanding of gendered operations in education. Feminist theories, masculinity theories, post-structuralist theories, materialist theories have constituted the theoretical background of such research. Further,

contemporary research on education and gender also addresses sex-role theory, gender egalitarianism, anti-violence, critical and feminist pedagogy, grounded theory, cartesian corporeal agency, psychoanalytic theories, leadership theories and gender reproduction.

Recent research trends look at the theoretical and practical implications of sorting and grouping human beings by the designation of biological sex, through schools, sports teams, sexuality education curriculum, etc. Further, research has also created space for pregnant and mothering teens, students in special education, 'at-risk' students in alternative schools, sexual minority and gender non-conforming students and they have created single-sex classrooms schools for students of colour among others. Indeed, the major theme of early research on transgender issues in education focused on how to make campuses more inclusive to serve the educational needs of transgender students. By the end of the first decade of the twenty-first century, international scholarship on transgender issues in education has shifted from central concerns regarding access, visibility and resources in higher education to the inclusion of studies about importance of inclusive curricula and pedagogy in primary and secondary schools and have engaged in research on teacher preparation and medical education. One can surely take away from such international research trends to identify particular concerns of education of transgender communities in India.

The following are the themes that have emerged from review that was undertaken.

1. Gender and Access to Education

Understanding Access

To understand access to education from the lens of gender, one need to unravel the term itself as well as need to understand how research has approached it so far. The Joint Review Mission report that was carried out under the *Sarva Shiksha Abhiyan* understood access to education by including indicators such as enrolment in school (class-wise as well as level-wise), out-of-school children, information on average drop-out, retention, attendance and transition rate across grades, physical access to school and availability of school infrastructure such as functional toilets, classrooms, etc. Yet, such quantitative indicators and the data

arising from them neither account for the ‘texture of inequalities’ of the social fabric nor do they encompass the multifarious aspects of the gendered realities of accessing education (Ramachandran, 2018). Many girls face multiple barriers because of gender exclusion making it more difficult for them to enrol in and complete primary school and continue to secondary school (Lewis and Lockheed, 2007). In other words, access to education need to be understood beyond developmental indicators. It need to include judgement of educational quality and process (what children have access to), and of educational outcomes (what competencies and capabilities are acquired and how they are valued) (Consortium for Research on Educational Access, Transition and Equity, 2011). On a similar note, Ramachandran (2018) emphasised on the importance of including factors such as quality of schools and their effective functioning, availability of enough number of trained teachers, classroom experience and ways teachers cater to disadvantaged groups, non-discriminatory pedagogical practices and curriculum regular assessment and feedback to ensure high-learning outcomes and meaningful access to education (Ramachandran and Chatterjee, 2014; Ramachandran, 2018).

The paper presented a nuanced examination of various determinants of school participation based on the findings of the PROBE survey (Public Report on Basic Education, 1999) related to the main feature of schooling in North India. They identified household variables (such as parental literacy particularly, maternal education, household wealth, caste, land ownership, etc.) and school variables (such as provision of mid-day meals, teacher regularity and qualification as well as a low teacher-child ratio) as conducive factors to ensure enrolment of girls. The parental motivation proved to be a strong influential factor on the enrolment of students in primary school such as girls’ enrolment rose by as much as 30 per cent points, if her parents considered education as ‘important’ for females. Further, it was found that, the chances of completing primary education rose by 30 per cent points in the availability of mid-day meals in the primary schools. A plausible explanation of it was that it significantly reduced the ‘private’ cost of education. A significant finding was the interplay of disadvantage of belonging to scheduled castes or tribes and other backward classes that weigh heavily on the educational attainment of girls.

Ramachandran (2002 and 2003) and Ramachandran (2004) showed how an increase in enrolment did not directly lead to the empowerment of women. According to the NFHS-2 (1998–1999), overall, 15 per cent of boys and 22 per cent of girls aged 6 to 17 years of age were not attending school at the time of the survey. Nearly, 13 per cent of the respondents perceived education as unnecessary for girls. The major reasons cited for children who dropped out of school were lack of interest and the necessity for them to work at home or outside. Ramachandran placed the issues of irregularity in school attendance, dropout from schools and low learning outcomes within a larger framework of social institutions intertwined with economic factors that determined the child's ability to access and continue schooling. In her work, she identified gendered cost of education that remained hidden from plain view, i.e., school uniforms, textbooks, cost of parental investment, etc. Further, the low quality of education, lack of proper school facilities, the 'school-community-teacher-children conundrum' revealed indifferent attitude of teachers towards the socio-economic hardships faced by students of marginalised communities. It resulted in disillusionment with the entire concept of schooling in many such communities (Ramachandran, 2002; Ramachandran, 2004). Such woeful expectations from the community were compounded by the gendered effects of poverty, labour requirements of the household, agricultural and non-agricultural activities, etc.

A qualitative study was conducted to understand the factors that facilitate and impede primary school completion of students in Andhra Pradesh, Karnataka and Uttar Pradesh. Results of the study revealed that factors such as the availability of schools within a reachable distance, conducive school environment including accessible infrastructure, supportive and empathetic teachers, as well as their regularity, parental educational levels and their investment in their child's education (especially, that of the mother's), supportive environment at homes that relieved students from household responsibilities (such as taking care of siblings, child labour, etc.) had provided tangible benefits of education in terms of social status, livelihood and upward mobility. Sustained education and awareness about immunisation and easy accessibility of health facilities facilitate successful primary school completion for girls as well. Being the oldest child, having siblings with disabilities, the burden of responsibilities of chores in and out

of the household, social practices of post-puberty restriction on movement, early marriages and dowry, and factors that threaten the safety of girls within schools such as teacher's addiction and drunkenness were some of the most important factors that impeded primary schooling completion of girls who belonged to diverse poverty situations.

Ramachandran (2003) underlined how girls, who belong to marginalised communities of Scheduled Castes and Tribes were worst in accessing education. Women from landless households especially, from social and economically backward communities and those living in the most backward regions of the country had been totally bypassed by educational and developmental processes. Bandhopadhyay and Subhramanian (2008) and Samson and Noronha (2007) also focused in their studies on how lack of infrastructures such as functional toilets acted as a powerful deterrent for adolescent girls to attend schools. It not only affected hygiene and privacy issues but also caused inconvenience during menstruation. Roy (2015) brought out the complex negotiations of acquiescence and contestations with socio-cultural norms of femininity. It showed how socio-economic realities, and religious and cultural norms affected girl's participation, retention, performance in the classroom and further, limited her expectations from higher education.

The studies thus, showed that access to education should not only be understood in terms of physical access pertaining to infrastructure specifically but they also need to consider functional toilets for girls and the availability of secondary schools within walking distance. Further, other factors such as quality of schools and their effective functioning, mid-day meals, availability of enough number of trained teachers, classroom experiences, teachers' behaviour towards disadvantaged groups, non-discriminatory pedagogical practices and curriculum, regular assessment and feedback also require due consideration. Additionally, the household variables in terms of parental literacy (particularly, maternal education), household wealth, gendered costs of education, caste and land ownership, parental motivation, etc., have a strong influence on the enrolment of girls at the primary stage. The high levels of absenteeism and dropouts among adolescent girls as they move from middle to secondary level education can be of many complex factors. The findings underlined the various socio-cultural aspects of gender dynamics

that determined access to education. Thus, access to education can also be understood in the context of complex socio-political norms mediated by gender.

Economic Factors Affecting Access

Kingdon (2005) analysed her study keeping household wealth as the main determinant of educational attainment and found that enrolment was contingent primarily, on wealth and stated low enrolment rates among the people from poorer backgrounds may be because of the 'high opportunity cost of schooling', i.e., the hidden cost of schooling even with very low school fees. Thus, families that require children to supplement family income need to incur high opportunity cost of schooling and therefore, were demotivated to enrol their children even in primary schooling. Such a high opportunity cost of schooling negatively affected boys more than it affected girls, owing to the strict division of labour that were followed in families. In other words, more boys were expected to participate in labour work, while girls were entrusted with domestic chores. In an interesting study (Kingdon and Theopald, 2008) observed that the demand for schooling actually depends on the economic returns to education in the local labour market. However, NSSO, 2006 data showed that, gendered ramifications on education attainment bear high on girls as they move up the level of grades. Further, one may understand that economic returns may not be sufficient to counter hegemonic ideals of femininity and gender.

Alcott and Rose (2017) attempted to understand learning disparities throughout the cycle of primary education, by modelling five characteristics that may affect learning outcomes. Findings of Annual Status of Educational Report (ASER) 2020 in rural India, endorsed the findings of earlier studies, where gender, socio-economic wealth and parents' literacy were important factors for determining learning outcomes. However, after controlling all other factors, it was found that, household wealth and parental schooling showed sizeable gaps, which keep on increasing as one went higher on the grade scale. In other words, gender, socio-economic status and parental education were non-significant in the learning outcomes at Class 1. At Class 5, however, all these variables had significant influence on the learning outcomes of children. Poverty reportedly, superseded all other characteristics as a predictor of learning disparities. Combining all the estimates,

the research findings indicated that a girl belonging to one of the poorest households, whose mother and father did not receive formal schooling, were less able to solve mathematics problems than boys belonging to a wealthy household, whose parents were literate. Further, poor girls were less able to do subtraction than poor boys. This research foregrounds the interface of socio-economic factors, literacy of parents and the institution of gender that circumscribes the experience of learning (outcomes, retention) for many girls in rural India. Such data paints a complicated scenario with respect to gender and educational access (in terms of enrolment, educational attainment, learning outcomes, etc.)

The findings revealed that interface of socio-economic factors, literacy of parents and gender affects learning, and retention for many girls in rural India. The families that require children to supplement family income and the high opportunity cost of schooling demotivated the parents to enrol their children for schooling.

Gender and Household Education Expenditure

Gender difference in educational access and attainment can be significantly attributed to economic factors that manifest in the form of intra-household expenditure on education, i.e., decision of resource allotment and investment on education differed for girls and boys that established a certain pro-male bias in the intra family educational investments. Educational investment includes a variety of economic factors: school fees, books, uniforms, transportation and other material as well as tuition fees. Further, parental investment in terms of time and energy as well as the push to attain education are some of the non-economic factors affecting access to education.

Kingdon (2005) argued that, intra-household educational expenditure can potentially affect two decisions: whether to enrol retain the child (boy or girl) in schools and how much to spend on their schooling. Such decisions were further, compounded by factors such as the gender composition of the household's child population, the age of the child, literacy of the household heads, familial and parental bias, etc. In rural India, the percentage of all-girls' households reporting positive educational expenditure was only 47.3 per cent, while the corresponding percentage for households with at least one boy was 66 per cent. Further,

all-girls households were nearly 19 percentage points more likely to report zero educational expenditure than at least one-boy household. Such findings showed a strong correlation between the gender composition of households and the household decisions to incur positive spending on education. The probability of positive educational expenditure increased in the presence of a boy in the household rather than a girl. One of the most important finding in her research was that, gender bias was substantially noted in the current enrolment rates within 10–14 and 15–19 age groups, 16 states reviewed indicates a high probability of zero educational expenditure among girls belonging to the said age groups.

The findings of the study by Lancaster et al. (2008) were consistent with the previously discussed studies. Their data analysis in underdeveloped rural Bihar, Kerala and Maharashtra presented a sharp gender bias in educational expenditure for the age groups of 11–16 and 17–60 years of age. Further, gender disparity in the allocation of budget prevailed at the lower rather than higher level of adult literacy. This took away the notion of economic backwardness being proportionate to gender bias. For example, even in the backward areas of Bihar, gender bias against girls in educational spending was mostly noted to prevail in households having lower adult (male) literacy than households with higher levels of adult literacy. There was additional evidence of significant inter-generational transmission of gender biasness in educational spending. The findings of adult male literacy having a positive impact on girls' education was further, substantiated by Vaid (2004) concerning inequality in educational transitions. Her study revealed, while education of both the mother and father played an important role in the transition of children across the educational stages, the literacy of the mother had a strong effect in pushing for the education of all the children and did not held any significant effect for only girls. However, father's literacy and gender interaction significantly showed that daughters have a better chance in accessing education, if a father is literate. Himaz (2009) found aspects of gender discrimination in Andhra Pradesh within the expenditure on education of students after being enrolled in school. The study concluded that differential expenditure was prominently found in decisions of enrolment as well as expenditure after enrolment in the age group of 10–14 years of age. Such a difference in spending on educational prospects after enrolment

was manifested majorly in the form of extra tuitions, i.e., more is spent on boys for extra tuitions than girls. In the age group of 15–19 years, however, the expenditure bias is mainly in the form of the decisions of enrolment, i.e., more boys were enrolled in schools than girls.

Thus, gender biasness in educational expenditure was reported. The probability of positive educational expenditure increased in the presence of a boy in the household rather than a girl. Gender biasness was also noted by researchers in the enrolment rates within 10–14 and 15–19 age groups. There was a high probability of zero educational expenditure (non-enrolment) as well as lower educational expenditure among girls belonging to the said age groups. Lower literacy of parents and household expenditures played an important role.

Gender and Choice of School

With globalisation, privatisation has been taking place at an unprecedented pace with private schools catering to the market values. Maitra et al. (2016) examined the extent and causes of the gender gap in private school enrolment, especially focusing on the role of individual, household and community characteristics. The study showed significant gender bias against girls in private school enrolment, which varied across the Indian regions. There was significantly a higher gender gap in northern and north-western states relative to those in the south, and the east. Research primarily showed that, it mainly depends on the ‘rational choice’ of the parents to maximise their ‘investment’ in their child’s private schooling. Thus, one may infer that gender gaps in private school enrolment were directly linked with the gender disparity in economic sectors and job markets.

In another study, Sahoo (2016) found various factors of higher preference for private schools such as gender, birth order, facilities in the private schools, remoteness of the village (farther the village is from the district headquarter, more is the demand for private schools). The report pointed out, intra-household gender gap in private school enrolment as well as school choices for children in the same household to be nearly 6 per cent. An interesting result of the research was that sex ratio had a positive effect on the cost of private schooling. A village with more men than women willingly spent more on their private schooling thus, increasing the cost of the schools and making it even more difficult for girls to access

such schools. The difference in school fees comes out to be the only factor to have a massively significant relationship with the gender gap in private school choice. Similar results were found by Goswami (2015) as well.

In a similar effort to analyse the household dynamics and behaviours of disadvantaged households in economically developing countries around girls' schooling, Srivastava (2006) examined the 'mental models' of households related to schooling of their daughters in low-fee private schools or LFPs. It was found that, maximum household members in her study were just as likely to send their daughters to LFP schools as their sons. The research suggested that, the 'mental shift' among the participants that prioritised daughter's education was driven by peer and family influence and the rapidly changing socio-economic changes in the country. However, the impetus for educating girls in low-fee private schools that caters to marginalised communities to which participants belonged to, was prominently the 'marriage market', while, some participants were eager to invest in their daughter's education with the expectation that it would supplement their household income. Ultimately, it was the marriage market that had a stronghold on the parental choices of educating their daughters. There was a higher demand for educated brides among lower-income and lower-caste groups. The research underscored how patriarchal thought processes still guide parent's choice for investing in girl's education and the type of school she goes to.

In conclusion, school choice for girls depends upon various factors such as distance, anxieties about girls' safety, prioritisation of boy's 'quality' of education than that of girls, intersection of social hierarchies such as caste, nationality, regionality, etc. The different researches showed that a simplification of parental school choice isn't possible and different forms of choices for private and public education should be localised in their respective contexts.

2. Gender and Marginalisation

The socio-political conditions that influence girls' access to education and the dynamics of schooling including policies are circumscribed by various factors that mutually influence and reinforce each other. Thus, gender inequality in education needs to be examined through diverse aspects of social and political divisions of caste, class, religion, disability and sexuality. Therefore, researches done on gender and marginalisation must look at the

aspect of intersectionality that treats each socio-political division not as exclusive entities on their own but as mutually reinforcing and intersecting with each other.

The interface of gender and multiple aspects of marginalisation severely affect educational attainment on various levels. One of them is access to education, wherein access is defined in terms of enrolment, drop-out rates, out-of-school children, etc. For instance, in 2013–2014, the average drop-out rates for boys and girls at the secondary level were 17.2 per cent and 16.9 per cent, respectively, while for scheduled castes, it was more than 19 per cent and for scheduled tribes, more than 24 per cent (UDISE 2019).

The Government of India has provided various forms of arrangement to meet disparities across caste in education. Special schemes pertaining to school education of SC or ST children currently include; free supply of textbooks and stationery at all stages of school education, free uniforms to children in government approved hostels and Ashrams schools and in some states also for children in regular schools, free education at all levels, pre-matric stipends and scholarships to students at middle and high-school stage, special scheme of pre-matric scholarships for children of castes and families engaged in unclean occupations like scavenging, tanning and flaying of animal skin, girls and boys hostels for SC or ST students and lodging facilities in hostels of backward classes including SC or ST and Ashram schools for tribal children started with the intention of overcoming the difficulties of provision in remote regions to provide an environment, that is, more conducive. In addition, several states have instituted schemes such as scholarships to SC students studying in private schools, merit scholarships, attendance scholarships for girls, special school attendance prizes and remedial coaching classes, reimbursement of excursion expenses and provision of mid-day meals.

This section aims to identify trends within researches on education and gender that bring out the nuances of the effects of marginalisation on education along four axes of social stratification namely, caste, religion, sexuality and disability.

Gender and Caste

No discussion around gender, caste and education can be enough without acknowledging the invaluable contribution in literature by feminists, who theorised the interface of gender and caste to analyse the disempowering situations of subordination that women from

lower caste groups suffer from. “Dalit feminists have theorised the oppression of Dalit women in three ways: subject to caste oppression from upper caste, subject to class-based oppression from upper and middle classes and subject to patriarchal oppression at the hands of all men, including men from their own castes.” (Chakravarti, 2018) Further, they have constantly stressed on the institutionalisation of caste and gender politics in education, workplace, labour, etc., such that oppressive conditions on women and girls from such communities, and reiterated through such institutions.

Education of girls must be seen in the context of patriarchal structures of early marriage and motherhood and compulsory productive labour. It is important to consider that, education has primarily been considered a male cultural resource and education of women is contextualised along the lines of reproductive fertility and population control. Further, informal labour market is also caste and gender segmented. Dalit women and girls are located in the dual labour market—in agricultural and caste labour in rural areas and informal low paying sector in urban areas. Combined together, the realities of reproductive (domestic) or productive (wage) labour, shape education choices of girls, which are actually choices of their families and communities. Thus, larger structures intervene to maintain serious caste or class gender differences in education (Velaskar, 2004).

Various perspectives were considered by social scientists and researchers to understand social exclusion from education at the conjunction of gender and caste. One of the most prominent one is to look at exclusion through quantitative measures of access such as figures of enrolment, drop-out, out-of-school children, educational attainment, etc.

A study conducted by UNICEF (2014) on out-of-school children in South Asia spanning the countries of Bangladesh, Pakistan, India and Sri Lanka suggested that girls in rural areas particularly, those from scheduled castes and scheduled tribes in India also had higher rates of exclusion. School exclusion was considerably more prevalent among Muslim children and older children from socially disadvantaged groups. The average rate of school exclusion for primary school-age children from scheduled caste was about 5.6 per cent and for scheduled tribe was about 5.3 per cent in comparison to the national average of 3.6 per cent. Girls from scheduled castes had the highest rates of exclusion as about, 6.1 per cent of girls being out-of-school children.

In order to analyse educational disparities in its distribution across region, gender and caste groups in Maharashtra. Paranjape (2007) analysed data from NSSO tables of the 55th round for the population in the age group of seven and above separately for males and females in rural and urban Maharashtra for different social groups, viz., backward classes (BC)—SC or ST or OBC and non-backward classes. The study reported striking statistically significant unevenness in the distribution of education across region, gender and caste groups with SC or ST women, and girls belonging to rural areas being the most disadvantaged as compared to non-backward class urban men or boys. Further, the study reported how rural areas demonstrated acute social exclusion and inequality than urban areas. However, the inequality in educational attainment was much higher among women than men in both rural and urban regions.

Placing their study in the context of the hierarchical social stratification of caste and religion, Unni (2009) asked a pertinent question related to the freedom of boys and girls in accessing education of their choice in the backdrop of the institutional dominance of caste and religion. She tried to understand how caste and religion mediate gender differences in educational capabilities. The paper emphasised on the various ways in which caste, gender and religion were interwoven to create situations that significantly curtailed the freedom and motivation to access education. The author acknowledged how girls were categorised as disadvantageous on the basis of their gender, location (rural or urban) as well as their community (SC, ST, religious minorities), which created extremely restrictive and discriminating circumstances and further, closed doors on better opportunities in the labour market. The study explored the indicators for poor school attendance and poor educational attainments based on the institutional context and identified important factors such as unavailability or inaccessibility of school infrastructure, labour market discrimination and insecurities, and need for domestic work and child labour, early marriage and childbirth, high drop-out rates, low reading abilities had severely affected attendance and educational attainments of girls. The paper explained that high child labour instances in marginalised communities were reflective of the fact that Muslim and OBC households were more likely to be self-employed rather than be in salaried jobs. Such social realities therefore, created significant dents in the motivation to

attain education and send children to school. Looking through a gendered lens, issues such as reproductive fertility, marriage and childbirth were highly influenced by caste and religion, proving to be important determinants in achieving young women educational prospects that belonged to marginalised communities.

Joshi (2010) looked at factors such as enrolment, gender parity and drop-outs at different level of school education for children belonging to Scheduled Tribe or Adivasis. The data for the year 2006–07 published by Ministry of Human Resource Development (MHRD) was analysed for all states. While, acknowledging that the enrolment of ST children had undergone significantly up in the last three decades (1980–1981 to 2006–2007), the author viewed the gross enrolment ratio figures as not being reflective of the complex socio-political and economic picture that had significant regional disparities. For example, Gross Enrolment Ratio (GER) for ST children at higher levels of schooling (Classes IX–XII) for the year 2006–2007 was about 19.18 per cent, i.e., 23.39 per cent for males and 14.72 per cent for females. The author raised pertinent questions on how attendance is neither guaranteed by enrolment nor is the dismal picture of attendance reflected by enrolment figures.

Analysis was also done along the axis of gender by using the Gender Parity Index (GPI). The GPI among students across elementary, primary and upper primary levels was below the GPI levels of all other categories of students, showing how ST girls were worst affected in terms of access to school education. The gender parity gap was more pronounced to Classes XI–XII in these states largely because of the increased contribution of females in domestic chores along with associated social issues. Further, the study emphasised on how ST girls were kept back as child labourers to participate in agriculture, thereby, affecting educational attainment.

Javalkar and Andersob (2014) looked at the significant difference in the drop-out rates of girls belonging to SC or ST communities, viz-a-viz, an overall drop-out rate of girls in the Bagalkot and Bijapur districts in Karnataka. About 17 per cent of SC or ST children dropped out of school in Bijapur and about 12 per cent of SC or ST girls dropped out in Bagalkot in transition from Classes VII to VIII in comparison to 5 per cent of all girls in Karnataka.

However, such statistical numbers only point towards a problem without much exploration of the systemic inequalities that inhibit a complete and comprehensive schooling experience

for girls of marginalised communities. In an attempt to investigate the multiple gendered and caste-based barriers that impede SC or ST girls' participation in schools, Bhagavatheeswaran et al. (2016) examined various socio-political, economical barriers as well as enablers to education among SC or ST adolescent girls in northern Karnataka. In-depth semi-structured interviews with girls, their parents or guardians and school administrative members and teachers led the authors to broadly classify the barriers into macro-societal, educational, inter-personal and individual factors. Macro-societal factors included an overwhelming belief within the larger community that places little or zero value on girls' education, owing to their inevitable domestic responsibilities and anxieties over control on female sexuality. It led to fears of ruining reputation or by participation in schooling after puberty, girls might fall in love and can choose the wrong path. Educational factors included poor educational levels (the research found that some girls did not know how to write their name, even after completing primary school), physical and verbal abuse on caste-related issues by teachers, lack of interest of teachers in teaching lessons, students being passed even when they were not understanding what was being taught and the lack of toilets for girls. Further, sexual harassment (understood as 'teasing' in the research) by other adolescent boys compounded the anxieties of adolescent girls for schooling. Interpersonal factors mainly included high prevalence of child marriage and discontinuing of education, lack of familial as well as community support and economic burdens. Personal factors included peer influence of dropping out and getting married as well as harboring low values of education. Beyond the specific individual barriers, broader patterns emerged, which raised questions about the limited agency of girls with regard to their educational choices particularly, in contexts, where girls' education was undervalued and they were considered as economic burdens or assets.

Multiple disadvantages of girls from SC or ST communities can also be exacerbated with a lack of representation of women belonging to marginalised communities in the position of power. Halim et al. (2016) hypothesised that living in a district, where higher proportion of SC or ST women represent in state legislatures may increase SC or ST girls' primary school completion, progression and performance. For this analysis, they linked three data sources; India Human Development Survey (2005), Election Commission of India (2000–2004) and Census of India (2001) projected in the 2003–2004 District Information Survey for Education (DISE)

dataset. The authors argued that owing to their intersectional positionalities, SC or ST women legislators can play a larger role than their non-SC or ST counterparts in reducing gender-caste gaps in primary schooling. Further, the authors believed that a SC or ST woman legislator is likely to maintain a stronger sense of solidarity with members of SC or ST and especially, with SC or ST girls and women, and to be most supportive of policies benefiting SC or ST girls. Testing this hypothesis, author found a positive correlation between positive representation in the state legislatures of SC or ST women and grade completion of SC or ST girls. SC or ST women political representation was more strongly associated with their reading and overall performance than it was for non-scheduled and scheduled boys. At the same time, it was found that non-SC or ST women legislatures were not associated with SC or ST or non-SC or ST children's grade completion and age-appropriate progression. This was an interesting insight into the hegemonic caste relations that maintained the subordinate position of women and girls from SC or ST communities, and pointed towards the fact that only gendered representations are not enough but an intersectional, inclusive representation of people would combat subordination of marginalised communities.

Paik (2009) observed in her study the psychologically crippling and inerasable experiences of Dalit girls in formal institutions of education through subjective experiences of their schooling. She argued that, Dalit girls were subjected to a certain discipline, policing, control and regulation by teachers, and communities that were determined through power dynamics of caste and gender. Through in-depth interviews that brought forth the subjective experiences of schooling, the study made visible the covert as well as the overt manners in which caste and gender manifested itself in classrooms and schools. The author spoke of how classrooms became sites of creating caste inequalities that determined capability and rank of the students based on caste thereby, making Dalit girls vulnerable to hostile environment in the schools. Caste discrimination took many forms, one of which was the reprimanding and violent attitude of teachers (overwhelmingly, upper-castes) towards Dalit students. In that context, the author noted how Dalit girls, who were first generation learners were particularly vulnerable because they had to fight both gender and caste oppression. Other discriminatory attitudes brought out by the study were reprimanding for dirty uniforms, dismissing students and the value of education for them,

openly mocking them for belonging to lower castes, etc. Furthermore, the choice of school demonstrates caste and gender inequalities as well for Dalit girls were encouraged to settle for poor educational experiences in municipal and government schools. The study brought out the robust ways in which caste and gender dynamics interweave with one another to create discriminating situations for Dalit girls in their endeavour to achieve education. In her work, the author critiqued how educational research has treated girls in schools as a homogenous category, not digging deeper to bring forth the salient ways in which caste manifests along with gender.

The work by Ramachandran and Naorem (2013) on exclusion of SC and tribal children in schools through a six-state qualitative study reiterated the findings of researches discussed above on the lines of teacher behaviour, sitting arrangements in classrooms, overt discriminatory practices and mockery, etc. It further brings out nuances of caste-based practices in schemes such as Mid-day Meals (MDMs), participation in school activities, access to water as well as with respect to particular tasks assigned by teachers. The study illustrates examples of discriminatory sitting practices in MDM, where students would sit according to their caste, gender and religion. Further, in some states upper-caste students would wash their utensils and drink water before lower-caste students. Students belonging to SC or ST communities were not allowed to touch hand pumps and water pitchers in some states, and upper-caste children were needed to pump water for them. Tasks of cleaning the school premises as well as toilets were most often than not, delegated to girls belonging to SC or ST communities, thereby, demonstrating perpetuation of caste practices within the educational structures.

The study by Srivastava (2017) examined the performance of the Ashram schools at the primary stage in Chhattisgarh from a gender perspective. Textbooks were examined to see the gender representation and assess the understanding of children about the concepts in the disciplines of Language, Mathematics and Environment Studies textbooks. The study reported a lack of definite guidelines regarding responsibilities of officials for the smooth functioning of the residential schools. Infrastructural facilities provided at the hostel were also not fully functional. The study has helped in understanding the performance of the Ashram schools in Chhattisgarh by gathering perspective of students, parents and other stakeholders in the Ashram school management.

To conclude, findings of the study revealed that rural SC or ST women and girls were at the most disadvantage stage as compared to non-backward class urban men or boys. Girls in rural areas particularly, those from Scheduled Castes and Scheduled Tribes in India have higher rates of exclusion. Studies show that the multiple disadvantages of girls from SC or ST communities can also be exacerbated with a lack of representation of women belonging to marginalised communities in the positions of power.

The wide gaps and disparities that mark the educational attainment of Muslim is a matter of a particular concern. Hasan and Menon (2004) pointed out in a survey conducted in 40 districts of 12 states of India, where roughly 60 per cent of Muslim women reported themselves to be illiterate and the school enrolment rate for Muslim girls was 40–66 per cent. The proportion of illiterate Muslim women was substantially higher in the rural north than it was in the rest of India. Less than 17 per cent of Muslim women enrolled in schools, completed eight years of schooling and less than 10 per cent completed higher secondary schooling, which was below the national average. The educational status of Muslim girls in north India was particularly abysmal, resulting in substantially lower enrolment rates at the middle school and higher secondary school levels (4.58 per cent and 4.75 per cent, respectively as opposed to the national average of 17.86 per cent and 11.42 per cent, respectively). The authors pointed out that, contrary to prevalent stereotypes about forces of conservatism being the cause for low level of education among Muslim girls. Financial constraints outweigh parental opposition for girls continuing their studies. In the north zone, financial constraints were much more important for Muslims than they were for Hindus, underlining once again the poverty of Muslim households in this part of the country, and this provided the most powerful explanation for the poor levels of women education in the north as a whole. The south presented a different picture. Girls belonging to lower socio-economic classes had as good a prospect of continuing in school as girls from higher classes. This was because of higher levels of state investment in education, a larger percentage of female teachers, extensive network of roads and good transport facilities that enabled easy access to schools. Thus, regional variations in educational attainment among Muslim girls needed to be understood against the socio-political and economic backdrop of the region itself.

In yet another study, Hasan and Menon (2005) broke the myth of inherent 'conservatism' of the Muslim community as the reason for the 'low-educational status' of 'Muslim girls' and drew attention to a plurality of social forces and state policies that shaped their educational experiences. The study attempted to capture the 'micro experiences on the ground' through a comparison of five cities, namely, Delhi, Aligarh, Hyderabad, Calcutta and Calicut. The authors argued that the educational disparity of Muslim girls was not rooted in religion but was a result of socio-economic deprivation, state neglect and increasing influence of communal politics. Low educational attainment of Muslim boys, early marriage and absence of a sizeable middle class that would use education to enter professional services were explained as community-specific factors shaping education of girls in the community.

The SACHAR Committee Report (2006) put forth the general issues based on identity, security and equity that the Muslim community faced, which further, compounded the difficulties faced by Muslim girls in achieving good-quality education. It included the feeling of insecurities coupled with traditional community and religious orthodoxies have grave, gendered impacts on women and girls' mobility on their education. The report elucidated problems of low enrolment rates, low levels of retention and high dropout rates that were primarily linked to reasons such as abject poverty and financial constraints, low access to schools, low quality of education in government schools in the vicinity, the poor state of Urdu medium schools and cultural and religious stereotypes regarding girls' education. Furthermore, security concerns in the public spaces and transport curb many girls' access to 'mainstream' schools located at a distance from their residence or result in high dropout cases, when the girls reach upper primary and middle schools. The absence of hostel facilities in school compounded with religious discrimination in availing residential facilities, made it even more difficult for girls to access quality education in far-off schools. The government schools that were accessible to such families both financially and geographically, delivered extremely low-quality education. Parents were therefore, left with no option than to send their children to Muslim denominational institutions. Gender stereotypes and bias ensured that boys were preferred over girls for private institutions, and cultural conventions and customs define Urdu education as 'culturally appropriate' for girls. Since, systemic discriminatory

policies against Urdu learning in government schools placed a major roadblock in accessing government and state schools. Madrasas became the only resource through which girls were educated.

Nuna (2003) evaluated Area Intensive Programme, a centrally sponsored Government of India scheme, with a view to provide basic educational infrastructure and facilities in areas of educationally backward minorities' concentration that did not had adequate provisions for elementary and secondary education. It was found that the efforts of state government in increasing enrolment had shown very marginal progress except in Kerala and Karnataka. One of the objectives of the scheme was to increase the participation of Muslim girls in the vocational, science, engineering and commerce courses that remained unfulfilled.

Nuna (2011) further, identified similar impeding factors in attaining secondary education in her study on barriers in secondary education (Classes IX and X) of Muslim girls in four districts of Uttar Pradesh. Some of the barriers that emerged from the analysis of household level data were lack of access to secondary stage schooling facilities, expensive cost of secondary education, socio-religious beliefs that placed less value on girls' education, familial and community discouragement and opposition, gender bias in parental attitudes towards the education of daughters and sons, non-awareness of educational development programmes and schemes particularly, targeting girls, etc.

Another study conducted by Jaireth (2011) analysed the curriculum of *Maktabs* and *Madrasas* from a gender perspective. It was found that in southern India, the *Madrasa* education was of diverse nature. In Karnataka and Andhra Pradesh, few *Madrasas* were also managing primary schools, which were covered by SSA. These institutions were receiving all the benefits of SSA, viz., mid-day meal, free uniform, free textbooks and teacher's salaries. In Kerala, besides the Arabic and English languages, students were also skilled in local language, i.e., Malayalam. In Kerala, there was co-educational *Madrasas*, especially in the Arabic colleges, while in Karnataka and Andhra Pradesh, separate Madrasas existed for boys and girls. There were separate girls' and boys' Islamic institutions in Karnataka and Andhra Pradesh. Both men and women teachers taught in Kerala *Madrasas* and Arabic colleges, while in other two southern states, women teachers were nearly absent in boys' *Madrasas*. There were no Arabic colleges in Karnataka and Andhra

Pradesh as in Kerala. Few men teachers were also employed in girls' *Madrasas* for teaching higher Arabic literature for which women teachers were rarely found. The Malappuram *Madrasa* had highly developed infrastructure to the level of advanced institutions with computer technologies and subjects like Islamic banking, etc., opted by both girls and boys.

Gupta (2011) attempted to understand the process of creation of religious and logical identity in the context of Muslim girls. It was observed in the study that, religious and sexual identities work together under social pressure. The study also showed how religious and sexual identities played a role in the context of educational experiences and life desires of Muslim girls.

Bassi (2020) brought out the complex interplay of gender and religion in circumscribing the realm of education for girls. Placing itself in the historical context of girls' education in Punjab, the study demonstrated how religious education became intertwined with girls' education. While, such a prospect resulted in fostering favourable conditions concerning girls attaining education, the study analysed how such religious education created 'obedient' and 'religiously oriented' Sikh women, who may further enrich the Sikh family, its values and customs properly. The article demonstrated how religious socialisation happens through certain school processes and practices, generating religious identities that are mediated through notions of gender. The study provided an interesting case study for understanding how education for girls is perceived, visualised and the factors that allow girls to access education.

The above discussion indicates several dimensions of low participation of girls belonging to the Muslim community in the education system. The reasons were manifold, which ranged from prevalent stereotypes and financial constraints, inadequate access to schools, low quality of education in government schools in the vicinity, the dismal state of Urdu Medium schools, stereotyping based girls' education, early marriage and absence of a sizeable middle class that would use education to enter professional services.

Sexuality and Education

The identity of an individual is often determined by the moral dictates and judgments of the society. However, individuals who seek to challenge these with their personalities, sexual orientations

and inclinations are often shunned, abandoned and treated as the other. Gender identity and sexual orientations are often so stringently boxed up in the binaries of men and women, that any gender expression beyond the binary invites immediate contempt from society. Such as the case with transgender persons, who have to wage a regular battle to have their identity acknowledged.

Leading lives in fringes, they regularly face discrimination in workplaces, jobs, public places and services such as health and education. The abominable state of the transgender persons worsened with the society viewing and treating them as 'different' people not capable of fitting into the prescribed sanctimonious structure of the family in spite of having legal acknowledgement and sanction.

Further, in the Indian context, one has to be cognizant of the intersections of caste, class, gender and sexuality that create multiple disadvantages for sexual minorities. Discrimination on the basis of class, gender and sexuality not only limits the choice of profession and the possibility of economic advancement but also impedes access to education and information about lifestyle choices of sexuality of minorities. Census, 2011 data revealed for the first time the low literacy level in the transgender community, just 46 per cent, compared to 74 per cent literacy in the general population. According to Asmy and Nagaraj (2015), this may be due to the inability of the educational structure to facilitate skill acquisition, especially at the secondary level. In India, as the children move to the higher classes, the learning gap increases, especially among weaker sections and disadvantaged groups, which either results in higher drop out or creation of an unproductive workforce with little skill to sustain in the job market. The authors argue for affirmative action and rigorous sensitivity programmes to ensure higher participation in educational institutions and mechanisms.

Mitra (2017) discussed that othering of transgender people in itself is a human right violation that impedes in achieving complete self-expression and fulfillment of basic rights. With respect to education, the study identified major problem areas such as exclusion from educational opportunities till 2004, poverty stemming out of the fact that transgender persons are forced to resort to begging, sex-work or socio-cultural rituals to make their ends meet, constant systemic violence in forms of overt discrimination, corrosive language and deliberate exclusionary

practices, lack of access to restrooms, etc. The author recommended to future teachers to acknowledge how harassment and disrespect in terms of sexual orientation is one of the root causes of lower literacy rate in the transgender community as well as to accept and be empathetic towards transgender students.

In a study determining the various forms of educational discrimination faced by transgender people in Tamil Nadu, Sathya and Thasian (2015) found that, out of 24 sampled transgender persons, only 50 per cent of the respondents got primary education and 4 per cent got higher secondary, 67 per cent of the respondents were doing sex work and 25 per cent were involved in begging work. The monthly income of 54 per cent of the respondents was ₹5000–10000 and 46 per cent got below ₹5000. Further, the study brings-forth the apathy of educational institutions, people in positions of authority and teachers, who do not have much knowledge (or sensitivity) about transgender and transgender behaviour, lack to identify transgender students or transsexual behaviour person. None of the schools of the respondents reported giving counselling to transgender students about their changing gender and sexuality. Furthermore, many transgender students were forced to experience sexual harassment by their school teachers, creating hostile and unsafe environments that force them to discontinue their education and create fear to appear in higher education. The author suggested introducing a comprehensive sexuality education programme at various learning levels.

In her study among transgender communities in Kolkata, Sinha (2016) found that most of the respondents were uneducated, since they had been disowned by their families' right at birth. On the other hand, those who were being brought up as males till the age of 14 or 15 got a chance to attend high schools. Such an observation threw light on the way access to education was mediated through hegemonic institutions of gender and sexuality. The study also found that, a few individuals were transgender who had a progressive family and were fortunate enough to attend college.

Arora (2019) also reported instances of abuse, verbal or otherwise in case of transgender persons and their experiences of feeling like a social outcast was recorded in the study. The abuse they suffered was from both the students as well as the teachers, which ultimately led to absenteeism, poor academic performance and even school dropouts. Thus, the school became an unsafe

space that compounded the vulnerability which transgender people face.

Very few studies are in the area of sexuality and education as different sexual orientations and inclinations are often shunned, abandoned and not treated as normal. This forced exclusion led transgender students to quit education and thereby, limit their career opportunities. Further, the education structures at the secondary stage did not provide them such skills, which will make them economically independent. This exclusion led to poverty and the transgender persons resort to begging, sex-work or socio-cultural rituals to make their ends meet. There is constant systemic violence in forms of discrimination, corrosive language and deliberate exclusionary practices, lack of access to restrooms, etc. The people in positions of authority and teachers are still not sensitive to the needs of transgender students. Furthermore, many transgender students were forced to experience sexual harassment by their school teachers and students, creating hostile and unsafe environments that force them to discontinue their education and create fear to continue their higher education.

Gender, Disability and Education

In India, girls with disabilities are at the intersection of various forms of discrimination. Parental prejudice surrounding their ability and value, continue to perpetuate the view that educating them is futile. Further, girls with disabilities are not considered an educational investment because they will not be able to participate in the labour economy effectively. As a result, 68 per cent of girls with disabilities are not in school. Girls with disabilities have a lower enrolment rate in school than boys with disabilities across many sectors: urban versus rural, by type of schooling, by level of the schooling and in primary versus secondary schooling (Kohama, 2012).

Hans (2015) skillfully intersected in her book three concepts—disability, gender and power. It highlights how each of these different concepts can traverse across and cast an irrefutable impact on each other. It probed into diverse elements such as geographical and socio-cultural differences that had a profound effect on the physical and mental health of women with disabilities which further, escalates their invisibility. She strongly emphasised the need to shift the focus from highlighting the victimisation of women with disabilities to the need to accord recognition to women agencies. She

took initiatives to develop deeper into understanding the discourse of feminist disability and pointed out the need for restrictive power which strongly advocates prevention of violence since, in most cases violence was manifested in and through the power structure.

According to Census (2011), about 61 per cent of Children with Disabilities (CwDs) aged between 5 and 19 years were attending an educational institution, compared to the overall figure of 71 per cent. About 12 of CwDs dropped out of school, which was comparable with the overall percentage of dropouts among all children. About 27 per cent of CwDs never attended any educational institution as opposed to the overall figure of 17 per cent, when the entire child population was taken into account. This clearly demonstrated the state of marginalisation of disabled children with respect to their education.

The condition worsens when a gender lens is employed to understand the barriers faced by CwDs to access education. The girls with disabilities face multiple, layered and structural obstacles to access education in spite of the Right of children to free and compulsory Education (RTE Act, 2009) which ensures quality education to all children. They are largely invisible within the discourse of Education for All (EfA) and such forced invisibility poses a major challenge for girls with disabilities. Adding a gender dimension, the analysis of 51 countries included in the World Bank and WHO report showed that 50.6 per cent of males with disabilities had completed primary school as compared to 61.3 per cent of males without disabilities. Females with disabilities reported 41.7 per cent primary school completion compared to 52.9 per cent of females without disabilities, a difference of 8.9 per cent between males and females with disabilities (World Report on Disability, WHO, 2011).

In an article highlighting the inequalities in education with respect to women in India, Dawn (2016) underlines the multiple factors that affect access to education for girls with disabilities. Some of which being the type of disability, the socio-economic status of their family, race and ethnicity, their area of residence (rural or urban). She further accentuated in her article the significant hurdle that poverty causes for girls with disability. For families with scant resources, they were likely to prioritise the male counterparts of the girls with disabilities in terms of basic necessities of food, medicines, aid equipment and education. This was further, underscored by the World Report on Disability (WHO, 2011), which stated that the

correlation between low educational outcomes and disability was stronger than any other marginalising characteristics.

A barrier-free school environment is pivotal for realising the goals of inclusion. One of the barriers to such an education is accessibility. Physical accessibility refers to facilities that provide easy access not only till the school building but also, within the school as well as facilities such as toilets that allow the child to participate in their education in a wholesome manner. Yet, it is access that becomes the biggest barrier in case of children with disability. According to the research done by Bakhshi et al. (2017), where they interrogated the causes of exclusion of children with disabilities in educational institutions, persons with multiple disabilities were 1.82 times less likely to have access, while persons with a severe disability were 1.79 times less likely to have access to high school compared to non-disabled persons.

Physical accessibility proves to be a major challenge particularly for girls with disabilities. Large distances between home and school along with poor commuting facilities generally stand between education and CwDs especially, in rural India but it is further compounded by gender issues such as the fear of sexual violence on girls with disabilities, creating public spheres a hostile space for them. This deters parents from sending their girls to schools far away from their residential places.

According to the Secondary Education State Report Cards, Provisional (National Institute of Educational Planning and Administration, 2016–17), accessible toilets were provided in less than about 20 per cent schools across 12 states. This was further, compounded in case of girls with disabilities, where lack of proper toilet facilities and other infrastructural support to maintain menstrual hygiene along with cultural conditioning, lack of hygiene knowledge, inability to change sanitary napkins, need for privacy and logistic support in terms of trained female staff is needed by girl children with disabilities that lead to high rates of drop-outs among them (Women with Disabilities India Network, 2019).

Another aspect of access to education for CwDs are aids and appliances. According to research by Limaye (2016), the government of India has many schemes, policies, programme for children with different disabilities but such facilities do not reach many families especially, those who stay in villages or remote areas. Research suggested that, aids and appliances were concentrated in urban areas. Most of the appliances distributed however, were rendered

non-functional and were mostly discarded. Even in this aspect, however, a striking gender disparity was noticed. According to the 42nd Annual report in 2014–2015 by Artificial Limbs Manufacturing Corporation of India (ALIMCO), out of 70,765 beneficiaries, a mere 27.59 percentage are girls. This ratio was slightly better in the North-eastern states compared to the rest of the country. Even in the case of ADIP camps conducted in schools through SSA, the percentage of beneficiaries was around 36.

Other than accessibility, Women with Disabilities India Network recognised the physical, psychological and sexual violence against girls with disabilities within families as well as public institutions as one of the biggest hurdles in the way to education. Further, institutional neglect and abuse amplifies the situation. It was also noted that, abuse towards disabled children especially girls, is less likely to be investigated or persecuted, which means abusers know it is easier to escape consequences even if the abuse is discovered (Women with Disabilities India Network, 2019).

The studies revealed that girls with disabilities face multiple, layered and structural obstacles to access education in spite of the Right to Education Act, 2009 that ensure quality education for all children. Further, institutional neglect and abuse amplified the situation. It was also noted that, abuse towards disabled children especially, girls was less likely to be investigated or persecuted. However, the new National Education Policy, 2020 has given sufficient emphasis on the need to accelerate and facilitate quality education for children with disabilities including those with learning disabilities. While, NEP 2020 aims to provide quality education to disabled students at par with other students, it also underscores the importance of having special educators, who would not just be proficient with their subject but be trained sufficiently to cater to the individual demands of disabled children.

3. Gender and Curriculum

Curriculum provides a systematic structure through which knowledge is disseminated and acquired by learner with the change in educational objectives. There has been change in the meaning and understanding of the term curriculum. It is considered as the heart of any learning institution. Earlier, it was limited to only classroom teaching. Now, it refers to the overall learning experiences provided to the students inside as well as outside of a classroom for their mental, social, emotional and psychological development

(Jaiswal, 2020). For the purpose of the present trend analysis, the researchers have considered papers from diverse point of views, including the studies, which have highlighted feminist pedagogy and its role in transacting the curriculum.

A discussion on gender and curriculum in India, however, demands a look into how various National Curriculum Frameworks have addressed the nuances of gender in curriculum. The National Curriculum Framework, 1975 stipulated the 10+2+3 system, wherein the first 10 years would comprise a common curriculum for all students. This resolved the debate on differentiation of curricula, at least at the policy level and underlined the central argument of the Education Commission that adopting science and technology education was essential for social and economic transformation. While doing so, however, it laid the basis for linking girls' and women's education to the instrumentalist vision of development in modernising the nation-state. This was in keeping with the explicitly instrumentalist approach to women education evident in the Fourth Five Year Plan (1969–74), where the benefits of women education were linked to lower fertility and improved nutritional status of children.

National Curriculum for Elementary and Secondary Education: A Framework (1988), devoted a special section on Curricular Concerns, which addresses equality of education and opportunity, wherein it had been specifically stated that there is a need to remove disparities and equalise education opportunity by attending to the specific needs of those, who have been denied equality so far, a concern later reflected in the NPE, 1986. The curriculum further elaborated by stating that, "to promote equality it is necessary to provide for equal opportunity to all not only in access but also in the condition for success". In post NPE (1986) however, education was seen as an agent of social change and textbooks were revised at various levels following the NPE's recommendations. The NCERT also brought out a series of teachers' handbooks to address gender equality in classrooms through curricular transactions. NPE Review Committee pointed out that although, the NPE (1986) gave prominent space to education for gender equality, there was no reference to gender in the entire chapter on the 'Content and Process of School Education' except for a mention that 'equality of the sexes' is to be one of the ten core curriculum areas. The review committee therefore, recommended that gender equality be built in the very essence of curriculum (including hidden

curriculum) instead of following a simple approach of ‘adding’ concerns of gender inequality (Position paper on Gender Issues in Education, 2006).

National Curriculum Framework for School Education (NCFSE), 2000 addressed gender bias in curriculum formation but in a limited manner. This is evident in the way in which the section on ‘Education of Girls’ appeared under the broad heading of ‘Education for Social Cohesion’ (rather than, say, change or progress) in the framework document. The section provides an abstract statement on gender equality and then, quickly reduces itself to emphasise on gender-specific roles. “There is a need to develop and implement gender inclusive and gender sensitive curricular strategies to nurture a generation of girls and boys, who are equally competent and are sensitive to one another and grow up in a caring and sharing mode as equals and not as adversaries” (NCFSE, 2000). Thus, the NCF was simply accommodating the “idea of equality within the pervasive instrumentalist view of education for girls and women, in which women were seen primarily as reproducers” (Position Paper on Gender Issues in Education, 2006).

As part of development of National Curriculum Framework (2005), Position Paper on *Gender Issues in Education* was brought out. The paper stated that, gender need to be portrayed in curriculum in a manner that does away with biases, sexism and stereotypes. It further argues how creating a ‘quantitative equality’ in the curriculum by simply depicting ‘role reversals’ of men and women is not the right approach. It advocates that for gender to be depicted properly, the curriculum cannot continue perpetuating masculine and feminine traditional roles but need to be repositioned with respect to gender and how it operates in society. The Position paper underscored the fact that, a gender-just and empowering curriculum should have the potential to enable students to critically engage and challenge unquestioned forms of knowledge about gender identities. It underscored the possibility of integration of gender in the curriculum, without sidelining gender issues as ‘marginal’ and ‘incidental’. The section on *Gender and Curriculum*, looked at how different research works have addressed the issue through various perspectives and how they pave model ways of new researches around education needed to be taken up in future.

International studies have focused much on how subjects, their pedagogical teaching-learning processes and the choice of subjects

by students were entrenched in gender dynamics. Weinrich (1981) reported that, 13–14 year old pupils rated woodwork followed by physics and chemistry as the most masculine subjects and cookery followed by typing, english and french as the most feminine. Similarly, Archer and Freedman (1989) found that, A-level students rated engineering, physics, chemistry and mathematics as masculine and english, biology, psychology, french and sociology as feminine. However, a later study by Archer and MacRae (1991) showed that, children aged 10–11 showed less pronounced stereotyping of school subjects than was evident in the earlier studies, in that only three subjects namely, Craft Design and Technology (CDT), Information Technology (IT) and physics were rated as significantly masculine. While, there has been considerable investigation of subject stereotyping by pupils and while there is also evidence of considerable stereotyping of school subjects by teachers (Gilborn, 1990; Lightbody, 1994). There has been rather less investigation of gender differences in the liking of different school subjects though, it is usually presumed that gender differences in liking reflect gender linked subject stereotypes. In her study of third-year pupils at 10 co-educational schools, Archer (1992) found that girls aged between 10 and 15 reported liking most the three subjects usually regarded as stereotypically ‘masculine’: mathematics, science and games. On the other hand, Lawrie and Brown (1992) indicated that in their study of 248 fourth-year pupils at both single and mixed-sex schools, boys were significantly more likely to report liking chemistry and games than were girls.

From a feminist critical stand point, Raveendran and Chunawala (2015) challenged the mainstream, positivistic scientific discourses that perpetuate an overwhelming masculine and patriarchal point of view. The paper argued the way, science curriculum documents and the NCERT Class XII textbook reflect the masculine, positivist discourse of science.

The Central Advisory Board of Education Committee (2011) critiqued the feminisation of certain subjects based on the patriarchal concept of masculine objectivity and feminine subjectivity. It stated, “instead of playing into society’s expectations, schools should play a reformatory role”. Similarly, topics like reproductive health and courses like food processing should be offered to both sexes and should be combined with inputs on right to education and empowerment. Knowledge construction needs to be interrogated from the purview of the rights of women.

Textbooks form the primary basis of school curriculum and therefore, the portrayal of women in textbooks is of concern. Blumberg (2008) argued that gender bias in textbooks is an, “invisible obstacle on the road to gender equality in education— an obstacle camouflaged by taken-for-granted stereotypes about gender roles (IBID)”. Through, case studies across the world, it was found that such a phenomenon was nearly, universal. Blumberg thus, argued that combating gender bias in textbooks need to be given priority since, textbooks occupy more than 80 per cent of the classroom time. Further, such biases further reiterate the traditional roles of gender, which is socially and culturally sanctioned and remains ‘hidden in plain sight’ for the content of school textbooks.

Department of Gender Studies (DGS), NCERT (1980) had developed a number of handbooks for teachers at various stage of school education. These handbooks primarily highlighted status of women and women’s equality and empowerment through curriculum. Thereafter, periodic gender auditing of textbooks was also done, wherein school textbooks of various states as well as those of NCERT were reviewed from a gender perspective. Various processes through which gender bias manifested in learning materials was elucidated as invisibility, stereotyping, imbalance, and selectivity in training material for Teacher Educators on Gender Equality and Empowerment (2013). Textbooks selective interpretation of events primarily, focused on dominant narratives and excluded alternative perspectives and experiences thereby, eluded the complexity of the said events.

Department of Gender Studies (2014) analysed NCERT textbooks of Environmental Studies, Maths, English and Hindi at the primary stage of Classes I to V. It was noticed that, some of the content of textbooks questioned social practices like child marriage, dowry and involvement of men or boys in sharing household chores, child-rearing responsibilities and caring practices. The teacher’s pages in the textbooks encouraged the creation of an inclusive classroom environment through group work, project work, discussion and learning together. However, even though, all the textbooks attempted to highlight gender concerns, there were certain elements of stereotypes presented in some textbooks. Men were shown in diverse professions, whereas women were mainly shown as home makers, teachers, nurses and doctors.

In another report (DGS, 2017) on Textbook Analysis at the Elementary stage of NCERT and for the states of Assam, Bihar,

Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Odisha, Maharashtra, Manipur and Rajasthan, it was noted that most of the state textbooks reflected the various forms of biases mentioned above. Women were relegated to feminine jobs and responsibilities that cater more to care-work and nurturing, while men were associated with masculine jobs and opportunities. Women contribution in various different fields for example, freedom struggle or as social reformers were mentioned albeit in a limited manner. Further, men and women were shown in relational category as father, mother, brother, sister, son and daughter, and as uncle and aunt.

Gender-based analysis of twelve NCERT textbooks of Classes I to V by Dawar and Anand (2017) concluded that textbook writers need to be careful not just about having equal representation on the cover of the textbooks but also inside the chapters. Females not only need to be represented more but their portrayal need to be in sync with the contemporary roles that they have been taking up in our social set-up. Such representation and portrayal of both females and males can help young children to get exposure to and identify role models for them. It is important to realise that, if we need to change the portrayal of females in textbooks, the portrayal of men need to be changed. They both are inter-connected and none of them should be shown as subordinate to the other. Since, students already enter the school with pre-conceived notions of gender-roles for women and men, textbooks in schools must help to challenge those stereotypical images in their young impressionable minds. However, one need to be critical of such techniques since, a simple role-reversal is insufficient to challenge gender biases. Equitable and gender-just curricula need to factor in the ways in which gender works.

Bhog (2002) pointed out that, in her review of 75 lessons in the language textbooks barely, three made a genuine attempt to represent women in a different light. One of the example is the lesson on Rani Laxmibai of Jhansi, whose story provided enormous potential for challenging traditional stereotypes of women. However, Bhog showed that, while qualities such as 'courage', 'strength' and 'struggle' were valued highly in narratives of 'great men'. Laxmibai was depicted as 'a great rider and fighter' but nonetheless 'vulnerable', 'prone to depression' (at the death of her husband and son) and 'doubt'. The analysis of textbooks suggested that, school knowledge plays an important role in reinforcing and 'naturalising' identities of male and female. They are based on

distorted portrayals of gender roles that bear little resemblance to the diversity of roles that women play in society and they offer poor role models for girls.

Bhog (2010) pushed further, the understanding of gender and curriculum in textbook with a certain domain of enquiry related to the way current policy debate remains in contrast with earlier historical debates, when educated girls and women were tied to face the challenge in social order or in majority of instances, in conserving it. The study observed that, these textbooks served as an important vehicle for the promotion of national and regional values and gender was constructed only as a trope for defining these values. It was noted that, in the regional-language textbooks, the nation was represented in metaphors of idealised womanhood and the language itself was identified with essential notion of purity and chastity of women. With regards to the English-language textbooks, the study concluded that accessibility to English itself was gendered since, women and girls had only limited access to this subject. The construction of gender in these textbooks as the study notes, was within the ambit or framework of the moral and political values that define upper-caste modern Indian identity and did not relate to the live realities of the learners themselves (Bhog et al., 2012). The school played a key role in creating and normalising gendered norms, values as well as gendered understanding of the nation and concepts like tradition and modernity. It attempted to interrogate from a feminist lens the discipline of geography as is taught in schools to understand exactly, which domains were explored and which were marginalised in the normative understanding of geography.

Chauhan (2012) brought out interesting conjunction between institutions of gender, communalism, and education in their function of constructing the feminine identity of girls and women. The research aimed to understand how education plays a pivotal role in the gender socialisation process by cementing gender identities, norms and values through the curriculum being taught at school. The study analysed school textbooks of Saraswati Shishu Mandir School from Nursery to Class V and then their varied components till Class VII. It grappled with gendered representations in textbooks and the normative, patriarchal imagery it created for young girls and women about their identities and functions.

A report of the committee of the Central Advisory Board of Education (2005) on 'Regulatory Mechanism for Textbooks and

Parallel Textbooks taught in schools outside the Government System' examined a selected sample of textbooks in Social Science and Hindi, regional languages and English in the state of Bihar, Chattisgarh, Delhi, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Rajasthan, Uttar Pradesh and West Bengal. Besides other parameters, the textbooks were also analysed from a gender perspective. The West Bengal report mentions the neglect of the representation of women. The Kerala report criticised the use of the term 'men' and suggested to include women as men outnumbered the women in visuals. The Maharashtra report highlighted that Geography books do not contain content on women's labour. History did not portray the courage, accomplishments and social participation of women in historical processes. There is a need to consciously engage students with women's struggles against patriarchy. The sex segregated curricula in *Madrasas* taught women their domestic roles, while there is no mention of men's domestic responsibilities. Such literature advised Muslim girls to follow proper etiquette and moral virtues, essentially dictating what a Muslim woman should be like.

Jeffrey et al. (2004) demonstrated how a particular Urdu course book named *Ladkiyon ka Islami Course*, gives emphasis to the domestic competence of a woman, along with defining respectable women as demure, controlled and distancing from 'lower-order'. Such gendered anecdotes assure a proper condition according to religious and cultural conventions, leaving little or no space for gender equity to feature. However, the study also points out that the choice of being educated in *Madrasas* is a matter of inadequate alternative educational provisions, especially in rural and poor urban areas, where *Madrasas* acquire significance in Muslim formal education.

To conclude, studies showed that textbooks serve as an important vehicle for the promotion of national and regional values and that gender is constructed only as a trope for defining these values. Some studies have shown that even though the textbooks had attempted to highlight gender concerns, there were certain elements of stereotypes present in some textbooks. Most of the state textbooks reflected the various forms of biases, wherein women are relegated to feminine jobs and responsibilities that cater more to care-work and nurturing, while men are associated with masculine jobs and opportunities.

4. Education and Gendered Socialisation

Schools have been understood by sociologists as site of social reproduction and socialisation of children into members of the society. Such a socialising process also fits children into the binaries of gender and perpetuates the gendered norms and gender constructs prevalent in that particular society. The students then, become gendered individually, in a way that they internalise gendered ways of living, norms and limitations, stereotypes and even the hierarchy of gender. Thus, it is imperative to see how aspects of school education mold each child into the socially sanctioned notions of femininity and masculinity, and how that, in turn, affect their educational access, retention, participation and outcomes. On the other hand, gendered interactions and beliefs also shape the educational experience of the child as well as their parent's choices of enrolment, continuation, discontinuation, absenteeism of education.

Kumar (2010) urged that girl's education should be looked at in a far wider and more complex perspective than what is generally applied with reference to social policy, goals specific to education such as closing the 'gender gap' or giving equal opportunity to the girl child. The look at how gendered socialisation begins from the family itself in the sense that how the family perceives the child, and the child involvement to family's work and livelihood. He argued that for a girl child, her involvement in the family's livelihood through domestic chores is rendered invisible, which ultimately contributes to the social invisibility of the girl child. A girl child thus, internalises self-denial and the restrictions and regulations that come with her gender. Expected educational outcomes lie in sharp contrast to the socialisation of girls as submissive and docile subjects, and whose goals are defined by the social structure to the marriage and motherhood. Its emotional content and the reasoning on which it is based, the agenda of cultural imprinting on girls' minds sharply contradicts the objectives of child-centered education.

Kumar (2017) further, noted that educational policies and the push for universal elementary education from the state are based on the understanding of equality of sexes as being equivalent to a balanced presence of girls and boys in the classroom. The subjective experiences of boys and girls and how they differently perceive the school, the teacher, the pedagogy, etc., were left out

of state documents. Thus, he argued, state policies need to bring into the factor of girlhood, while designing policies for effective educational attainment for girls.

Manjrekar (2013) attempted to ethnographically capture the process of socialisation of children into the ideal of labour in the modern nation through examination of one lesson in a textbook for Class IV and its transaction in a classroom in an urban government primary school in a city in Gujarat. It exemplifies the complex ways in which gender, class and nation interweave in dominant constructions of what constitutes 'work', and helps us understand the significance of these constructions to the life world of children. Interviews of children revealed that the participation of children in the discussions around the chapter titled '*Kaun Kya Banega*' was informed by their social experiences. Such insights from school ethnographies can enhance our understanding of how identities are critical to the sociology of childhood within the modern nation-state as well as guide alternate framework to address the challenges of more socially inclusive school curriculum and pedagogy.

MacDougall (2005) explored the social aesthetics of Doon School in Dehradun to explore the ways, masculinities are constructed and preserved. He looked at the ways, activities—educational or co-curricular had an objective of subverting the colonial image of the Bengali effeminate man and a new masculine Indian was to be built upon a regime of bodily practices borrowed from British schools, not only on playing field but in the dormitory, classroom, assembly hall and dining hall. The boys boarding school emphasised on their physicality, physical actions and gestures, appropriate clothes, the importance of acting boldly. The author states that the aesthetics of power creates particular masculine relationship between boys, wherein certain dominant groups exercise power over other groups. Through such aesthetics, therefore, the author paints a nuanced picture of how different aspects of the school, uniforms, dormitories, corridors, appropriate behaviour and punishments help in shaping students into gentlemen, thereby, socialising them into the ideal man in the society.

Benei (2005) provided interesting insights into the role of schools in gender construction by suggesting that the processes of gender construction in schools may be far more complex than the way we understand gender socialisation particularly, in the context of modernity. The author analysed the processes of

schooling within a same-sex military school in Maharashtra. Such schools had high appeal on the basis of the masculine, military tropes of soldiers and army men being the loyal servants of India. The increased emphasis and rigour of self-discipline (celibacy and control over one's emotions), self-control, order and appearance created military schools as the ideal space for a particular form of masculinity, where gender relations within and outside the schools with the same-sex and opposite sex are cultivated strictly in a hierarchical fashion.

Anand (2018) examined the gendered biases that school teachers perpetrate in their regular communication and relationship with their students. It further, compares it with the notions of femininity and masculinity that children have internalised themselves. It informs about their subjective experience of the school settings. The research treats the school as an institution vital in its function of transmitting cultural norms of the larger society. This makes the subject of inquiry important for feminist research to understand how teachers perceive important issues such as gender and gendered norms, and how gendered dynamics within schools and experiences of schooling can lead to gender socialisation. The research findings found that teachers harboured traditional and normative ideas of gender roles and often perpetuate similar stereotypes in their engagement with their students.

Narwana and Rathi (2019) debated between co-education and same-sex educational institutions in their relative effectiveness in ensuring accessibility, participation, choices and participation in education as well as combating gendered stereotype and discrimination. The authors base their research on a comparative study between two co-educational schools (one rural and one urban) to foreground the importance of socio-cultural settings in influencing the dynamics within a social institution like the school. The research focused on the complex interplay between factors such as familial norms and concerns, culture, caste, socio-geographical context (rural or urban), peer culture that define a gendered experience for the students in the school setting. The research findings suggested that, school institutions are agential spaces that may play an important role in challenging gender stereotypes. Reversely, one may also look at school institutions as sources of secondary socialisation of children in their respective gender norms.

In conclusion, researches have shown that the intersectionality among gender, class and caste, influence the life worlds of children

as well as how they experience schooling. Teachers are socialised into traditional and normative ideas of gender roles and often perpetuate similar stereotypes in their engagement with their students. School spaces too influence gender conditioning and socialisation, and become sites, where students become man or woman through various pedagogical processes.

5. Schemes for Girl's Education and Empowerment

Several studies were adopted to promote education of girls in independent India. Theoretically, all formal and non-formal education and training programmes are open to women. In addition, provision exists for opening of separate institutions or separate wings for women or girls exclusively. Education is free for girls upto higher secondary stage and several states have made education free for girls right up to the university level. Besides, free education for all children up to the age of fourteen, there are incentive schemes like free noon meals, free books, free uniforms and attendance scholarships for girls and children from disadvantaged groups (Nayar, 2000).

The improvement of educational status among Indian girls is a persisting challenge for both the Union Government as well as State Government. A study by Nuna (2012) on post-primary education of scheduled tribe girls under National Programme for Education of Girls at the Elementary Level (NPEGEL) was conducted to analyse and evaluate the impact of NPEGEL on post primary education of Scheduled Tribe (ST) girls in Assam and Arunachal Pradesh. Findings revealed that in Assam, the district authorities had taken several efforts under the NPEGEL, for example, provision of alternative schooling through bridge courses to provide schooling facilities to out-of-school girls, preparation of training modules on gender sensitisation, conducting gender sensitisation workshops with teachers, community mobilisation as well as providing vocational training to girls. In Arunachal Pradesh, funds were used for construction of a room and purchasing of a teaching-learning material. Several steps were taken like remedial teaching for girls, whose academic performance was found poor in the mid-term examination in Class VI, life-skills training and local need-based incentives, etc. Hence, the study suggested the need to sustain such programmes for a longer period of time by ensuring regular and in-time financial support to schools.

In a similar context, Rout (2013) analysed the performance of the Sarva Siksha Abhiyan (SSA) scheme in the Keonjhar district of

Odisha. The paper enumerated the reasons for lower educational levels of girls in the state. Since, SSA had limited financial provisions for girls' education in the form of innovations at district level, the paper discusses the performance of the NPEGEL and the KGBV scheme in the Keonjhar districts. In spite of the existence of such scheme's factors like poverty, early marriage, economic instability influences the girls from discontinuing education. The paper thus, stressed on the need for ground-level percolation of the policies and the paper suggested on a participatory approach needed to be adopted, whereby the community leaders, locals, school teachers, students, social scientists and the NGOs could be involved to raise awareness among families on the importance of educating the girl child. Such scholarships brought about nuanced understanding of what happens in the social contexts at the grass-root level.

A study by Yadav (2013) on the Implementation of KGBV Scheme in the Muslim concentrated districts of four states (Andhra Pradesh, Bihar, Jammu and Kashmir and Rajasthan) in India assessed the availability and quality of infrastructure, and participation of Muslim girls in the KGBVs that were operational. The study showed that the presence of KGBVs in all the states had enhanced the enrolment and retention of Muslim girls. However, retention was still an issue in some of the KGBVs. The parents were satisfied with the scheme and wanted it to be up-scaled to Class XII. Community participation was found positive and girls were enthusiastic to continue their education in the KGBV. Most of the girls of Muslim community in these KGBVs were first generation learners. For them, staying in hostel with all facilities like cooked food, playground, television, and quality time to interact with peers and friends served as a good incentive. This study is very pertinent in generating an understanding of the functioning of the KGBV scheme and it will help in providing suggestions for further effective implementation of the scheme.

Srivastava (2015) studied the strategies adopted for enrolling girls in *Kasturba Gandhi Balika Vidyalaya* managed by different agencies in Andhra Pradesh, Bihar and Gujarat. It examined the methodologies used for enrolling the drop-out and never enrolled girls in the *Kasturba Gandhi Balika Vidyalaya* in the said states. The findings highlighted those multiple strategies were adopted by States for enrolling girls. Some of the popular strategies adopted were using local media, door-to-door campaign, and inter-personal contact of teachers with parents and community members,

pro-active role of state officials and panchayat members. There was no documentation of procedures related to enrolling girls from 'hard to reach' groups. In all the states visited, the enrolments included girls from marginalised communities, CWSN girls and girls of single parent, orphans and victims of domestic violence. The study showed that the scheme had acquired community support and popularity. Vocational courses in unconventional areas could be introduced for enhancing the skill of the girls for the purpose of employment as well as for personality development and entrepreneurship.

Yadav et al. (2021) examined the infrastructure of the KGBV hostels in Assam, Gujarat and Telangana in terms of the role of the scheme in enhancing the enrolment, and retention of SC girls in the catchment areas of the villages, in and around the block. Findings revealed that the scheme helped in enhancing the enrolment and retention of girls from the SC community. Both parents and students were satisfied with the facilities provided at the hostel. Students thus, felt that hostels provided a safe space for them to continue their education. The girls did not experience any caste-based alienation during their stay. However, need for trained female security guards for the safety and security purposes were expressed by the warden and parents. They also expressed the need for facilities like sports, library, coaching and recreational activities in the hostels.

Wadhwa and Anand (2020) emphasised that the rapid increase in girls' enrolment rate in elementary education could be attributed to the policy focused on residential schools and bridge camps that help to integrate out-of-school girls to formal schooling. The research specifically, focuses on the role of KGBV scheme in furthering the objective of inclusive and quality education. Though, KGBVs have aided in increasing the representation of adolescent girls from SC, ST and OBC communities, representation from Muslim communities is still very low. At the micro-level, one teacher for over 30 students creates numerous challenges in the residential setup including learning levels. With significant administrative challenges, there was a significant difference in the satisfaction of students and teachers with educational resources and infrastructural facilities. While, upper primary KGBVs have been functioning since 2004 in India, the strategy of introducing secondary level KGBVs was introduced much later in 2018. It poses a major challenge for smooth transition of girls to secondary level

of education. The study finding clearly asserts gender biasness towards having son, irrespective of the number of daughters in the family. Due to the financial support offered by *Ladli* schemes, majority of the beneficiary girls wanted to continue their education and aspired to make a career for themselves. Being financially independent, to be able to help family after marriage as well, have high self-esteem, feel empowered and be able to take decisions were the major factors that gravitated beneficiary girls to have high educational and career aspirations.

Conclusion

The report categorises the research into five major themes; access, curriculum, gender and marginalisation, gendered socialisation and scheme. It is important to note that, no theme is mutually exclusive and interact with each other in one way or the other.

The research within the theme 'Gender and Access to Education' brings forth a variety of factors that allow girls to access educational facilities. The concept of access, therefore, is expanded beyond a physical reach to educational system and infrastructure, and includes completion of grades and fulfillment of educational aspirations within it. Much of the research caters to access in terms of school attendance and educational attainment, subject to factors such as parental literacy, household wealth, land ownership, gendered costs of education, familial and community support, etc. Further, biases in the choice of schools, i.e., preference given to government schools over private schools are also taken by many researchers to underline how gender discrimination seep into the choice of expenditure on education that have ramifications on access to proper educational facilities. However, access to education can be taken up from a socio-political perspective as well. There were few researches that elaborate how social and cultural aspects such as child, early marriage, practice of dowry, early pregnancies, cultural stereotypes around menstruation, increased anxieties around the control of female sexualities, discriminatory practices in schools, harassment and gendered abuse and peer pressure affect access to schooling.

The theme of 'Gender and Marginalisation' brings out the multifarious ways in which marginalisation across social, economic, and political axes compound the gender experiences of schooling. In the sub-theme of caste, gender and education, researchers painted a complicated picture of how caste practices manifest along with

gendered norms and regulations through discussions around the distribution of educational resources, exclusionary practices within schools, labour requirements from children belonging to lower caste and tribal groups. However, one would have expected detailed analyses of the particularities of power dynamics that impede SC or ST girls from achieving high level of education. Attention could be given to particular situations that demonstrate hierarchical gender and caste-power equations such as caste and gender-based harassment in different types of schools (rural or urban, private or aided or government), the hegemonic imposition of a particular way of education, dismissing alternative forms of teaching and learning that seem more accessible to marginalised girls, the role of schools in re-establishing dominant caste and gender power relations and hierarchies, and the way it may affect schooling of girls from marginalised communities. One would encourage for researches to be taken up to explore the intersection of caste and gender from a feminist point of view that identifies the double discrimination of *Dalit* and *Adivasi* women face, and therefore, critically examines the minute details of how they circumscribe the experiences of schooling for such women.

One can extend the above-stated discussions in the sub-theme of gender and religion. Much of the researches explored the ways in which educational backwardness is maintained in Muslim women. Further, explorations on other socio-religious communities such as Jain, Christians, Parsis, etc., can be taken up to understand the complexity much better. At the same time, feminist analysed of Muslim women and their educational possibilities need to be more nuanced and detailed.

Another extremely important area that needs to be urgently taken up by researches on gender and marginalisation is the effect of gender on educational access for highly marginalised groups of children such as street children, children without adult care and protection, children in conflict with the law, child workers, children of parents in stigmatised occupations like sex work, waste picking and manual scavenging and children engaged in these occupations, HIV positive children and children of HIV positive parents, migrant children, children from de-notified, nomadic and semi-nomadic tribes, and particularly, vulnerable tribal groups and children living in conflicted areas, etc.

In terms of sexuality, one feels that there is a lacuna of research. Literature can address issues of sexuality and gender

and how heterosexist norms are reiterated in schools by practicing exclusion towards anyone, who does not fit the binary of gender and sexuality. Researchers can take up the educational concerns of sexual minorities and may focus on aspects such as access, visibility and resources in higher education to include studies about the importance of inclusive curricula and pedagogy in primary and secondary schools, and about teacher preparation.

In the theme that caters to curriculum, one may expect researches to further explore the gender in which curriculum is developed, the aspects of 'hidden curriculum' that are an integral part of the schooling experience and how they assist in moulding students in a certain gendered fashion that also falls in line with the dominant structures of caste, class, sexuality, etc., gendered transaction of written curriculum. Socialisation of gender also provides promising field of further exploration particularly, with regard to boyhood students. Moreover, researches are needed from the perspective of feminist standpoint specially related to marginalised groups' access to quality education to bring into focus their specific needs for integration into the society.

A particular lacuna in educational research of gender is that of gender-based violence and schooling experiences, while, ample research has been done on School Related Gender Based Violence (SRGBV) in South-African countries. Researches in India has not been able to specifically look at instances of gendered violence and its effects on educational attainment and learning within schools itself. If anything, the instances of violence have been subsumed under larger axes of caste, class, religion, etc. Leach (2007) conducted exploratory research on sexual harassment and abuse faced by adolescent school-going girls in South India identified how in spite of GBV being a severe barrier to increasing girls' educational participation, it was kept hidden under layers of shame and taboo that is accorded to any sexual matter. However, apart from this particular study, no substantial study has been taken as its object of enquiry GBV in understanding girls' educational enrolment, participation, retention, absenteeism, drop-out rates, etc.

Further, issues of cyber crime can be interrogated as to how cyber harassment affects school going children and their educational experiences. One cannot stress enough on the importance of studies that may suggest ways of combating forms of violence in and outside schools through inclusion of sexuality education in their curriculum that addresses aspects of gender, sexuality, violence, etc.

COVID-19 has affected learning in an unprecedented scale. Women and children bore the brunt of the pandemic with respect to health, safety, education, nutrition, etc., which has exacerbated social inequalities and hierarchies (UNICEF, 2020). Such disruption of the social life further, adds on to the gender inequalities within educational systems and unfortunately, reverses whatever progress of gender equality in education has been made till date.

A policy brief on the gendered impact of COVID-19 on education of school-aged children in India by Right to Education Forum states that girls, who are marginalised at various levels of caste, class, religion, community and other structural hierarchies, have limited access to technological devices and therefore, the digital forum itself encapsulated the entire process of education during the pandemic. The policy briefly reports in its findings that home proved to be a non-conducive learning environment with an alarming majority of girls (71 per cent) being employed in care work (National Policy Brief on girls education: Gendered impact of COVID-19 on education of school-aged children in India, 2021). Further, one also needs to be cautious of the various vulnerabilities that girls are subjected to because of the pandemic lockdown. High risk of drop outs may directly translate into early marriage for some and for others, the family becomes a hostile space, where they may face domestic violence and other forms of gender-based violence. Even more vulnerable are people belonging to transgender communities since, the pre-COVID is already dismal. The pandemic further, isolates them from educational services.

It is in this context that one suggests thorough research on the effects of the COVID-19 pandemic on school-going girls as well as students from transgender communities. It is imperative that action research need to be done in this field so, post-pandemic situation of gendered access to education can improve.

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Continuous Professional Development (CPD) of In-Service School Teachers in India

A Systematic Review

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ABSTRACT

A systematic review of the articles, research papers, books, policy documents and practices related to Continuous Professional Development (CPD) in India reflects that CPD is a continuous process of developing, maintaining and documenting a teacher's professional skills. Through CPD, teachers get a chance to enhance their knowledge, skills, competence and expertise. The independent India has provided this facility of CPD for school teachers in various ways as reflected in its policies, and practices as reviewed and given in this paper. It has also been found that the COVID-19 situation in India expedited the rapid shift in CPD practices from face-to-face to online learning. Accordingly, mobile screens replaced blackboards and electronic documents replaced notebooks. However, to keep abreast with the changes and prepare their students for the future, teachers will have to further develop themselves continuously. They need a lot of things like latest subject knowledge, strong understanding, good analysis and ability to use digital skill, and practical application of knowledge to qualify as good teachers. Realising the importance of CPD for teachers, National Education Policy 2020 suggested that each teacher is expected to participate in a minimum 50 hours in-service annual training for them. Programmes like NISHTHA, MOOCs, OERs of NCTE, DIKSHA provide training opportunities to a large segment of school teachers. Special training programmes were also conducted for in-service teachers so they can use platforms like Google Classroom, Zoom, Google-meet and Webex to continue the online teaching for students. To prepare efficient teachers, teachers need to

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be constantly top-notch in their profession. It is only possible, if they can sustain their continuing professional development. Accordingly, all related reflections given in this paper have been elaborated and reflected on the basis of the systematic review.

Keywords: *Continuous Professional Development (CPD), In-service School Teachers and Systematic Review*

Introduction

A teacher with holistic knowledge and excellent skills is the most needed asset for a human society. On the contrary, a teacher with partial out-dated knowledge and skills is a barrier for true education of students. Hence, the self-propelled habit of Lifelong Learning (LLL) is pivotal for knowledge and skills to be an effective teacher. In other words, we can also say that professional development of a teacher has to be a continuous process. Only an efficiently skilled teacher can best serve the need of students, school and society. It also holds well in light of the National Education Policy 2020 which states, “Teachers truly shape the future of children, therefore the future of a nation. Only the very best and most learned became teachers. Society gave teachers what they needed to pass on their knowledge, skills and ethics optimally to students” (p. 20). Obviously, it is true because students get more benefits from qualified, experienced and knowledgeable teachers. Their ability to communicate is equally important. The school teachers need to learn how to acquaint the students with the latest knowledge through innovative modes of teaching. So, it is important for the teachers to participate in such programmes, be it pre-service or in-service. According to Gartia and Sharma (2013), Continuous Professional Development (CPD), especially helps the in-service school teachers learn to cope with new knowledge and skills. It enhances teachers’ capabilities, competencies and enables them to keep abreast of the current issues. This paper focuses on the results of a systematic review related to the concept and need of CPD for school teachers, overview of policies related to CPD of school teachers in post-independent India and the CPD practices prevailing in school education at present. It also reflects in brief about the post COVID-19, and NEP 2020 developments, needs and challenges.

Concept and Need of CPD for School Teachers

As more emphasis was given to make the professional development (PD) programmes continuous and on-going, a new term Continuous

Professional Development emerged. There are some definitions given below, traced after review to explore the concept of CPD:

- “CPD is the process by which teachers maintain, and develop knowledge and skills related to their professional lives. It combines a variety of approaches, ideas and techniques to help teachers manage their own learning and growth.” (Bosschieter, 2016, p. 71)
- “On-going divergent activities (formal, non-formal and informal) that aims at developing teachers’ intellectual abilities (cognitive domain), self-confidence, attitude, values and interest (affective domain), and skills and competencies (Psychomotor domain) for improving personality, and to carry out the responsibilities of the teaching profession properly in accordance with the changing times and needs of the prospective teacher and society.” (Srinivasacharlu, 2019 p. 30)
- “A CPD programme is one which provides continuous, ongoing, work-embedded support to the teachers throughout their career span. As a systematic and planned programme, it helps teachers to continually acquire and document relevant knowledge and skills.” (Bhaumik and Priyadarshini, 2020)

Accordingly, based on the definitions given above by Bosschieter (2016), Srinivasacharlu (2019), Bhaumik and Priyadarshini (2020) the concept of CPD can be summarised in two points given below:

1. CPD is a continuous process of developing, maintaining and documenting a school teacher’s professional skills. These skills may be gained formally through courses and training, informally through watching other teachers or non-formally by visiting other institutions and field trips. It is the sum total of formal, informal and non-formal learning experiences throughout a teacher’s career, i.e., from pre-service teacher education to retirement.
2. CPD goes beyond the term training with its implications on learning skills of the teacher. It helps teachers to learn new skills, develop new insight into pedagogy, and explore new or advanced understanding of content and resources.

Several efforts have also been made to highlight the need of CPD by Tewari (2016), Jaiswal (2017), Srinivasacharlu (2019), Singh, Patel and Mishra (2019). Some systematically drawn observations from them highlighting the need of CPD have been mentioned below:

1. **Finding new teaching strategies:** By participating in CPD, teachers become more skilled and knowledgeable about what they do, and discover new teaching strategies and ways. They also understand the areas, where they can improve and change their styles to be more effective.
2. **Greater self-confidence:** Those teachers who take part in CPD, feel more positive about their work and themselves as a person also.
3. **Remain motivated and improve their learning curve (professional growth):** CPD keeps teachers motivated as they get professional help to become better educators. They learn from experienced leaders and experts, which enhances their learning curve and leadership skills. They also know what are the latest trends in education and how they can improve themselves so they can catch up with the trends.
4. **Set smart, professional goals:** CPD makes teachers better goal setters and helps them to set SMART (Specific, Measurable, Attainable, Relevant and Time-bound) goals. With CPD, teachers can define career goals that are realistic and achievable.
5. **Equip their students for the future:** Today's students will need to equip themselves with new technical skills, people skills and competencies to perform effectively as future professionals. With CPD, teachers will play a key role in preparing their students for the twenty-first century.
6. **Organisational skill and time management:** Apart from teaching, teachers spend a lot of time in developing curriculum, evaluating students and doing other paper work. CPD will enable them to stay organised and manage their time efficiently.

Accordingly, looking at the need and importance of CPD, various educational policies in India have given due place to it, as mentioned below:

Policies Related to CPD of School Teachers in Post-independent India

Under various committees and commissions variety of initiatives were taken to enhance the capacity of school teachers (NCFTE-2009, p.67). The Secondary Education Commission (1952–53) recommended the arrangement of refresher courses, short courses in special subjects, practical training in workshops and professional conferences as a part of teacher training colleges

Singh, Patel and Mishra, 2019, p. 26). At present, the CPD for teachers is organised in the name of INSET or In-service Teacher Training (Tewari, 2016, p. 47). This programme encompasses teaching skills, sound pedagogical theory and professional skills to create the right knowledge, attitude and skills in a teacher (Holistic development of a teacher). Most of the activities identified for CPD were sporadic responses to the recommendations of the various commissions. These activities have been systematically extracted and discussed in the Table 1 given below.

Table 1: Provisions for Professional Development of School Teachers Reflected in Education Commissions, Committees, Policies in India

Education Commissions, Committees, Policies	Provisions for Professional Development of School Teachers
The Education Commission (1964-66)	<ul style="list-style-type: none"> • Universities and teacher organisations should organise in-service education for teachers. It enables every teacher to receive 2 or 3 months of in-service education once in every 5 years. • Training institutions should work on a 12-month basis, and organise programmes like refresher courses, seminars, workshops and summer institutes. (pp. 85-86)
The National Committee on 10+2+3 Educational structure (1972)	<ul style="list-style-type: none"> • Every teacher is made to undergo in-service training courses and other refresher courses at least once in 3 to 5 years by taking advantage of summer vacation. Training should especially include updating the teachers' knowledge in their subject(s) of teaching. (Para-6.12, p. 71) • Training should cover elements like continuous assessment, remedial teaching, physical education and moral education. (Para-6.13, p. 72)
National Policy on Education (NPE)-1986 and Programme on Action (POA)-1992	<ul style="list-style-type: none"> • Establishment of District Institutes of Education and Training (DIETs) in each district, upgradation of 250 colleges of education as Colleges of Teacher Education (CTEs). • Establishment of 50 Institutes of Advanced Studies in Education (IASEs), and strengthening of the State Councils of Educational Research and Training (SCERTs). • Organise especially designed orientation programme for all new entrants and refresher courses for all the teachers at least once in every five years. • In-service and refresher courses should be related to the specific needs of teachers. Evaluation and follow-up should be a part of the scheme. (p. 179)

<p>National Curriculum Framework (NCF)-2005</p>	<ul style="list-style-type: none"> • In-service training was provided at sub-district level through Block Resource Centres (BRCs) and Cluster Resource Centres (CRCs) under District Primary Education Programme (DPEP). • In-service training situated within the context of the classroom experiences of teachers. DIETs, which have the responsibility of organising such training, should do so in a manner in which both teachers and their schools benefit from such training. • Suggested working out a training policy defining parameters such as the periodicity, content and methodology of programmes. (p. 111–113)
<p>National Curriculum Framework for Teacher Education (NCFTE)-2009</p>	<ul style="list-style-type: none"> • Design of in-service programmes for teachers would depend on the specific aim of each programme along with general aims, like content and pedagogical approach. • 20 days of training for all elementary teachers is being mandated by the government. Courses of both short duration (4 to 5 days) and long duration (1 to 3 months) with specific skills or areas of interest offered to teachers over the year. • Use ICT as resources by teachers for wider dissemination of information. • Provide the option of taking a year off (paid or unpaid) to pursue a course for teachers. Avail of duty leave of 3 to 4 days a year attend meetings and conferences connected to their profession. (pp. 67–69)
<p>Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNTT)-2014–2015</p>	<ul style="list-style-type: none"> • Addressing the need of systematic teacher training and development, providing professional supervision and support, and creating updated teaching-learning environments for teachers. • Create, and strengthen existing institutional structures and mechanisms that enable teachers to transform their pedagogical approaches. • Ensure teachers are properly supported with appropriate academic inputs and resources, including ICTs required for teaching-learning activities and innovative teaching-learning practices. (www.nmtt.gov.in/outcomes, 2022)

The above section reflected a very brief review of CPD provisions for school teachers in independent India. Further, the forthcoming section deals with various practices in the post-independence India.

CPD Practices Prevailing in School Education in India at Present

Various programmes for in-service teachers training programmes were initiated by the Government of India in recommendation of

various commission and policy reports. As per NCF-2005, 500 DIETs, 87 CTEs, 38 IASEs and 30 SCERTs have been set up for providing in-service education to primary and secondary school teachers (p. 112). Researchers such as, Tewari (2016), Singh, Patel and Mishra (2019) pointed out the importance of some programmes by the government to enhance the professional development among school teachers. The systematically drawn overview of these programmes have been mentioned and discussed below in Table 2.

Table 2: Provisions for Professional Development among School Teachers in Different Government Programmes.

Government Programmes	Provisions for Professional Development among In-service School Teachers
District Primary Education Programme (DPEP)-1994 Focuses making Primary education universal	<ul style="list-style-type: none"> • Strengthening the teachers' in-service training and development of new designs for training • Selection and training of master trainers, and resource persons within the district • Training of educational administrators including district- and block-level functionaries • Augmenting the DIETs and other activities required for continuous, and updated training of teachers
Sarva Shiksha Abhiyan (SSA)-2000 Focuses on Universal Elementary Education (UEE)	<ul style="list-style-type: none"> • Provision for 20 days training under in-service education for all primary and upper primary teachers every year. • Besides strengthening the capacity and competence of teachers in pedagogy and subject matters, they were introduced to interventions on several aspects of elementary education like education of girls, SC and ST children, children with special needs, other categories of learners with various disadvantages, community mobilisation.
Revised SSA Framework-2011 As a compliance of the RTE Act 2009	<ul style="list-style-type: none"> • DIETs, Block Resources Center (BRCs) and Cluster Resources Center (CRCs) have been conceptualised to function as academic resource centers for the purpose of PD. Teachers' training needs to be identified, training modules to be reviewed annually to avoid repetition and a long term, and sustainable plan for preparation of master trainers to be developed.

<p>Rashtriya Madhyamik Shiksha Abhiyan (RMSA)- March 2009</p> <p>Focuses making Secondary education universal</p>	<ul style="list-style-type: none"> • In-service teachers and heads of schools will be trained for five days every year. Subject-wise teachers are required to be deputed in every school. Specialised teachers for physical education, art, craft and culture are required to be deputed. • Develop a mechanism, whereby secondary school teachers can share their expertise and experiences and learn from one another, thereby developing a learning community and culture.
<p>Samagra Shiksha (4 August 2021)</p> <p>Focuses on improving the quality of education by focusing on the two T's— Teacher and Technology</p>	<ul style="list-style-type: none"> • Subsumes the 3 schemes, i.e., Sarva Shiksha Abhiyan (SSA), Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and Teacher Education • Various kinds of dynamic and need-based training programmes are provided for Teachers (Refresher and Induction) and Principals or HMs (Refresher and Residential) for Capacity Building • Focus on strengthening Teacher Education Institutions (TEIs) like SCERTs and DIETs to improve the quality of teachers. SCERT to act as the Nodal institutions for both in-service and pre-service teacher training. (https://samagra.education.gov.in, n.d.)

In India, main organisations for providing professional development to teachers at different levels are DIETs at District level, SCERTs at State level and NCERT at National level. Besides these, agencies like IASES, NIEPA, KVS, Extension Education Centres also play an important role. The role of DIETs, SCERTs and NCERT in teachers' professional development has been discussed in the Directorate of Distance and Continuing Education (DDCE), study material on Teacher Education, which has been summarised in Table 3.

Table 3: Role of Different Organisations on Teachers' Professional Development

Organisations	Role on Teachers' Professional Development
<p>District Institution of Elementary Education (DIET)</p>	<ul style="list-style-type: none"> • Organise training, and orientation programmes for Elementary and Secondary State school teachers (both pre-service and in-service). • Organise seminars and workshops to enhance the abilities of teachers for teaching subjects like mathematics, science, art teaching and yoga at school level. (p. 126)

<p>State Council of Educational Research and Training (SCERT)</p>	<ul style="list-style-type: none"> • Arrange in-service training for different categories of teachers, inspect officers and teacher-educators, and coordinate the work of other agencies operating at the state level. Organise programmes including correspondence-cum-contact courses for professional development of teachers, teacher-educators and inspecting officers. (p. 128)
<p>National Council of Educational Research and Training (NCERT)-1961</p>	<ul style="list-style-type: none"> • NCERT, (2006–2009) made a pioneering effort to utilise two-way video conferencing modes to provide training to school teachers concerning the thrust areas of the National Curriculum Framework (2005) and the new textbooks developed by the NCERT. (p. 127)
<p>National Council for Teacher Education (NCTE)-1995</p>	<ul style="list-style-type: none"> • Monitors the progress and quality of teacher education institutions in the country. It gives guidelines for minimum qualification of teacher educators and teachers. Responsible for giving recognition for starting new courses in teacher training, existing teacher training institutions and formulating the NCFTE for teacher education. (https://ncte.gov.in/website/index.aspx, 2022)

The significant achievements in the field of CPD and its practices in India can be summarised in the following four points along with the follow-up Table 4:

1. CPD programmes for teachers through INSET have been increasingly and actively pursued during the last two decades after the NPE 1986 or 92. During the 1990s the INSET programme was initiated and implemented through the TEIs upgraded to DIETs or DRCs (for elementary school teachers), CTEs and IASEs (for secondary school teachers) under the Centrally Sponsored Scheme.
2. The inputs in these programmes were of two types; subject matters and some selected educational themes, like TLM Preparation and use, Adolescent Education, Planning and Management, Environment Education, Gender Sensitisation, CCE.
3. Institutionalisation of teacher's in-service education with the establishment of a training network comprising NCERT, NUEPA, SCERTs, DIETs, CTEs and IASEs, and establishment of sub-district resource institutions like BRCs and CRCs in the districts covered under primary education projects.

4. Teachers were empowered through training, re-training, refresher and orientation programmes in certain skills such as generic skills, pedagogic skills, ICT and technology enabled training and other appropriate interventions.

Table 4 Summary About CPD Practices Prevailing in School Education in India

Organisations	NCERT, NIEPA, SCERTs, DIETS, CTEs, IASEs, BRCs and CRCs
Modes of INSET	Seminars, Refresher Courses, Workshops, Conference, Study Group, Correspondence Courses, Distance Education, Extension Activities, Field Activities
Models or Approaches for INSET	Cascade Model, Reflective Teaching Model (RTM), Split Model, Site based Model, Self-directed Model

Issues Related to CPD in India Before NEP-2020

From the Government Documents NCF-2005 and NCFTE-2009; articles of Tewari (2016), Singh, Patel and Mishra (2019) researcher pointed out some issues of CPD for teachers in India before New Education Policy (NEP, 2020). Some of these issues are identified and discussed in the paragraph given below:

Present CPD programmes in India focus only on the training aspect of in-service teacher’s development. Its goals aren’t addressing the actual needs of teachers and objectives aren’t designed in an integrated manner. Planning and conduct of such programmes were entirely left to the respective TEIs, not involving teachers. Top-down approach in the present cascade model of CPD has been ineffective in bringing positive results. There is nothing to ensure that what is learnt by the teachers in the CPD programme as feedback and follow up is weak. Other issues like absence of specialised database system about periodicity of CPD and teachers-participants, unavailability of training mechanisms for senior secondary teachers, clubbing upper primary teachers training with either primary or secondary level teachers were also identified. Beside these, due to COVID-19 schools and colleges were closed, which encouraged digitalisation of education, and use of various innovative strategies and methods. There has been a rapid shift from face-to-face mode to online learning. This rapid shift of e-learning prompted by the pandemic has brought a digital divide among teachers. To overcome the above discussed issues and keeping focus on the holistic development

of teachers' various initiatives were taken to improve existing CPD programmes.

Post COVID-19 Initiatives to Improve CPD among School Teachers

The Department of School Education and Literacy (DoSEL) under the Ministry of Education (MoE), Government of India has taken several initiatives related to capacity building of school teachers to ensure professional development post-COVID-19. These initiatives were published by DOSEL Under MoE, India on a report named *Compilation of Initiatives or Actions taken to mitigate the effect of Covid-19 pandemic on education of school children*. The highlights of the compilation are discussed in the following six points.

1. NISHTHA (National Initiative for School Heads and Teachers for their Holistic Advancement) Online
 - NISHTHA is a capacity-building programme for improving the quality of school education through integrated teacher training. It aims to build competencies among all the 42 lakh teachers and school principals of the country at the elementary stage. The DoSEL has launched the NISHTHA programme under the centrally sponsored scheme of Samagra Shiksha in 2019–20.
 - The objective of this massive training programme is to motivate and equip teachers to encourage, and foster critical thinking in students. The initiative is first of its kind, wherein standardised training modules are developed at national level for all States and UTs. This programme was conducted face-to-face mode before the pandemic. However, it is now conducted in 100 per cent online mode, keeping the needs of teaching and learning during the pandemic.
 - Expected outcome of NISTHA programmes is to train the teachers, so they can use the art of pedagogy for developing creativity and innovation among students, and strengthen personal-social qualities of students for their holistic development. (pp. 11–14)
- i. NISHTHA 1.0 (Elementary Level; Classes I–VIII)—Online (<https://itpd.ncert.gov.in>)
 - ❖ Launched on 6th October, 2020. In this programme, there are 18 modules: 12 for teachers, 5 for school heads, and

- 1 specialised module on teaching and learning during COVID-19 times. 24 lakh teachers and school Heads are covered at primary and upper primary.
- ❖ Each module consists of guidelines, primers, a training package with QR coded e-content, videos on each module and other e-resources. The details of the 18 modules of NISHTHA 1.0 are available in both English and Hindi, and can be accessed on Digital Infrastructure for Knowledge Sharing (DIKSHA) Portal.
 - ❖ CBSE has adopted a few NISHTHA courses for the teachers of its affiliated schools. These courses are available in English medium on DIKSHA portal.
- ii. NISHTHA 2.0 (Secondary Level; Classes IX–XII)—Online (<https://itpd.ncert.gov.in>)
- ❖ Launched on 17 July 2021 and completed on 28 February 2022, targeting 10 lakh teachers and school Heads at secondary level
 - ❖ 12 Generic and 1 Pedagogy Online Courses
 - ❖ 33 States or UTs Initiated in 10 Languages
 - ❖ 8 Autonomous Organisation under Ministry of Education (MoE), Ministry of Defense (MoD) and Ministry of Tribal Affairs (MoTA)
 - ❖ Course Schedule available on <https://itpd.ncert.gov.in/mod/page/view.php?id=48500>
- iii. NISHTHA 3.0 (NIPUN Bharat; ECCE to Classe-V)—Online (<https://itpd.ncert.gov.in>)
- ❖ Launched on 10 August 2021
 - ❖ 12 Online Courses (9 Phases)
 - ❖ 33 States or UTs Initiated in 11 Languages
 - ❖ 5 Autonomous Organisation under MOE, MOD and MOTA
 - ❖ Targeted 25 lakh teacher and school Heads at pre-primary and primary level.
 - ❖ Course Schedule available on <https://itpd.ncert.gov.in/mod/page/view.php?id=48501>
2. Special capacity building of teachers on how to conduct online classes
- CBSE , KVS and JNV undertook a massive exercise to build online teaching capacities of their teachers as soon as the

lockdown started, to ensure continuity of learning through online. In this process, CBSE has trained 4,80,000 teachers (during April–September 2020), KVS trained 15855 and JNV trained 9085 teachers all India.

- Several bite-sized modules were prepared and disseminated post-training to augment the capacities of teachers. Special orientation for primary teachers and HMs was organised for sensitising them on handling students, and conducting their classes online. (p. 14)
3. Special Resources for teachers: MOOCS Modules on Experiential Learning and Competency-based Education; realising the urgent need for building capacities of teachers, activity-based and highly engaging modules should be prepared on the pedagogies. The modules should inculcate experiential learning, competency-based education and the need to integrate real-life situations into the teaching and learning process (p. 17). These modules are available on DIKSHA portal at <https://diksha.gov.in/explore-course?selectedTab=course>
 4. Open Education Resources (OERs) for Teacher: National Curriculum for Teacher Education (NCTE) has also taken the initiatives for uploading OERs on its official website, www.ncte.gov.in, and made it available free of cost to all stakeholders consisting of 28 areas or themes, covered under Teacher Education Courses (p. 18).
 5. DIKSHA (Digital Infrastructure for Knowledge Sharing)—one Nation, One Digital, Educational Platform
 - DIKSHA is the ‘one nation; one digital platform’ for school education in 35 States and UTs along with those of NCERT, CBSE and NIOS of the central government. DIKSHA can be accessed through a web-portal and mobile application.
 - It contains modules for capacity building of teachers uploaded in different languages by the States and Centre. It will serve as National Digital Infrastructure for teachers. All teachers across the nation will be equipped with advanced digital technology. It will help teachers to create training content, profile, in-class resources, assessment aids, news and announcements, and connect with the teacher community. (pp. 21–23)

6. National Teacher Platform (NTP): Our teachers are our heroes.
 - NTP contains courses for teachers to enable continuous learning, provide resources for use in classrooms, and a dashboard for progress and assessment. The NTP will be available to all teachers anytime and anywhere.
 - The NTP will cater to the needs of teachers from all stages of school education, i.e., pre-primary, primary, upper primary, secondary and senior secondary, including the development of attitude, skill and knowledge. The platform will continuously develop and evolve in an iterative manner, based on the needs of users and stakeholder's feedback. (<https://www.india.gov.in/spotlight/diksha-national-digital-infrastructure-teachers>, 2022)

NEP-2020 Initiatives for CPD Programme for In-service Teachers

The present NEP-2020, approved by the Union Cabinet of India on 29th July 2020, gives importance to the teachers. National Education Policy 2020 (NEP 2020) envisages that the extant 10+2 structure in school education will be modified with a new pedagogical and curricular restructuring of 5+3+3+4 covering ages 3–18. As teachers play the most important role in nation-building by creating high quality of human resources in classrooms, NEP-2020 places them at the centre of these changes. It stresses the importance of CPD for in-service teachers and sets a professional standard for them. These initiatives are as follows:

1. Continuous Professional Development (CPD)
 - NEP-2020 (Para 5.15) recommended that ‘Teachers will be given continuous opportunities for self-improvement and learning the latest innovations and advances in their professions. These will be offered in multiple modes including local, regional, state, national and international workshops as well as online teacher development modules. Platforms, especially online platforms, will be developed so that teachers may share ideas and best practices. Each teacher will be expected to participate in at least 50 hours of CPD opportunities every year for their own professional development, driven by their own interests. It will systematically cover the latest pedagogies regarding foundational literacy and numeracy, formative and adaptive

assessment of learning outcomes, competency-based learning, and related pedagogies such as, experiential learning, arts-integrated, sports-integrated and storytelling-based approaches, etc.’ (p. 20).

- NEP-2020 (Para 5.16) also recommended that ‘School Principals will also be expected to participate in 50 hours or more of CPD modules per year, covering leadership and management. It focuses on preparing, and implementing pedagogical plans based on competency and outcome-based education. They will have similar modular workshops and online development opportunities on leadership or management to improve their own leadership and management skills’. (p. 21)

2. Professional Standards for Teachers

- By 2020, a set of National Professional Standards for Teachers (NPST) will be created by the NCTE in consultation with NCERT. It will determine all aspects of teacher career management, including tenure, CPD efforts, salary increases, promotions and other recognitions. The professional standards will be reviewed and revised nationally in 2030 and thereafter, every ten years, on the basis of empirical analysis of the efficacy of the system. (NEP-2020, para 5.20, pp. 21–22)
- A new and comprehensive National Curriculum for Teacher Education (NCFTE) will be developed on the principles of NEP-2020 by NCTE in consultation with NCERT until 2021. (NEP-2020, para 5.20, p. 24)

Issues Related to CPD in India After Implementation of NEP-2020

NEP-2020 pays special importance to the teachers, and their training programmes for upgrading their professional knowledge and skills. The National Council of Educational Research and Training (NCERT) has developed 50-hour CPD guidelines for teachers, head teachers and teacher educators as envisaged in NEP-2020. This guideline covers the needs of teachers and Head teachers, and comprise various programmes and activities for participants with allotted time for each activity. The focus is to encourage proactive learning and community participation, following a bottom-up approach. However, some of the issues are still unaddressed and need to be

given attention. These issues were as follows:

1. Both NEP-2020 and 50-hour CPD guidelines developed by NCERT, suggested that CPD programmes need to be organised according to the needs of teachers. However, there was no provision currently present to know what actually teachers need for their PD. Questions like (i) what kind of professionalism is needed by teachers? (ii) how teacher training should transform into teachers' professional development? must be addressed, while framing objectives and content modules of CPD.
2. Though 50-hours CPD guidelines suggest teachers to maintain an e-portfolio, which would make it handy for them to analyse their skills, set goals and objectives accordingly. However, as if now, it was not available for every teacher.
3. Both NEP-2020 and 50-hour CPD guidelines developed by NCERT supported CPD programmes, should be offered to teachers in a blended mode (online and offline). However, according to Bhaumik and Priyadarshini (2021), many teachers are either still unaware of online CPD (OCPD) or are unable to perceive their benefits. The major barrier perceived by teachers in opting for an OCPD was internet connectivity and lack of supporting devices. Lack of knowledge of computer applications for doing an online course also creates technology fear among teachers. (p. 9)
4. Suggestions like development of Annual Continuous Professional Development Calendar for teachers and Digital Repository of Resource Persons given in 50-hour CPD guidelines by NCERT, however, not implemented it till now.
5. NEP-2020 recommended a new and comprehensive NCFTE, and NPST for teachers' professional development, which was planned to be published in 2020 and 2021, respectively. However, till now, it is not published.

Conclusion

The systematic review of a variety of documents in the form of research papers, articles, books, chapters in books and online learning materials reflect that CPD is an ongoing continuous process of developing, maintaining and documenting a teacher's professional skills. In independent India, the need of CPD has been well realised. Accordingly, it has been given its due place in post-independent policies and practices particularly towards the

end of the last century as already reflected above in related sections of the paper. However, most recently, the transition from face-to-face to online learning took place, owing to COVID-19 and created issues like digital divide, and subsequent related inequalities among teachers. To reduce the digital divide among teachers, they must consult, and empower themselves by developing skill and knowledge through CPD. Like all previous Government policies and frameworks like NPE-1986, NCF-2005 and NCFTE-2009, NEP-2020 too pays special importance to the teachers, and their training programmes for upgrading their professional knowledge and skills. As per NEP-2020, each teacher is expected to participate in Continuous Professional Development (CPD) for a minimum 50 hours in a year. The Department of School Education and Literacy under the Ministry of Education has taken various initiatives for capacity building of teachers through online mode to mitigate the effect of COVID-19 pandemic on education. Programmes like NISHTA, MOOCS modules, OERs of NCTE, DIKSHA provide training opportunities to a large set of teachers. Special training programmes were also conducted for teachers during summer vacation or holidays so that they can use platforms like Google Classroom, Zoom, Google-meet, Webex, etc., to continue online teaching for students. However, there are some issues present in the INSET programmes like top-down approaches, poor feedback and evaluation, less involvement of teachers, absence of reflective practice, and lack of follow-up programmes that must be addressed first in all future programmes. Besides these issues, the other issues like time, money, and infrastructure may also be addressed for implementing motivating and successful CPD Programmes. Success of CPD programme will lead to better equipped motivated school teachers hence, good school education in India.

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Small-Group Learning in Science Perspective towards Classroom Engagement

BISWAJIT BEHERA*

ABSTRACT

This paper contributes to the understanding of teacher trainees' engagement during Problem-based Small Group Learning (SGL). Six participants were selected purposively, who filled informed consent and were affirmative in giving extra time for this experiment. The process of sharing and interaction during SGL was studied through a qualitative case study. The study components included the group, roles of participants, peer-group relations, encountered situations and the practice of sessions. Participant observation, focus group discussion and field notes were the measures for data collection. The researcher facilitated the group members during SGL in various possible ways such as observed group works, checked solutions, gave hints, clarified notations, asked and answered questions, pointed out errors and helped the group to work. The result revealed that, SGL was effective to promote socially accepted behaviours as well as cognitive behaviour. Classroom engagement consisting of behavioural engagement was demonstrated through the participation and effort of learners in activities. Consequently, classroom engagement was enhanced through pedagogical method and classroom environment.

Keywords: *Constructivism, Small Group Learning, On-Task Behaviour, Classroom Engagement*

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Introduction

Learner-centred learning is a paradigm shift in the process of teaching-learning. This approach recommends various means to facilitate it. The goal is to explore a real problem such as teachers need to integrate learner's prior experience into the learning process, need to develop higher-order thinking skills among students like, problem-solving and enquiry, and keeping students engaged with various tasks to carry out collaborative learning. Hence, teaching and learning should be conducted more interactively. Probing questions should be encouraged and classroom sessions should contain more fun, creative, collaborative, and exploratory activities for students for experiential learning (National Education Policy, 2020).

Collaborative learning is accompanied by a problem-based approach, where the problem is designed as per the needs of the students. The focus is on the learner and authentic problem. Activities on problem-solving foster students' understanding, stimulate their intellectual questioning, pose arguments and state opinions. This creates a constructivist environment among any given group of learners. Therefore, the classroom learning environment should be based on the constructivist approach to help learners enrich their understanding, especially for more complex or abstract scientific content (Dhindsa et al., 2011).

A constructivist learning environment is a situation, where learners work together in a group and collaboratively support each other. This is designed to support the learners' knowledge construction process. Learners use a variety of tools and information resources in their guided problem-solving activities. They seek each others' needs and help convincingly. The learners perceive it to be more constructivists (Gijbels et al., 2006). It is done in a small group setting.

Small-Group Learning (SGL) is an active engagement of learners in which learning occurs enjoyably. SGL is defined as a way of learning in which a small group of learners get actively engaged in dialogues and collaboration on a problem-solving task.

Literature Review

Constructivism is a learner-centred theory. Its emphasis is on the process of learning to prepare the learners actively. It stresses on learners' understanding on the construction of knowledge.

It tries to answer the question; 'How do learners acquire knowledge?' Knowledge is constructed by and embedded in each learner, not something 'outside' (Sultan et al., 2011). Constructivist approaches have brought a paradigm change in science education. This view considers group learning in which all participants present their ideas strongly and remain open to the ideas of others. Learning science involves putting learners in a problematic phase where they can go beyond empirical enquiry. 'Learner-centred learning', 'learning by doing' and 'application of real-life situation into classroom learning' are the core values of problem-based science instruction. The participants get engaged in science-based enquiry activities. They are posed with hands-on and mind-on activities, and are introduced to dialogue and discussion related to their activities. The gain of varieties of learning experiences results in their scientific findings (Abd-El-Khalick and Lederman, 2000).

Problem-based learning implements the important aspects of the constructivist framework (Hmelo-Silver, 2004). Its implementation comprises of explaining how students learn science in classrooms. Learners are exposed to encounter scientific ideas in a social environment. Scientific ideas can be introduced through problem-based small group learning. SGL is a way of creating a social learning environment in which students work together to enquire about their task and are well suited to a science lesson to engage students (Shachar and Sharan, 1994). In SGL, the problem drives the learning situations that are in the learner's real-world and presented as problems. A major concern for this approach lies in posing of a complex problem, and carrying out learning activities in a free and fair environment. As learners engage themselves in an activity during PBL, they develop an understanding of the importance of the problem, comprehend the relevance of the topic and construct knowledge through their experiences. Intellectually challenging questions lead to student engagement (Zeegers and Elliot, 2019). This is an instance of deeper learning in the classroom. Hence, the learners must determine their own learning needs and issues based on the problem that they encounter. Thus, it explores students to get solution of challenging questions and its application in a real-world learning (Agarkar, 2019).

PBL plays an instructional role for small groups. Students get actively engaged in different tasks, while working together in collaboration such as problem identification, procedure(s)

description, mathematical problems solving, essay writing, drawing of diagrams, project designing and knowledge construction. Their work consists of interaction among participants that include assigning tasks, holding each individual accountable for their learning, engaging in probing questions, providing team-building activities, communication and discussing ways of group work for accomplishments (Bennett et al., 2010). They maximise their learning through sharing resources, viewpoints and helping in each other's learning. Learners interact with each other in a safe collaborative environment from which knowledge emerges. Group work demands 'mutual engagement' in a coordinated effort to solve the problem together (Webb et al., 2006). Well-managed group work allows students to develop communication skills by countering their work based on evidence, learning from others and engaging them in problem-solving (Patchen and Smithenry, 2015). Shepardson (1996) stressed that group work establishes positive interdependence, individual accountability, equal participation and good social skills.

A typical size of a 'small group' consists of Classes VI to VIII learners supported by the facilitator. Small-group learning intends to keep learners engaged through free discussion on a particular topic. However, 'group size' is less important than what the group does. The importance of small-group learning is that it must be learner-centred (Mccrorie, 2019). In small group learning, learners are divided as per their roles and responsibilities into different tasks such as planning the task, entering the data, calculating and estimating mathematics problems and reporting the finding(s). Learning is a form of collaborative problem-solving. Therefore, the type of collaboration in the small group includes resource identification, a process of relating and structuring ideas, looking for underlying principles, finding relevant evidence and critically evaluating knowledge (Loyens et al., 2013). Draskovic et al. (2004) viewed that learning mechanisms in small-group comprises of task-related interaction, knowledge elaboration and knowledge acquisition. So, the learning context and a way participants work get facilitated in the group plays an important role. Van Boxtel et al. (2000) argued that, collaborative learning has the potential to engage students in activities that are valuable in the process of understanding concepts, reasoning out scientific themes, asking and answering questions, conflicts in opinions, evaluation of explanations and negotiation of conflicts. The engagement

emphasises group and collaborative activities. The formation of a small group, their dynamics and how well they function are important considerations in SGL. This strategy enhances various kinds of skills; behavioural skills and cognitive skills, which can be assessed effectively. The functioning of SGL is represented in Figure 1.

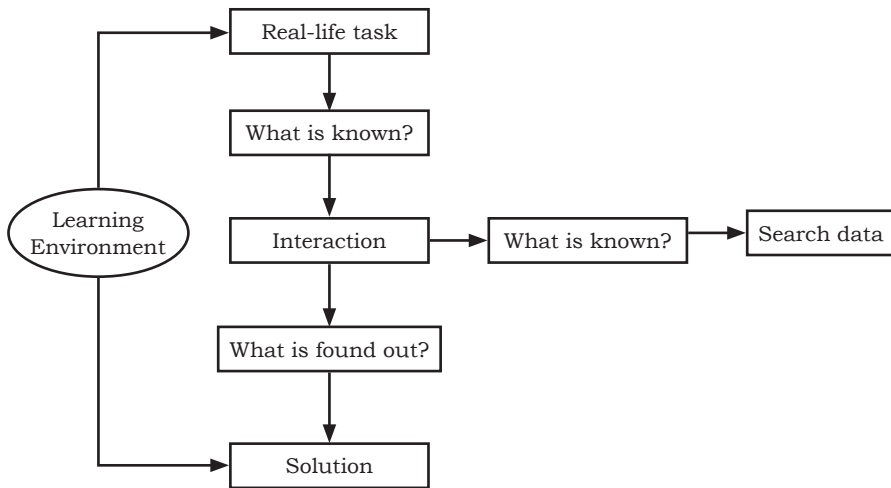


Figure 1: Work model of SGL (Author's Conceptualisation)

The above figure explains the working principles of SGL. The group work starts with an authentic task, which is designed to take real-life experiences into account. The group exploration is based on the 'given data' and 'data to be found out'. The group formulates tentative solutions by generating data and evidence. In the discussion, the dialogue continues to accept or reject the possible solutions. This form of interaction engages the learners until they reach general agreements on the solution(s).

In the group, the learning needs are diversified. As the small group becomes the focus of learning situation in a classroom then, the teacher becomes the facilitator of each small group. The facilitator determines the size of the group, working interaction type and learning task to be posed. In SGL, the group is more likely to consist of students of similar abilities. The facilitator's control of the learning process and the organisation's changes are the issues that sustain the learning process (Cunningham et al., 2011).

Small group provides benefits in learning through various ways such as development of discussion skills and thinking, exploration of attitudes, and sharing and reflecting upon experiences. The core skill of small-group learning is interaction. It comprises of questioning, active listening, responding and explaining. It is very important to ask questions and to listen effectively to whatever is told in a discussion to understand its implicit meaning. It needs mutual engagement in a coordinated manner to solve the problem. Small group learning is effective for both the cognitive and affective development of learners as it ensures knowledge, and understanding of a topic, and increases the ability to reason out and solve a problem, enhances empathy towards others, develops inter-personal skills, builds team-working skills and increases responsibility for learning.

Meaningful learning emphasises on conceptual understanding of the learners because it provides authentic tasks. National Curriculum Framework (2005) directs that teaching of science should be recasted to enable the learners to examine and analyse everyday science. Meaningful activities on everyday life tasks develop a deep understanding of the important ideas to be learned. Activities decide the promotion of thoughtful engagement on the part of the learners. The learning environment plays an important role in which each and every learner's learning experience plays a significant role (Boghossian, 2006). The learners are given opportunities to identify the learning issues as per their goals and objectives. Individual pedagogical goals design learning as engaging. The constructivist learning environment is beneficial in mediating students' knowledge and skill (Rikers and Loyens, 2011). The discussions among the students and the teachers facilitate in acquiring a deep understanding of the subject matter. An active learning environment fosters interactions with both teachers and students. Learners remain engaged in activities that enable them to find scope to think in various ways and solve problems accordingly (Meeuwise et al., 2010).

Constructivism emphasises on social action and social interaction for the intellectual development of a learner. Active interaction through social relationships facilitates the creation of richer meaning from experience. Hence, learning should reflect the inter-dependence between teacher development and learner through a collaborative teaching approach (Kojima, 2012). A small group learning environment is made conducive to ensure the classroom engagement as well as social communication of learners.

Engagement in a learning activity creates a collaborative environment within a group. It even extends outside the formal classroom when learners are motivated enough. This is known as active engagement. The learners during small group work access open learning materials, discuss and dialogue in a collaborative way, ask questions, formulate hypotheses and resolve the issues through negotiation. Reeve and Tseng (2011) proposed that learners' involvement in assignments as a part of a group is an aspect of students' engagement. This is an example of the active engagement of students. SGL is such a platform, where learners are involved actively with different kinds of activities.

Some cognitive and affective behaviours are manifested during activities. The learners are engaged in a learning process directly. This is the behavioural engagement of students (Nguyen et al., 2018). Classroom engagement refers to students' cognitive involvement, active participation and relational attachment with the specific learning task. Students' relational attachment is perceived as a motivated behaviour. Behavioural engagement is related to learning success and motivation (Dotterer and Lowe, 2011). Engagement in the group involves cognitive as well as relational behaviours to solve the problem-based task. Cognitive behaviours refer to problem-solving exercises with the use of cognitive strategies. These strategies are coding, analysis, interpretation and generalisation. Relational behaviours are learning behaviours, whose element are students' sense of belongingness (Fredricks et al., 2004) and students' self-regulatory strategies to monitor the learning process (Chapman, 2003). The integration of both cognitive and relational behavioural patterns contributes to the success of SGL.

Rationale of the Study

In this study, the perspective of small-group learning is described as a problem-solving process. The constructivists advocate that face-to-face work on problems having multiple solutions facilitate cognitive growth. From this point of view, the platform for students to discuss, debate and present their perspectives is an important element in small group learning. Classroom engagement is based on constructivism assumptions that learning is influenced by how a group of learners participates in purposeful learning activities (Coates, 2007). Active learners contribute more to tasks and on-task behaviour, initiating interactions that are related to achievement.

They perceive greater satisfaction during interactive learning (Curran et al., 2008).

Small group learning in science helps in improving both cognitive achievement and student attitudes toward science. Students' intentions to understand and construct the meaning of the content to be learned are associated with deep learning (Gijbels et al., 2009). They adapt to the learning environment in which they find themselves significantly in a greater autonomy and more engaged. Students' perception of participating in small groups, working interaction with students of varying abilities, contribution of ideas and suggestions, cooperation with other students to finish the task tended to be more positive. So, SGL supports positive engagement. How learners undertake task management and participate in learning activities, illuminate positive classroom engagement (Martin and Liem, 2010). Social constructivism claims that learning occurs best in social groups. Learning is social with knowledge being co-constructed through interactions with peers (Wentzel et al., 2010). The affective aspects of behaviour play an important role in small group learning. Classroom engagement is predominantly affective (Wang and Holcombe, 2010). Therefore, manifestations of these behaviours of group effect cannot be ignored.

One key area of research on small group processes is the helping behaviour of students during learning. Learners work together in small groups to accomplish a common task. It encompasses motivation and sustenance in the participation of a variety of learners (Feden and Vogel, 2003). They learn best while working with peers. They become able to negotiate what they have to do, what decisions to consider and when it is to be presented in the group. A positive perception of peer tutoring was also evident by Ling-Gan and Hong (2010). Learners learn and enjoy when they are intensively involved in their activities. Learners' engagement is invested in an effort directed towards learning, understanding, and mastering knowledge and skills. So classroom engagement is self-regulating through involvement in the task at hand, persistence, participation, attention and effort in activities (Christlie et al., 2008).

Classroom engagement is usually collaborative. It depends on significant amounts of self-directed learning on the part of students but there is little knowledge about studies on engagement during SGL. Engagement can be measured through understanding student satisfaction, active learning in a group and participatory

involvement in the activities of thinking processes. SGL is not associated with only cognitive area but the relational aspects can also be associated with the learning goal. Thus, there is a need to consider the relational aspect of small-group learning in exploring classroom engagement. Studies on engagement are using quantitative tools like, survey questionnaires or rating scales (Appleton et al., 2006). Qualitative tools for the assessment of engagement can bring in-depth exploration. For this, the qualitative methodology was used to capture classroom engagement.

Purpose of the Study

The researcher positioned SGL to meet the needs of learners and to enhance their learning engagement. Learners' engagement in the group is required to share and interact with others. Hence, the process of sharing was explored through a qualitative case study with the following objective and research questions.

Objective of the Study

- To understand the engagement of teacher trainees of mathematics and science education by exploring the process of sharing, and interaction during problem-based small group learning.

Research Questions

1. How do the participants interact with others to achieve their goal of learning?
2. How do the participants engage themselves to indicate on-task behaviours?

Method

The study was focused on the process of small group learning through a qualitative case study. The study components of the SGL process included the group, roles of participants, peer-group relations, encountering situations and the practise of sessions. Therefore, the researcher tried to become part of the field and an active member of the group. The active involvement in daily activities of participants in a small group setting was participant observation. Field notes were prepared by recording the activities of events. The elements of group dynamics during exploration, open conflict and assignment of various tasks among participants were discussed through focus group discussion. SGL was an event

where the relevant behaviours could not be manipulated. Thus, a case study relied on techniques like participant observation, focus group discussion and field notes through which data were generated (Miles et al., 2014).

Participants

Six B.Ed. teacher trainees were the participants of SGL. They were from the science and mathematics method group. Their entry qualification into B.Ed. course was B.Sc. in (PCM or CBZ group). Overall, a classroom consisted of 10 teacher trainees that included 2 males and 8 females. Out of which, 1 male and 5 females were chosen as a sample of the study. Six participants who showed interest and filled informed consent, and were affirmative in giving extra time for this innovation were selected purposively. They were informed that participation was voluntary and would not influence their result in the examination.

Tools Used

The researcher used qualitative research tools to collect data. It included observation through videotapes, participant observation through recording their approaches of conversation, discussions and interactions, and exhibited behaviours of participants by using field notes, focus group activities during problem-based learning, learning log, which included the recorded viewpoints, ideas, issues relating to the problem-based learning, diagrams and sketches in their reflective diaries.

Procedure of Data Collection

Procedure of data collection was based on the following three phases:

Phase 1: Entering into the Research Context

- Finding SGL Problem Scenario: The scenario was multi-disciplinary. It was based on real-world life, which seeks multiple solutions. The researcher identified the environmental issue for the SGL problem scenario. The major concepts included in this problem were the understanding of global warming, greenhouse effect, ozone depletion, etc.
- Orientation towards SGL: Two hours of orientation on theoretical aspects of constructivist pedagogy in general and problem based small group learning in particular was

carried out through PPT presentation. Doubts were cleared through question answer session. This was followed by one hour group work in which the researcher informed about how to work with others during the activities of PBL. Clear instructions were given about the group members, timings, content of the PBL, open book resources available including internet and recording of the events. The group activity was finished in 10 days. Each day activity was of one hour duration. The reflective diary was maintained by each teacher trainee to prepare their learning journal. This journal contained different ideas and viewpoints of the trainees according to the steps of SGL activities.

- Context of SGL: The SGL was initiated by posing a problem scenario. The participants were given the guidelines of small group operation. The members were introduced to the new material orally to the entire class, and through worksheets and text materials. The facilitator interacted with group members in various possible ways, observed group works, checked solutions, gave hints, clarified notations, asked and answered questions, pointed out errors, provided encouragement, helped the group to work and overall classroom management. The conflict was resolved by putting ideas together.

Activities of SGL

The activity of the PBL was organised as per the following steps:

1. Loud reading of the problem scenario.
2. Exploration of the problem—discussion on the problem statement was initiated. The participants were deriving the meaning(s) of keywords seen in the statements. Each concept and its meaning(s) were declared.
3. Listing out the known data—the given data were located.
4. Listing out the unknown data—‘What was known’ to them and ‘What was needed to know’ to them were traced out.
5. Listing out the hypotheses—they derived possible solutions. These were listed out serially as per the strength and weakness points of consideration.
6. Plan of Action—A list of actions to search different types of resources and reaching solution(s) were derived. The learning journal was maintained to record the accomplishments and progress of learning.

7. Write-up Solutions—the solutions were encountered and reviewed by participants to reach the concrete idea(s) of the solution.

Phase 2: Focused Exploration

- Participant Observation Using Video Tape: The researcher meticulously documented all the facts and relevant details during the events. The approach of discussion demonstrating cognitive and social behaviours was recorded.
- Focus Group: The activities of a small group during problem-based learning were recorded. The researcher followed the issues raised during the discussion of each event.
- Field Notes: The main way of recording data was through field notes. It was prepared immediately, during and just after the completion of an event. Information including time duration of each activity, the learning resources searched from the internet, materials used by the teacher trainees during PBL were the part of contents of the field note. The sharing of resources, ideas, openings, cooperation among participants, confusions and negotiations related to particular aspects of questioning and answering were written in the field note.
- Transcription of recorded content in Video Tapes: The video recorded verbal and non-verbal activities, and behaviours were transcribed.
- Learning Log: Relevant diagrams and certain ideas, which stormed into participants' minds during PBL were recorded. These were learning logs, which were then analysed.
- Iterative analysis: A preliminary analysis was commenced as soon as the activities of PBL progressed. The data collection and analysis were also carried out simultaneously.

Phase 3: Result Dissemination

The data was organised systematically to reduce the scrambled words. Themes were determined and the result was obtained.

Procedure of Data Analysis

Large amount of descriptive data were managed through analysis. The analysis was made in the following ways:

1. Preliminary Analysis: The information which was found in a field note, reflective diary of the trainees, observation and

video recordings were part of qualitative data. The analysis explored the qualitative data. These were processed in response to the research questions of the study.

2. Transcript: Video recorded data were transcribed. The verbal and non-verbal behaviours shown by the teacher trainees during each step of PBL were sequentially formatted. This was a data reduction activity of qualitative analysis.
3. Identification of Meaningful Themes: The researcher searched out the themes to locate the cognitive and social kinds of behaviour. The descriptions of verbal as well as non-verbal interactions were categorised into themes. The repetitions of occurrences of behaviours demonstrated during activities of PBL were searched out. The meaningful behavioural patterns were examined to develop the themes of behavioural engagement. These were listed out to illustrate the meaning of the behavioural engagement of teacher trainees during solution of problem scenarios. A careful, detailed and systematic examination of patterns was done to construct the meaning of engagement.

Case Analysis

TT1 (First Teacher Trainee) read out the written series of points. She narrated the list of 'known data' of the problem scenario. She showed the following sequence of given data located in the problem scenario:

1. Civilisation is growing up in the world.
2. Thermostat—a constant temperature
3. Causes of new carbon numbers are:
 - (a) our modern cities
 - (b) consumption of crops that are made up of pesticides
 - (c) air and water used
 - (d) passage of season
 - (e) a global average temperature of about 57°F
 - (f) psychological calendar according to three seasons

The detailed points under 'known data' were agreed upon by other trainees.

TT2 approved the list of data on 'What is given?' Other teacher trainees read out the statements repetitively and approved her list. She, then, found another step in problem-solving, that is, informed

the group to find the list of 'Need to Know'.

TT3 found certain issues during learning and made a list of learning issues. All were easy, comfortable, looked towards each other, smiled and opened a reflective diary for recording their information.

TT4 and TT3 both were helping TT1 about what was to be recorded under the column 'Need to Know'.

During those times, TT5 and TT1 were silent and grave. They were engaged in writing those things on their diaries.

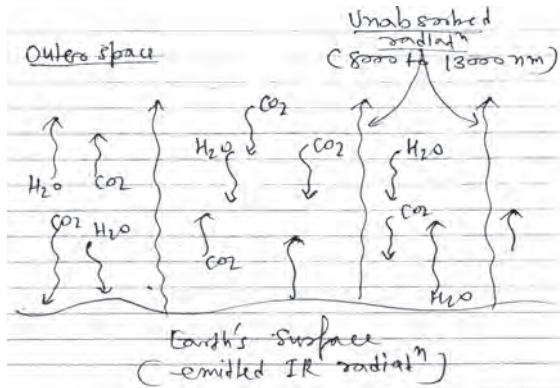
TT2 pleaded two points for 'Need to Know'.

1. Accumulation of water (H_2O) droplets
2. Formation of glaciers

TT6 was excited to make clear meaning of the greenhouse effect through a diagram. He produced a picture by making arrow marks and straight lines (Learning Log 1).

The figure was appreciated with open clapping by all teacher trainees.

TT6 again tried to clarify the effect of an increase in CO_2 in the atmosphere. TT2 and TT3 were exchanging their viewpoints with TT6. TT5 was open to talk with TT6. She reasoned out the cause and effect



Learning log 1: Figure of the greenhouse effect

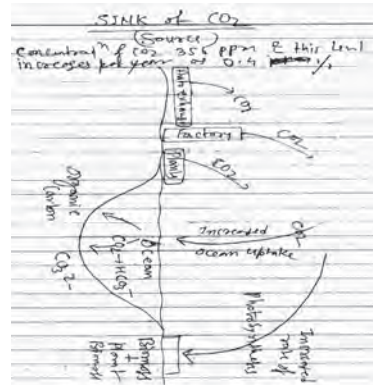
of CO_2 . She received the answers to the effect of CO_2 from TT6. She had firm eye movement at TT6. Her palms of both hands were open during her argument to claim the cause of CO_2 towards situations of the atmosphere. She was nodding her head, while collecting the responses from TT6 and other teacher trainees. The teacher trainees were silent during their conversation. They accepted their points. They recognised the key points from their discourse. While the discussion of the greenhouse effect was going on, a significant point was raised by TT6, i.e., sinking of carbon dioxide. He presented the idea through a figure (Learning Log 2).

TT3 clapped, being happy with this figure.

TT4 marked the figure as correct.

TT1 and TT5 understood the central idea of the figure. All were looking to this figure.

TT3 recognised the concept of the figure as a new one. TT4 had eye contact with TT6, while TT3 was saying.



Learning log 2: Figure of a sink of carbon dioxide

Observation

The teacher trainees in the group had a particular task during learning. The task was distributed as per the steps of the SGL process. The steps were identified as 'Known Data', 'Need to Know', 'Learning Issues', 'Possible Solutions', etc., when one was preparing 'Known Data', other two listed out 'Needs to Know' and another trainee collected the issues to make ready a list of 'Learning Issue'. This implied a clear distribution of work in the group. Thus, a 'division of work' principle was adopted, which proved the group was formed as a 'community'. Also, participation was spontaneous among teacher trainees during the discussion, dialogue and conversation on related issues and drawing of figures. They took responsibility for their distributed work and shared their views. They also worked in pairs. They worked together during the conversation and drawing of figures. So, it is concluded that sharing, cooperation and collaboration were the social behaviours that developed during the group work.

Further, one trainee led the group to learn a new concept. It developed trust in others. This demonstrated the confidence of the trainee. Thus, learning results in autonomy in doing satisfaction and overall enjoyment to them. Pleasure and gratitude were other distinct components of social behaviours found in the group.

The teacher trainees were engaged in finding the carbon's mathematics number in a group. They were keen in calculating mathematics numbers. They desired to see the logic of this calculation. So, it is understood that teacher trainees were deeply thinking. It inferred their development of socially accepted behaviours like eagerness, interest, stimulation of action, excitement and empathy.

Results and Discussion

The study was carried out on knowledge sharing, interactions and building of on-task behaviours. The teacher trainees worked on a science-related case problem. They first activated their prior knowledge and afterwards discussed it with the material collaboratively. This contributed to the use of active and collaborative learning techniques, provided experiences that emphasised on thinking and problem-solving activities in the group. These were the academic challenges faced by the learners. This improved learners' classroom engagement (Umbach and Wawrzynski, 2005).

The results showed that during SGL process, the teacher trainees demonstrated cognitive behaviours. They worked collaboratively to clarify ideas and used appropriate language. Discussions with other trainees enabled them to get involved in explaining concepts. This facilitated them to work together cooperatively to accomplish shared learning goals. This helped to remove misconceptions and allowed clarification of ideas by learning from each other (Aldridge et al., 2012). This was a collaborative engagement style (Coates, 2007).

They learned how to socialise. The study revealed that a high level of interactive quality significantly affects learner's social presence as well as learner satisfaction (Oyarzun et al., 2018). The group members assisted each other through explanations and certain types of helping responses. At times, in a group, teacher trainees rendered more help to each other such as providing directions with prompts like 'that is right', 'okay', 'see the level of the picture', etc. They were approaching behaviours with others. They were proven to solicit behaviour as a part of their socially-oriented behaviours. Verbal as well as non-verbal communicative behaviours were seen among teacher trainees. The group was involved in activities that were new and more innovative. When teacher trainees were involved in SGL activities then, social and communicative values of each member were developed. Teacher trainees were more comfortable in oral communication within the group. It was such involvement in the task that encouraged teacher trainees to ask questions, provide explanations, clarify the points and participate in discussions. Group learning strategy prompted them to interact with one another and encouraged them to articulate their perspectives. Trainees were actively involved and vested in engagement (Howe, 2010). Through this engagement, teacher trainees learned to plan ways to proceed

with their work and communicated their new ideas to their mates. In effect, as Vygotsky (1986) observed that they used language as a medium to relate to each other, to facilitate others to learn, to scaffold each other's learning. So, it became their own and it developed ownership of their learning. This corresponds with a more constructivist, learner-centred approach to classroom engagement (Adams, 2006).

SGL was effective in engaging in the learning activity. The teacher trainees solved problems through sharing knowledge in collaboration. Shared experiences and feelings related to learning were helpful for almost all of the participants. Positive interactions and regulations in social interaction were meaningful for their collaborative learning process (Isohatala et al., 2019). These features enabled them to consider their artefacts from different points of view resulting in optimisation of their design of activities (Cakiroglu et al., 2017). Group engagement was ensured according to the improved performance of each member within a group. All members were capable of presenting. According to Dumont et al. (2010), teacher trainees are central to the learning process. Thus, learning requires that teachers should encourage students' active engagement. The facilitator provides autonomy, support, positive feedback, attention and more empathy for their students in a learner-centred classroom engagement (Adams, 2006). It can also be inferred from the study that the success of SGL was accountable for three components: task, group and sharing. It can be justified as:

1. the task was based on real-life problem scenario.
2. the teacher trainees worked on the task in a small group.
3. the group conversed as a whole for a time of sharing.

It was understood that posing a problem-solving task in a small group was the first component of student engagement. In 'understanding by design', it was emphasised that meaningful activities developed a deep understanding of the important ideas to be learned and promoted thoughtful engagement on the part of the group of learners. This engagement occurred during problem-solving activities concerning common problem-solving goals. It was viewed as sharing an understanding of the task (Sears and Reagain, 2013). Thus, classroom engagement was established on the identification of two domains of behaviour; socially accepted behaviours such as pleasure and gratitude like eagerness, interest and stimulation of

action, excitement, empathy, confidence, satisfaction, cooperation, and collaboration as well as cognitive behaviours like sharing for solving the problem. Classroom engagement consisting of behavioural engagement was demonstrated through participation and effort of learners in activities. Learning was enjoyable and satisfactory for them. This confirmed that positive classroom engagement increased student satisfaction (Carini et al., 2006).

Small group learning was seen effective on the ground that the problem was solved with multiple solutions. The learners gained different learning experiences creating an environment. Thus, SGL was proved as a dominant pedagogical strategy to attribute classroom engagement. According to Haug et al. (2019), classroom engagement is enhanced due to pedagogical methods and classroom environment. Learning sustained engagement in small group learning. Hence, classroom engagement is a process but not an outcome of small group learning.

Implication of the Study

The study has following implications for mathematics and science teacher education.

1. Pre-service teachers should be encouraged to practise small group learning for the active engagement of learners.
2. Teacher education programmes should provide a problem-based learning context in which pre-service teachers can practice constructivist teaching strategies in real classrooms.
3. Teacher education programmes should emphasise on the affective aspect of behaviours along with cognitive behaviours of learners for classroom engagement.
4. Heterogeneous grouping is needed to extensively investigate the effectiveness of small group learning.

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Mathematical Thinking and Teaching Practice of School Teachers at Upper Primary Level

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ABSTRACT

One of the goals of teaching mathematics is to develop mathematical thinking among students and to be able to identify, where mathematics is applicable in the real world. To inculcate mathematical thinking among students, it is necessary to involve mathematical thinking activities as a prominent part of their education. And if teachers are to encourage mathematical thinking in students, they need to engage in mathematical thinking throughout the lesson themselves. The crucial and essential part of the current scenario is knowing about teachers' thinking towards their teaching practice. The effect of teachers' mentality on improving the teaching process seems to be neglected to some extent. Considering this, existing gap, this study aims to go through teachers' minds and find out how they think. A purposive sampling technique was used to select ten mathematics teachers teaching at upper primary level in five Kendriya Vidyalayas in Patna region. Open-ended questionnaires, rating scales and classroom observations were used to collect data, and analysed quantitatively and qualitatively to reveal the findings. Data formulation and thematic organisation were done through content analysis for further interpretation, which revealed that teachers with greater mathematical thinking skills employ more underlying mathematical processes and methods in their teaching such as analysing the subject matter, designing lessons for a specific goal, and understanding students' reactions and responses.

Keywords: *Mathematical Thinking, Teaching Practice, School Education and Upper Primary Teacher*

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Introduction

What is the primary purpose of mathematics education at the elementary and secondary levels? Simply said, the mathematisation of the child's mental processes. In the words of Wheeler (1982), "knowing how to mathematise is more beneficial than knowing a lot of mathematics." Polya (1969) said that the higher goal of math is to help a child develop inner resources, clear thinking and the ability to follow assumptions to logical conclusions, systematically solve math problems with the right attitude and deal with abstraction. Every student has the right to a high-quality mathematical education, as mathematics is essential. It is a practical, exciting, and creative study area that all students can appreciate and enjoy. It helps them develop their ability to solve problems and reason logically. It makes students curious and energetic to explore, and make sense of their world. Day-by-day, educators have grown in the importance of thinking in the educational disciplines. Today's students live in a time when thinking is more critical in mathematics than the skills, we ask them to practise repeatedly.

To develop the right attitude towards mathematics among students, teachers play a crucial role. Teachers want their students to have good ways of thinking that they stick to allowing them to think quickly and easily. Teachers must adapt to enhance students' learning and motivate them (Adam, 2004). So, research (Chapman, 2017) still needs to pay attention to how teachers think and how that relates to how well they teach. In the equation for education, how teachers think is a significant factor that affects how they teach and what they do in the classroom. It helps teachers adopt a technique of making sense of what, why and how students learn. Because of this, teaching math requires understanding what teachers think about the math they teach, how they teach it and how their students learn. This requires focusing not on what teachers should do but on what they are already doing and why. To meaningfully support teachers' knowledge also requires an understanding of their thinking. Most researchers have looked at how students' thinking styles affect their academic performance in the classroom (Zhang, 2002; Sternberg, 1997) but few have looked at teachers' thinking styles at the school level from the point-of-view of an administrator. Therefore, this research is dedicated to investigate teachers' thinking styles in mathematics teaching and learning to increase their knowledge in these areas of mathematics education.

Teachers' Thinking about Mathematics Teaching-Learning

Academic conversations often talk about how much teachers know about the subjects they teach but rarely talk about how they think (Sullivan, 2003). Goe et al. (2008) said that a teacher's idea of teaching and how they do it are affected by how they think, how much experience they have, how well they know the subject matter and how they teach. From all of them, thinking is a major one that impacts teachers' teaching practice, planning, decision-making and subsequent classroom behaviour. Similarly, Fullan (1991) pointed out, "Educational change depends on what teachers do and think". It is as simple and as complex as that. "Educational reform becomes complicated because teachers' work is greatly influenced by their thoughts" (Clark and Peterson, 1986). It is seen that "there is so much reform but so little change occurs" (Payne, 2008). Many educational reforms, policies and strategies fail because they do not delve deeply into teachers' minds (Fullan, 2009). So, educational reform is only possible when teachers' ways of thinking are to be considered.

In general, thinking is a person's prior knowledge and understanding, which involves the critical and creative aspects of the mind. In our daily life thinking processes, there is much reasoning going on in our minds when an operation is performed, problem-solving, reasoning, critical thinking, creative thinking, reflective thinking, and so on. At this stage, individuals must organise their thinking systems well to get meaningful results. (Fisher, 2005; Ersoy and Basar, 2012; Gunes, 2012).

However, Messick (1976) pointed out that 'thinking' is a term used in cognitive psychology to describe the consistent individual difference in the preferred way of organising and processing information and experience. In the same way, a person's thinking style is how they prefer to deal with information and tasks (Sternberg, 1997; Zhang and Sternberg, 2005; Hunt, 2008).

Mathematics as a discipline is one of the important branches of science that requires a particular way of thinking (Maddox, 2002). It helps us learn skills we can use in real life, like thinking, making connections between events, reasoning, calculating, doing math, and so on (Umay, 2003). These skills support each other to make things meaningful. A mathematical thinking style provides different ways for individuals to present, understand, and think through the facts and connections of mathematics (Ferri, 2006). Mathematical

thinking requires physical, mental, and emotional connections to understand ourselves and the world (Hudson et al., 2015). It is said that mathematical thinking is a kind of thinking that is realised not only in cases with numbers and abstract concepts of mathematics but also in our daily life (Yesildere and Turnuklu, 2007). Different frameworks have been proposed for studying mathematical thinking. Like, Torner and Pehkonen (1999) have proposed the following perspectives:

- **Traditional Perspectives:** Mathematics is a set of skills like calculations, rules, formulas and procedures.
- **Formalist Perspectives:** Mathematics is viewed as logic that has proofs, concepts and precise language.
- **Constructivist Perspectives:** Mathematics is seen as developing thought processes by actively engaging, and building rules, regulations and formulae from real experience.

Rationale of the Study

Research on the mathematics teacher and initiatives to transform mathematics education place significant emphasis on teacher cognition, and its relationship to effective teaching. The teacher's way of thinking is crucial to the educational equation. It has a significant impact on teachers' behaviour and students' classroom experiences. It represents a teacher's approach to making meaning of what they do, why they do it and how they do it. Therefore, to comprehend mathematics education from a classroom or practice-based perspective, it is necessary to understand mathematics teachers' perspectives on the mathematics they teach, their pedagogical approaches and their students' learning. This needs a focus on what teachers are actually doing and why, as opposed to what they should be doing. Understanding how to genuinely assist teachers' learning involves understanding and comprehending their thinking patterns (Chapman, 2017). Mathematical thinking is not just reasoning about the subject matter of mathematics but a style of thinking about particular operations, processes and dynamic ideas (Burton, 1984). Different aspects have emerged in mathematical thinking and teaching practice. Argyle (2012) emphasised that sense-making is the active process of mathematical thinking. It is a constant, cyclical way of thinking in which a person tries to make sense of a massive amount of sensory information. On the other hand, Mordan and Pourasadollah (2014) pointed out that teachers' teaching

methods and personal experiences are more important than what they have learned in school. National Curriculum Framework (NCF, 2005) emphasised that schools should focus on the constructivist approach and learner-centred pedagogy to improve mathematical thinking. However, Khalid (2006) emphasised that more effort is needed to train the teacher to be aware of the importance of mathematical thinking to make it a success and an available avenue to implement lesson study for teachers nationwide. On the other hand, most of the research has focused on teachers' abilities and knowledge (Buehl and Fives, 2009); the role of teachers in the classroom (Wan et al., 2011); the areas of evaluation (He et al., 2012); and the role of technology in the classroom (Hermans et al., 2008). However, teachers' thinking and teaching practices seem to be somewhat neglected. This gap in educational planning needs more research so that the results can be used to pave the way for more efficient decision-making and planning. The researcher tried to analyse teachers' thinking and teaching practices from different aspects, and the study's results paved the way for quality teaching practise.

Objectives of the Study

The study aimed to examine upper primary school mathematics teachers' mathematical thinking and teaching practices. Hence, the objectives of the study were:

1. To study mathematics teachers' mathematical thinking and teaching practices in the classroom context.
2. To study the mathematics teaching approaches used by teachers to elicit mathematical thinking among students in the classroom context.
3. To study the assessment and evaluation strategies used by teachers to evaluate the students' responses.

Research Questions

1. What is the mathematics teachers' thinking about the way mathematics should be taught?
2. How the teaching approaches used by teachers to teach mathematics in the classroom elicit mathematical thinking among students?
3. Which different evaluation strategies do teachers employ to evaluate students' responses?

Research Methodology

Method

The descriptive survey method was adapted to investigate the mathematical thinking of school teachers about the teaching-learning practice of mathematics. First, an open-ended questionnaire was administered on different mathematics dimensions to elicit teachers' mathematical thinking. A rating scale was used to get the participants' thoughts on teaching practice. It was based on different dimensions of mathematics. Furthermore, the classroom teaching processes were observed to reveal the teachers' mathematics teaching practices.

Population and Sample

The mathematics teachers of upper primary level teaching in Kendriya Vidyalaya in Patna Region, India, constituted the population of the study. Researchers used purposive sampling technique as the data had to be collected within a stipulated time period as well as to know certain in-depth characteristics from a particular subset of population of the study. Ten mathematics teachers teaching at the upper primary level were selected from five Kendriya Vidyalayas in Patna region for the study.

Instrument

A Mathematical Thinking Scale (MTS) for teachers was developed. The scale is divided into sections A, B and C. In section A, participants were asked for demographic information. In section B, open-ended questions and a questionnaire based on a four-point rating scale were developed on the dimensions of mathematics: the nature of mathematics, the teaching of mathematics, learning of mathematics, mathematics assessment and evaluation from participants. Finally, in section C, the Classroom Observation Schedule (COS) was used to observe the actual mathematics teaching-learning process. In the process of the tool construction, open-ended questions (8 out of 12) and (24 out of 35 items) for Likert's scale were finalised for try-out after getting feedback from the experts.

Reliability of the Tool

The reliability of the tool was calculated through Cronbach's alpha (Coefficient alpha) and along with their dimensions which are mentioned in Table 1.

Table 1 Cronbach's Alpha for Dimensions of Mathematical Thinking Scale (MTS) and its Dimensions

Dimensions of Mathematical Thinking Scale (MTS)	Cronbach's Alpha Coefficient	Qualitative Descriptor
Nature of Mathematics	0.708	Acceptable
Teaching of Mathematics	0.790	Acceptable
Learning of mathematics	0.753	Acceptable
Mathematics Assessment and Evaluation	0.862	Acceptable
Mathematical Thinking Scale	0.912	Great

Reliability coefficient based on internal consistency of the entire scale was found 0.912, indicating the scale is highly reliable in nature.

Validity of the Tool

The opinions of experts determined the content validity of the scale. Four experts from the Regional Institute of Education (NCERT), Bhubaneswar: one each from the mathematics discipline, linguistic discipline, from psychology and education. Following expert comments and feedback, minor modifications were made to the scale. As a result, eight open-ended and 24 items for the rating scale were determined to be suitable for the final tool.

Data Collection Procedure

First, permission letter for the concerned authorities of the schools was taken from the Regional Institute of Education (NCERT), Bhubaneswar for the permission to collect data from the teachers and observe the classrooms. Then, permission from the concerned school authorities was taken to collect data from the participants. Participants were informed about the purpose of the study before administering the tool. After developing rapport with the participants, all essential instructions were stated clearly in the tool. After data collection, the scoring process was completed.

Findings of the Study

Response of the participants to the open-ended questions

Teachers responded to and interpreted the questions in several ways. Some teachers interpret the questions in terms of their

primary mathematics learning in the classroom, and some in the purpose of mathematics for them in everyday life 'here and now'. Some interpreted in terms of their long-term goals. The following themes emerged from the participants' responses to the open-ended questions which are mentioned in Table 2.

Table 2 Theme-wise description and examples from the open-ended responses of the participants

Themes	Description of themes	Examples
Everyday Life Here and Now	The usefulness of mathematics for everyday life is to work with daily life.	Figuring the total amount of money needed for work; accurately measuring lengths, widths and angles, and estimating project costs, etc.
Problem-solving	It helps to solve problems that arise in daily life, in mathematics and other contexts.	Gathering, organising, interpreting and communicating information to solve problems.
Thinking	Mathematics is all about thinking or using the brain.	When a mother prepares food, they never calculate the amount of sugar or salts but thinks of it.
Learning	Mathematics is a process of determining logical methods.	Once the children learn or observe the way of doing the activities, they follow the same procedure and repeat it regularly.
Process Skill	Mathematics helps in making better connections between mathematical problems and concepts.	In the mall, we frequently see flat 50% off, buy one get one free and so on. So we estimate the quality and quantity, weight and price per unit, discount calculations and finally, buy it.

Table 2 shows that teachers give priority to the utility of mathematics and consider mathematics as a tool to address societal issues. It works as a background in every activity and helps solve real-life problems.

Table 3 Frequency and Percentage of Mathematics Teachers' Thinking and Practices on the Nature of Mathematics.

Perspectives	Description	Strongly Agree	Agree	Disagree	Strongly Disagree
Traditional	Mathematics is mainly a fixed body of knowledge, facts and procedures.	3(30%)	5(50%)	2(20%)	0(0%)
	Mathematics help me to understand concepts, principles and strategies.	5(50%)	4(40%)	1(1%)	0(0%)

Constructivist	Mathematics is all about problem solving and logical thinking.	4(40%)	3(30%)	3(30%)	0(0%)
	Mathematics is used in the real world.	8(80%)	2(20%)	0(0%)	0(0%)
Mix of traditional and constructivist	Mathematics is related to the physical world and involves thinking.	5(50%)	3(30%)	2(20%)	0(0%)
	Mathematics is partially a fixed body of knowledge, rules and procedures.	6(60%)	3(30%)	1(10%)	0(0%)

Mathematics teachers' ideas regarding the nature of mathematics were taken through a Likert scale questionnaire that asked them to respond with 'strongly agree', 'agree', 'disagree' or 'strongly disagree'. Table 3 shows the responses of the participants. In view of the traditional way of teaching, the majority (80 per cent to 90 per cent) of the teachers think that mathematics is a discipline with fixed knowledge of facts and procedures, and that it helps us understand different concepts, principles and strategies, respectively. According to the constructivist way of teaching, 70 per cent to 90 per cent of teachers thought that math is used in everyday life to solve problems by using different ways of thinking logically. Similarly, in the context of both views of teaching, most teachers (80 per cent to 90 per cent) use both modes of teaching in the physical world with rules and regulations. As supported by Cross (2009) and Thompson (1984), most teachers do not have one fixed framework for teaching. Instead, they have a mixture of constructivist and traditional views (Askew et al., 1997).

Thinking about Teaching of Mathematics

In this subscale, different teaching strategies, types and ranges of teaching actions, classroom activities and resources used in their teaching practice were explored with a rating scale, which asked them to respond with 'strongly agree', 'agree', 'disagree' or 'strongly disagree' to the statements.

Table 4 summarises their responses and shows that 80 per cent to 90 per cent of the teachers agreed that mathematics textbook is necessary for teaching and that ideas need to be explained in-depth before students are given mathematics problems. Similarly, the majority of the teachers (70 per cent to 90 per cent) agreed that

a variety of materials to be used during the teaching-learning process to facilitate students' understanding so that they can link new knowledge with real-life experience by exploring mathematical ideas. This thinking is consistent with the higher aim of mathematics envisaged by the NCF-2005. However, most of the people who answered (90 per cent) agreed that an activity-based learning environment should be set up to get students to look into problems and find solutions on their own.

Table 4 Frequency and Percentage of Mathematics Teachers' Thinking and Practices on the Teaching of Mathematics

Perspectives	Description	Strongly Agree	Agree	Disagree	Strongly Disagree
Traditional	A teacher should explain the mathematical rules and procedures before giving them mathematical problems.	6(60%)	3(30%)	1(10%)	0(0%)
	A teacher should follow students' textbooks in giving instructions and make sure students receive this knowledge.	5(50%)	3(30%)	2(20%)	0(0%)
Constructivist	A teacher should help students link their new knowledge to their real-life experiences.	5(50%)	2(20%)	3(30%)	0(0%)
	A teacher should use a variety of materials to help students understand and give them things they can play with to learn more about math concepts.	6(60%)	3(30%)	1(10%)	0(0%)
Mix of traditional and constructivist	A teacher should provide activities that encourage students to engage actively.	7(70%)	2(20%)	1(10%)	0(0%)
	A teacher should provide students with problematic situations to investigate and find solutions.	6(60%)	3(30%)	1(10%)	0(0%)

Mathematics teachers' views about mathematics learning, which include behaviour, learning activities as well as mental activities, were explored using a rating scale which asked them to respond with 'strongly agree', 'agree', 'disagree' or 'strongly disagree' with the statements are depicted in Table 5.

Table 5 Frequency and Percentage of Mathematics Teachers' Thinking and Practices on the Learning of Mathematics

Perspectives	Description	Strongly Agree	Agree	Disagree	Strongly Disagree
Traditional	Students learn from teachers' explanation with demonstration.	5(50%)	2(20%)	3(40%)	0(0%)
	Learning is enhanced when students explain and demonstrate their solutions to others.	7(70%)	3(30%)	0 (0%)	0(0%)
Constructivist	Students' learn by actively engaging in learning activities and doing real-life related activities.	6(60%)	2(20%)	2(20%)	0(0%)
	Doing repetitive practice for mastery of skills is important.	3(30%)	2(20%)	5(50%)	0(0%)
Mix of traditional and constructivist	Listening to teachers' explanations and repeating practice is essential in learning mathematics.	7(70%)	2(20%)	1(10%)	0(0%)
	Students' prior experience plays an essential role in learning.	6(60%)	3(30%)	1(10%)	0(0%)

From one point-of-view, students learn mathematics best when their teachers show them how to do it (70 per cent) and when they can show others how to do it (100 per cent). Furthermore, active participation in various activities accelerates the learning process (80 per cent) and repetitive practices aid in skill mastery.

However, most teachers (90 per cent) believed that students' prior experiences play an essential role in understanding the teacher's explanation and mastery of skills.

Mathematics Assessment and Evaluation

In this subscale, different assessment and evaluation strategies were explored with the help of a classroom observation schedule and rating scale, which asked them to respond with 'strongly agree', 'agree', 'disagree' or 'strongly disagree' with the statements.

Table 6 Frequency and Percentage of Mathematics Teachers' Thinking and Practices on Mathematics Assessment and Evaluation

Perspectives	Description	Strongly Agree	Agree	Disagree	Strongly Disagree
Traditional	Written examinations	8(80%)	1(10%)	1(10%)	0(0%)
	Verbal questions	1(10%)	1(10%)	8(80%)	0(0%)
Constructivist	Assignment	5(50%)	3(30%)	2(20%)	0(0%)
	Problem-solving session	1(10%)	2(20%)	7(70%)	0(0%)
Mix of traditional and constructivist	When students make errors, the best remedy is to make them repeatedly practice these types of problems.	6(60%)	2(20%)	2(20%)	0(0%)
	Mathematics assessments make the goals for learning objectives for students.	7(70%)	2(20%)	1(10%)	0(0%)

Table 6 shows an analysis of teachers' answers about how they test and grade math students with different themes to a different degree. However, respondents give more priority (90 per cent) to written examinations than verbal questioning to assess students' understanding levels. Similarly, assignments are given more credit (80 per cent) than coordinating problem-solving sessions (30 per cent). In another context, most teachers (80 per cent) agreed that repeating similar types of problems is the best way to eliminate errors.

Theme-wise description of teachers' responses during the classroom observation

Based on the classroom observation certain useful techniques used by teachers are identified. They are briefly described under broad themes as given below.

Buying Time

When something remains unclear to students during explaining, teachers pause, smile, repeat the statement and ask the students, 'What does anyone else think about that?' Teachers use this technique to get additional information about students' thinking and responses to help them move the class forward.

Understand Their Process

During the class, the teacher sometimes asks the students to come to the blackboard to solve problems. When students solve the problem step-by-step, they understand how to get the correct answer and why they perform specific steps to get the answer. The students understand both how to solve a problem and why they perform specific steps in the process of solving a problem.

Catch Their Mistakes

Teachers formulate formative questions and ask the students to explain them. While explaining the answer, students catch the mistakes they made by judging the teacher's facial expression and response. This allows students to explain the mistake and why it was wrong. Students learn the most when they catch their mistakes and avoid repeating them in future problems.

Generalise the Steps for the Next Problem

A significant component of math is recognising patterns. The teacher left out three to four steps, while explaining the problems on the board and asked the students to think. Students try to find patterns and use them to solve problems that are similar but more complicated.

Engage Every Student

Teachers give problems on the board and ask them to solve them in their notebooks. They then move bench-by-bench to see the students' responses. By doing this, they try to engage all the students in the pace of learning.

It was also noticed that teachers try to figure out how much the students already know. They try to set learning goals that can be reached, choose teaching methods based on students' cognitive levels, plan and organise teaching activities from students' points-of-view, and change their teaching based on how well the students are learning. Hence, all of these activities should work complementarily to promote thoughtful and intentional planning for subsequent lessons.

Analysis and Discussion

Mathematics teachers' thinking about the way mathematics is to be taught

- Most mathematics teachers think that students should be encouraged to explore, investigate and create their knowledge through various activities.
- During classroom activities, teachers try to get information about students, like how they learn and interact, what they appear to know and what interests them.
- Teachers think that students should be given equal opportunities to think and work quietly by themselves.
- They think students should be given full opportunities to work independently and collaboratively to make sense of ideas.

Classroom practices in teaching and learning mathematics

- Teachers think students should be given opportunities to struggle with ideas to develop and use mathematical processes for example, justification, abstraction and generalisation.
- The teaching strategies included verbal explanation interspersed with question-answer sessions in the classroom. Occasionally, teachers explain, demonstrate the activities and organise students in small groups to solve the problems.
- They think students need to connect with their existing mathematical knowledge and understanding to make sense of a new concept or skill. Students grasp the connectivity of diverse mathematical ideas, and the linkages between mathematics and the real world by completing tasks. When students have the opportunity to use mathematics in real-life situations, they learn about its importance and contribution to other fields of knowledge.

- Some teachers' views are authoritative as they think mathematics classrooms should be initiated as per the teachers' instructions. However, most of them contradict and give more importance to students' freedom in school.

Mathematics teachers' knowledge to facilitate students' learning in the classroom

- They think interacting with students, encouraging discussion and cooperative learning can help in improving students' creativity.
- Most of the teachers' reflected that paying attention to individual students and understanding prior knowledge or misconceptions help to maximise students' learning potential.
- Most mathematics teachers think mathematics is best learned through exploring and investigating mathematical ideas.

Teachers Questioning

We paid close attention to the teachers' follow-up questions meant to expand on the students' initial responses. Frequently, these questions were designed to get students to explain things more clearly to figure out why they made mistakes, to get more information on how to solve problems or to draw attention to key mathematical ideas. Four types of teacher questioning techniques were identified and examined as a result of our iterative research process; general questions, particular questions, probing sequences of specific questions and leading questions. There was no connection between general enquiries and anything a student explicitly mentioned. Specific enquiries focused on a particular aspect of a student's explanation. Probing sequences of specific questions contained numerous instructor enquiries and multiple students' replies. They were composed of more than two related enquiries regarding a particular statement made by a student. The teacher allowed students to react, while directing them toward specific explanations or replies through leading questions. Other approaches that teachers employed to make student thinking apparent included:

- Re-voicing or repeating student answers or explanations.
- Outlining strategies they felt students used to solve specific problems.
- Emphasising mathematical principles in students' explanations.

Conclusion

The present study emphasised teachers' mathematical thinking and teaching practices in the classroom context. How teachers set up classroom instruction depends on their knowledge, thinking skills, experience, and understanding of mathematics teaching and learning. They need thinking skills that help them to recognise and then act upon the teaching opportunities that come up without warning. Even though teachers make decisions based on what students think in class, Clarkson and Presmeg (2008) say that teachers should also learn how students think outside of class. Teachers with better mathematical thinking skills analyse the subject matter, plan lessons with a specific goal and figure out what the students are trying to say by their answers. This view is also supported by Stacey (2006), who concluded that mathematical thinking is essential in every step in organising effective lesson plans for a better teaching-learning process. Mathematical concepts are seen as static, fixed, either discovered or waiting to be discovered and socially constructed phenomena (Ernest, 1989; Amirali and Halai, 2010).

Learning mathematics is a solitary process that involves goals, plans, ideas and mental pictures of different ways to teach (Ernest, 1989). In planning classroom experiences, a mathematics teacher must balance these ideas as mathematics is seen both as a social phenomenon and a solitary process. Therefore, from the beginning of teacher training, teacher education programmes must provide opportunities for aspiring teachers to reflect on their mathematical thinking and teaching practices. This may be the solution to reducing the discrepancy between thinking and practices, and enhancing teaching practice.

Educational Implications

The study has significant educational implications for school education. It will raise the educational standard of mathematics teaching by enlightening the teaching process and making an effort to improve teaching practice. The result can pave the way for better education planning, course materials, curriculum changes and teaching practices.

Limitations

The research study had some methodological limitations. First, it is difficult to generalise the study results due to the small sample size. Second, the study includes qualitative and quantitative responses, which the researcher could not link due to an anonymous response.

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Effectiveness of ICT Teaching Approach in Education Sector

R. ARULMURUGAN*

ABSTRACT

The proposed article is to describe the various innovative approaches to the teaching-learning process using the Information Communication Technology (ICT) tool. The problems of the conventional teaching approach are identification of the students' learning level, improvement of critical thinking and interpersonal skills. The prime objective of this article is to establish how it can be overcome by ICT tools-based learning approach. This article describes various innovative ICT approach methods used to enhance the students' learning outcome, assessing level of students' thinking, etc. The article describes the poll-based learning approach, automatic grade generated approach, mind-map approach, online quiz approach, virtual laboratory approach and brainstorm approach. This approach is used not only to identify students' level but also to generate the student's grade sheet, individual communication and maintain the assessment documents in a friendly manner.

Keywords: *Poll-based-learning Activity, Automatic Grade Sheet Generation, Result Analysis, Mind-map Activity*

Introduction

Information Communication Technology plays a vital role in engaging the students in learning mode continuously and interestingly (Ryan Legg et al. 2005). Information Communication Technology (ICT) helps to make students interested in recent day's online and offline classes (Bennett et al. 2017). Recent day's technology tools offer various teaching-learning approaches (Na J. Choi and

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Harrison D. 2017). These tool-based-learning approaches attract the students to come to regular classes (Kleinsmann et al. 2017). Nowadays, lot of the ICT-based tools are offered in the online platform such as online classroom, online quiz interaction session, virtual practical sessions, brainstorm activity, poll activity, etc., in this article, detailed discussion on ‘poll-based-learning activity’ followed by ‘automatic grade sheet generation and result analysis’ and ‘online mind-map activity’. This type of activity helps to recap the studied concept before six months of period (Kees Dorst and Isabelle Reymen, 2004). The poll-based learning and automatic result analysis activity are also most similar to the quiz oriented activity but is organised in different styles. The last one of the mind-map activity concepts uses to recap the content fast and understand the new concept in simplest manner (L. Thangmawia et al. 2022). In the next methodology session, detailed procedure and usefulness of these activities were described.

Information Communication Technology (ICT)-based learning tools are very helpful in educational programmes. Recent days’ lot of ICT-based tools offer to enhance students’ critical thinking level. The ICT tools are used to interact with the students through an online platform instead of conventional chalk and board, question and answer oral sessions. The same question and answer are conducted attractively in online platforms. In addition, it helps to generate the assessment at the end of each activity (Arnab Pan, 2022). These tools are used to monitor the students’ performance time-to-time as well as the level of understanding topic wise or chapter wise. Virtual online classrooms in recent days are more famous due to COVID-19. A lot of free virtual classroom tools have been offered in recent days such as Google meet, zoom, webex, GoTo team, Microsoft team, etc. These online classroom tools are used to engage the class for weak students remotely after completing regular academics, conduct the mentee meeting and counselling activity, etc. Virtual laboratory online platform uses to conduct the practical course in the simplest manner. In recent days, IIT’s developed more virtual laboratory-based courses, these courses show the video demonstration in the simplest manner. ICT tools play brainstorm activity. In addition, ICT tools generate the student’s assessment. It will create a nice presentation result, with respect to various parameters of questions, student’s depth, etc.

Methodology

This article explains numerous ICT-based learning approaches for enhancing students' creative thinking level. The approach such as poll-based learning activity, helps to find the students' learning outcome of the session, for example, at the end of the class, conduct five to ten questions through poll quiz method. Each end of the question easily finds the number of students answered correctly and number of students answered wrong, based on that easily estimated students' learning level. If necessary, revise the topic again to the students. The second innovative tool was automatic grade sheet generation and communication. This approach helps to generate the students' learning level plot automatically and it's a good approach to share the results to each student individually through mail. This mail shows what the correct answer is and what answer you responded, etc. The third innovative approach was mind-map activity, the mind-map helps to recap the concept after long days. In addition, the mind-map activity helps to interconnect the blocks. The fourth innovative method was ICT-based quiz activity. These quiz activities also generate the students' learning outcome plot at the end of the activity game. This quiz game helps to see the students' learning outcome, for example, how many students answer correctly and how many students are wrong on one particular question, etc. This helps to teach the concept again.

Poll-based Learning Activity

This section details a description of poll-based learning activity. The poll-based method is one of the simplest as well as interesting learning activities. These activities were conducted on Moodle platform. The following steps involved to perform the poll-based learning activity:

- Step 1: Instruct the students to join on an online Moodle platform.
- Step 2: The Moodle Bigblue online class interactive session has a 'White board' Screen method. In this screen type the question and related answer choices typed by teacher as shown in Figure 1.
- Step 3: There are options to conduct a poll. Instruct the student to answer the poll with option A to D.
- Step 4: Once completed the prescribed time, stop the poll to declare the student overall poll answer as shown in Figure 1.
- Step 5: Teacher start to discuss the answer of the question as shown in Figure 2. Declare the final result by tick mark on the polls as shown in Figure 3.

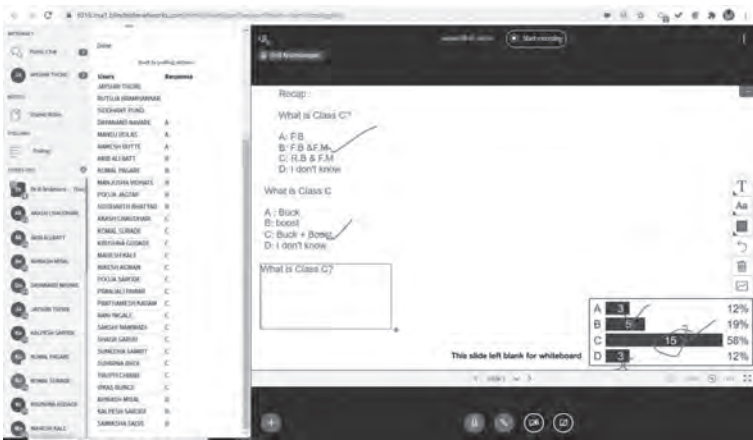


Figure 1: Organise the poll based learning activity



Figure 2: Declare the poll results and explain the concept



Figure 3: Discuss the correct answer and reason behind

Through, the activity not only engage the students in the classroom and also make them understand what is correct but why it is correct, where students are strong and weak, etc.

Automatic grade sheet communicating individually

Automatic grade sheet and result analysis generation. In recent days, the teaching faculty is facing a lot of clerical work due to a lot of accreditation bodies involved as well as outcome-based education expected assessment of each and every activity. These assessments are very much important to know the students' level of understanding but faculty face a lot of struggle to generate each and every result analysis of the clerical work. While preparing the 60+ students result analysis and grading sheet, there is possibility of error and mental work, on the other side, a lot of time is spent to prepare the format, etc., even the support of Microsoft Excel sheet facility and alignment of sheet, and generation of grade everything is needed to perform fast without mistakes. The automatic grade sheet generation concept helps to declare the grade in the confidential manner, and generate the result analysis in a neat model for maintaining the file and analysis for the next plan. The steps to generate the automatic grade sheet and communicate through private mail as detailed explanation is as follows:

- Step 1: Initially, faculty needs to create the quiz using the 'Google Form' for example, Quiz <https://forms.gle/p5ZSedXdN4e8YkcW9>
- Step 2: Instruct the student to perform the quiz in the Google Form.
- Step 3: Using Flubaroo add-on tools to generate the result automatically.
- Step 4: Install the add-ons and click to process the grade method. Initially upload the teacher answer key to compare the students' answer and generate the grade sheet. Figure 4 shows the students performing the quiz and the corresponding score was displayed in column 3.
- Step 5: Send the summary of grade score individually to all the participants as shown in Figure 5.

Effectiveness of ICT Teaching ...

	A	B	C	D	E	F	G	H	I
	Time-stamp	Email Address	Score	Name (optional)	Year	Ref No	PPR No	S/No LMS	Date of submission
3	10/19/2020 11:40:50	ashishmare73@gmail.c	28	28 Add Simare	TE	16	71003350	18	10/19/
4	10/19/2020 11:19:57	ruq111Zuhina@gmail.c	24	24 Truati Online	TE	28	71003408	27	10/19/
5	10/19/2020 11:20:21	sachindhru4@gmail.c	25	25	TE	28	71002749	28	10/19/
6	10/19/2020 11:16:00	pubhansingh14@gmail.c	20	20 Shubam B Dabam	TE	31	71003466	33	10/19/
7	10/19/2020 11:32:07	galivedar2001@gmail.c	12	12 Anshay Galivedar	TE	32	71003468	34	10/19/
8	10/19/2020 11:31:12	kalyanikaew2204@gmail.c	24	24 Oankud Kalyan Srinay	TE	33	71003456	35	10/19/
9	10/19/2020 11:34:27	sumitnigudese121@gmail.c	22	22 Gudey Sruvaha Namhar	TE	36	71002500	40	10/19/
10	10/19/2020 11:28:52	ranwalmingra0205@gmail.c	24	24	TE	36	71003017	41	10/19/
11	10/19/2020 11:03:21	jadavpranman75@gmail.c	26	26 Jadam Prathmesh Hari	TE	41	71002847	43	10/19/
12	10/19/2020 11:20:56	aprahkhye02@gmail.c	10	10 Vahar	TE	46	71003571	55	10/19/
13	10/19/2020 12:23:06	halwadassankh@gmail.c	24	24 Sakari Bhaskar Nairwad	TE	51	71003000	63	10/19/
14	10/19/2020 11:26:00	sumetha.kamr17@gmail.c	38	38 Sumit Kumetha Banjary	TE	61	71003302	68	10/19/
15	10/19/2020 11:28:15	aa620099@gmail.c	20	20 Shaikh Aaf Rashid	TE	88	71003770	72	10/19/
16	10/19/2020 11:35:04	ayshishore@gmail.c	20	20 Thoru Jyothi Bhargava	TE	88	71003220	76	10/19/
17	10/19/2020 11:38:32	mgayadivasa2000@gmail.c	19	19 Vijaya Maryasha prava	TE	70	71003842	71	10/19/
18	10/19/2020 18:21:34	anulast@gmail.c	38	38 RA	TE	000	00	00	10/19/

Figure 4: Score list of participants

Record of grades emailed for: MLJ

Flubaroo Grader - flubaroo_email@gmail.com

Below is a summary of the grades you just shared:

Assignment Name	MLJ
Number of Grades Shared	15
Number of Graded Submissions	15
Average Score (points)	12.22
Points Possible	24
Answer Key Provided?	Yes

You also included this message:

Nice attempt.. watch the video again & Refer the PPTs and participate the quiz again, even though i have attached the answer key too..

Figure 5: Grade details sent privately to each participant

Through this activity, result was generated automatically and shared students score in terms of number of grades shared, number graded submissions, average score, points possible and sharing the answer key, etc. Through the activity, students come to their level of performance and learn their mistakes with the help of the answer key.

Online Mind-map Activity

Online mind-map activity is one of the most interesting and important activities. This activity is used to recap the complete concept in a short interval of time. The pictorial way of representing this activity made it stronger for understanding the concept without support of any other documents. In recent days, a lot of ICT tools offer to perform the mind-map activity. This session on miro.com performed a mind-map activity sheet shown in Figure 6. The procedure to perform the activity as given below:

- Step 1: Teacher completes the chapter.
- Step 2: It will perform the activity individually and group. Instruct to do map on paper within the group followed by perform on step 3.
- Step 3: Once the paper is complete, ask to perform the same activity in miro.com.

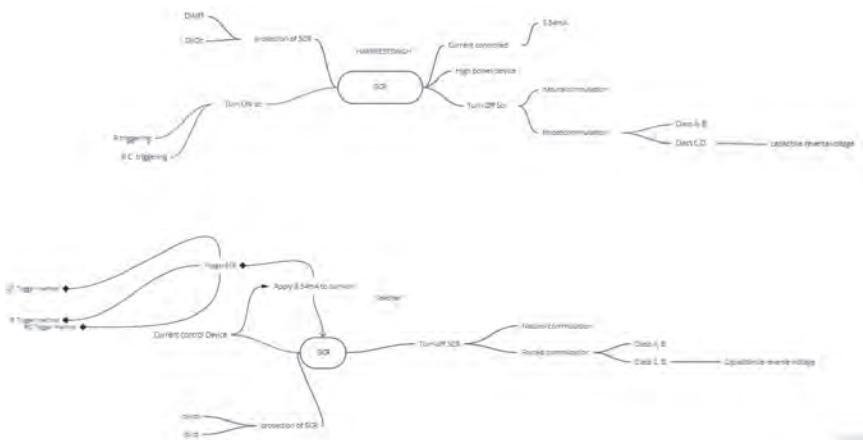


Figure 6: Online mind-map activity

Figure 6 shows the SCR topic activity after completing the chapter of power semi-conductor devices. Through the activity, students learn the power of understanding, remembering and applying to start to work fast, and link the pre-requisite and post-requisite of the topic. At the end of the activity, students go through their classmate's performance stage-by-stage to enhance their thinking level.

Online Quiz Interaction Session Using ICT Tool

The online quiz interactive session using Information Communication Technology tools is one of the prime tools to engage the students more actively in the classroom as well as motivate the students in terms of first, second and third prize. It is used to extract the assessment more easily. Through this activity, monitor the students' performance in terms of active involvement, those who are not in the active involvement as a teacher, instruct to participate in the activity. In this activity, play a music in back side, it is used to feel comfortable zone, while performing the activity by students. The procedure for performing the activity is, as follows:

- Step 1: Complete the particular portion before performing the activity.
- Step 2: Instruct the students early to prepare and practice the content of completions.
- Step 3: Prepare the quiz questions and answer, etc. This quiz performs automatically shuffle the questions and answer. So, I need not to worry about the malpractice issues.
- Step 4: Perform the activity in class. As a teacher, I opened the 'Quizizz.com' website. There is an option to generate the live quiz when the teacher presses the button to generate the 'Code' for joining the quiz.
- Step 5: Teacher instructs the students to join the quiz using code. Once all the students join the quiz, it may take two minutes and the teacher starts the quiz. Once the quiz is started, others can't join the quiz after that. Before joining the quiz, they are instructed to join with their roll number followed by name, so it is helpful to identify the student name and roll number in the easiest manner.
- Step 6: Students perform the quiz individually with the help of their smartphones.
- Step 7: Once the planned time has lapsed, the teacher needs to stop the quiz by pressing at the right side of the window to see the results.

Figure 7 shows the appearance of each question in the game. It is easy to select the answer out of the options, similar to multiple choice based. Figure 8 helps to monitor the student performance by the teacher, this window helps to identify the weak students.

Teachers need to go nearest to the student, start to encourage and find out the reason for lacking the performance in the quiz. In addition, who is performing good and bad in the activity, it will clearly show to the teacher and it will show the number of questions participated out of the total questions with respect to time, etc., it will show very clearly. This window helps the teacher to motivate and form a group for the next activity.



Figure 7: Appears of each question in student portal



Figure 8: Performance chart of live quiz

Once the decided time is over, click the end of the quiz at the top-right corner to stop the activity. It will show the rank of the first three students as shown in Figure 9. Appreciate the top-three scored students and motivate the next ranks students to come on end of this activity.

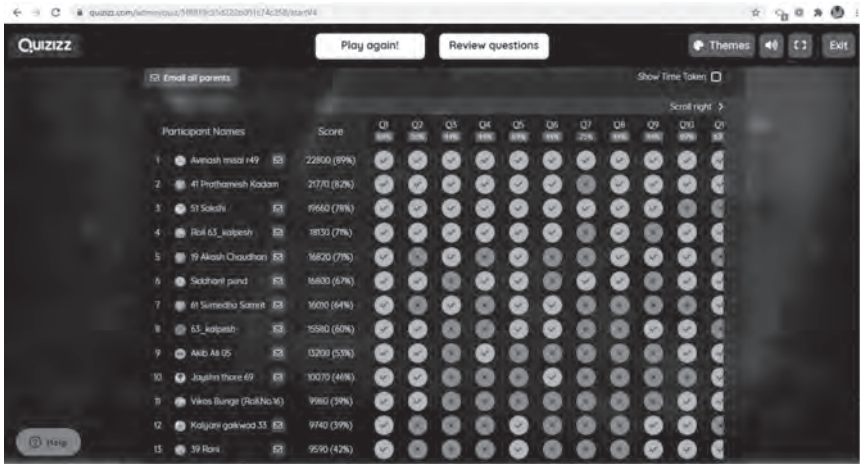


Figure 11: Performance of student's assessment

Figure 10 and Figure 11 shows the individual students' performance and individual question performance. It helps to enhance the student's level.

Research Recommendation

This article discussed the details, methods and procedures of various innovative ICT-based activities such as poll-based learning activity, which uses to evaluate the students depth of knowledge on the session. The Bigblue—white board uses to conduct these activity easily. Further, scope of this activity is to form the group members to conduct debate. The second one is automatic grad sheet communication. This activity helps to re-learn the mistakes. Further, scope of this activity is to give oral inputs to the students on the next day. It helps to recap the concept to entire students of the class and evaluate the students to re-learn. The third one described the online mind-map activity. This activity helps the students to link the studied content and easily recap the concept. Further, extended into asking the students to explain within the group. The fourth activity dealt with an online quiz interaction session. These online quizzes help to evaluate students' learning outcome individually. Further, extended into ask the students to write the mistake in their note, through that, students remember and re-learn the concept.

Conclusion

The proposed approach helps to solve the exciting conventional teaching approach problems of identification of students' learning level, students' thinking level, accessing student's grade, etc. Various innovative ICT-based learning approaches such as poll-based learning, automatic grad-sheet generation, mind-map approach, online quiz, virtual laboratory approach and brainstorm approach are discussed. These approaches reveal the learners' understanding level. The various ICT tools deliver complicated mathematical equations and concepts in the simplest manner. Moreover, the ICT tools are used to check the differences easily among various understanding levels of students. Students with different level of understanding can be assessed using ICT tools. This will help teachers to categorise the students into groups for organising group activities. These approaches are used to enhance the remembering and understanding level. Further, it improves students' level of thinking, remembering level into creative level by using a mind-map and brainstorm approach and communicating the students' performance results individually using an automatic grade system. The automatic grade system is used to extract and maintain the students' results in the easiest way. The poll-based-learning approach used to identify the whole strength, strong and weak area of the topics. Besides that, learners themselves enjoyed the ICT-based-teaching approach.

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A Comparative Study of Status of Awareness of RPwD Act 2016 for Inclusive Education in Government and Private Schools of Chandigarh, Panchkula and Mohali

SNEH BANSAL*

Introduction

The Rights of Person with Disabilities Act, 2016 supports the concept of Inclusive Education and the action plans of the education sector have prioritised educational access to children with special education needs by making compulsory the necessary arrangements. This includes the creation of a barrier free environment, adaptations in curriculum, teaching methods and evaluation procedures, engagement of specialist teachers, and ensuring the availability of specific teaching and learning material in regular schools. Further, to meet these challenges, government at Central and State levels have introduced procedures, benefits and concessions to children with disabilities.

The Act also has a provision that every child with benchmark disability between the age of six to eighteen years shall have the right to free education in a neighbourhood school or in a special school, of their choice. Chapter-III of the Act covers the educational provisions for the children with disabilities. Section 16 of the chapter enlisted the duties of the educational institutions to provide inclusive education to the children with disabilities and for the purpose of Section 16, specific measures shall be taken to promote and facilitate inclusive education with emphasis on professional training, establish adequate number of resource centres to support educational institutions at all levels of school

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education, use of appropriate augmentative and alternative mode, provide books, other learning materials and appropriate assistive devices, provide scholarships, and to make suitable modifications in the curriculum and examination system. The New Education Policy 2020, is in complete consonance with the provisions of the RPwD Act 2016 and endorses all its recommendations with regard to school education.

Therefore, it was important to examine the extent and level of awareness of school personnel about the RPwD act for inclusive education of children with disabilities in both Government and private schools. For deep insight, the study had also explored the present status along with the steps taken and challenges, and barriers faced by schools to facilitate and promote inclusive education after the passage of the act.

Objectives of the Study

The present study examined the status of awareness of act for inclusive education in Government and private schools of three different sites, i.e., Chandigarh (UT), Mohali (SAS Nagar, Punjab) and Panchkula (Haryana), which help to compare and understand the status of awareness of RPwD Act, 2016 for inclusive education in these region. The study explored the steps taken by the Government and private schools of Chandigarh, Mohali and Panchkula schools to promote inclusive education for children with disabilities after the passage of the RPwD act 2016, and the concerns and challenges of principals, teachers and special educators of government and private schools of Mohali (Punjab), Panchkula (Haryana) and Chandigarh (UT) to provide inclusive education for children with disabilities.

Method

Purposive sampling was used to select 30 inclusive schools of Chandigarh, Mohali and Panchkula in which children with special needs were available. Out of these, 10 schools (5 Government and 5 private) were from Chandigarh (UT), 10 schools (5 Government and 5 private) from Mohali district (Punjab) and 10 schools (5 Government and 5 private) from Panchkula district (Haryana) with maximum number of children with special needs. The 31 Principals or Heads and 37 special educators of the 30 selected schools (15 from private and 15 from Government) were part of the study. From the 30 selected schools, 158 teachers teaching

to the maximum number of children with special needs (88 from Government schools and 70 from private schools) were included. In the lines of the objectives of the study, appropriate tools were developed and prepared as per the extensive search in libraries, research literature and suggestions given by the experts. Quantitative and qualitative analysis of the data were undertaken. Normative survey followed by in-depth study research design was followed. Data collected through interviews, case studies and documents, were of qualitative nature. Therefore, it required enormous time and effort to go through each interview, field notes, case and documents. These were analysed by inducting content analysis method. The analysis consisted of two different phases—the first phase in which the researcher read the interviews and field notes through several times to understand the ‘big picture’, and the second phase focused on discovering responses that highlight important messages or findings using inductive content analysis in which the qualitative data were analysed. It was used to explore the similarities and differences regarding the conceptualisation of inclusive education, understanding of RPwD act, 2016, steps taken to implement inclusive education and possible challenges and barriers faced in providing learning opportunities to children with special needs in schools. Thus, the researcher took extensive field notes of the interviews, focus groups and their observations. Descriptive statistics—mean, SD and percentages were calculated to analyse the quantitative data and for qualitative analyses, data were interpreted to present in a succinct format and analysed using thematic analysis.

Findings

Awareness and Knowledge level on Inclusive Education and RPwD Act, 2016

1. The sample regions were aware about the Inclusive Education and conceptualise Inclusive Education as ‘education for all and quality education’. Majority of the participatory government schools stakeholders were not much aware about the RPwD Act, 2016.
2. The government school principals of Chandigarh were more aware and had greater knowledge (62.26 per cent) about the salient features of RPwD Act, elements of inclusive education and curriculum adaptation of children with special needs than the Principals of Mohali (Punjab) (55.28 per cent), and

- Panchkula (Haryana) 51.84 per cent. However, all the three Government school Principals of Chandigarh, Mohali (Punjab) and Panchkula (Haryana) lied in the moderate range of knowledge level.
3. General teachers of Government schools of Chandigarh (60.97 per cent) and Panchkula (57.43 per cent) had moderate level of awareness, and knowledge than the teachers of Mohali (Punjab) which was 45.52 per cent which were at inadequate level. The awareness and knowledge level of the Mohali, Punjab Government school general teachers (45.52 per cent) scored lowest than the teachers of other two regions—Panchkula (Haryana) and Chandigarh.
 4. Resource teachers of Panchkula (Haryana) (65.80 per cent) had more knowledge about the RPwD Act than the resource teachers of Chandigarh (57.65 per cent) and Mohali (Punjab) (43.58 per cent). However, resource teachers of Panchkula (Haryana) and Chandigarh had moderate level of knowledge about the RPwD Act than the Mohali (Punjab) resource teachers with inadequate level of knowledge.
 5. Majority of the participatory private schools of the selected region were aware about the inclusive education. Majority of the private school principals and special educators were aware about the RPwD Act. However, general teachers were not much aware about the act and surprisingly, most of them had not heard about the Act.
 6. The school Principals of Mohali (Punjab) (82.41 per cent) and Chandigarh (92.20 per cent) had adequate level of awareness, and knowledge on the RPwD Act to facilitate and support inclusive education for children with disabilities. School Principals of Chandigarh possessed more knowledge about the RPwD Act. However, majority of the school Principals of Panchkula (Haryana) (65.06 per cent) had moderate level of knowledge about the RPwD Act.
 7. Majority of the general teachers of the three regions—Mohali (Punjab) (54.13 per cent), Panchkula (Haryana) (51.67 per cent) and Chandigarh (65.70 per cent) had moderate level of knowledge about the RPwD Act on the salient features of the act, elements of inclusive education, and curriculum adaptation and modification in classroom.
 8. The resource teachers of all the three regions—Mohali (Punjab) (68.45 per cent), Panchkula (Haryana) (59.61 per cent) and

Chandigarh (70.87 per cent) had moderate level of knowledge level about the RPwD Act on the inclusive education and different types of disabilities. However, the resource teachers of Chandigarh had more knowledge in RPwD Act than the resource teachers of other two regions—Mohali and Panchkula.

Steps Taken by the Schools to Promote Inclusive Education After the Passage of RPwD Act, 2016

1. All the selected states and UT had made the Rights of Persons with Disabilities Rules, 2019 to direct the institutions to provide support to children with disabilities.
2. In government schools of Mohali, Punjab, around 60 per cent of the school Principals, 75 per cent of the school teachers and 100 per cent of the resource teachers attended the training programme on inclusive education. In Panchkula (Haryana), 80 per cent of the school Principals, 53 per cent of the general teachers and 100 per cent of the resource teachers attended the training programme on inclusive education. In Chandigarh, 100 per cent of the school Principals, 72 per cent of the school teachers and 100 per cent of the special educators attended the training programme on inclusive education.
3. In private schools of Mohali, Punjab, almost 100 per cent of the school Principals, 19 per cent of the school teachers and 60 per cent of the special educators attended the training programme on inclusive education. However, 30 per cent of the schools had not appointed the special educators. In Panchkula, Haryana, 80 per cent of the school Principals, 60.32 per cent of the general teachers and 60 per cent of the special educators had attended the training programme on inclusive education. 80 per cent of the schools had appointed special educators. In Chandigarh, 100 per cent of the school principals, 39.4 per cent of the general teachers and 80 per cent of the special educators attended the training programme and 80 per cent of the schools had appointed special educators, psychologists and counsellors.
4. Majority of the government schools had children with intellectual disabled. The children with learning difficulties were also been seen as special children in schools. In all the three regions, majority of the private schools had children with specific learning disabilities.

5. In all the three region, majority of the private and government school placed children with disabilities in the regular classrooms based on the IQ and learning levels. Only the children with mild level of disability are the part of general classrooms. Children with low vision, speech impairment and learning disability were taught in regular classrooms, whereas children with ID and CP were fully placed in resource room. They were segregated from the regular classrooms even for co-curricular activities. Separate activities are being conducted for these children in the schools by the resource teachers. Participation of children with special needs depend on the 'degree of severity'.
6. In Government schools of the three regions, it has been found that the schools where there are special educators, the regular teachers had a tendency to send the disabled children to the resource rooms.
7. Infrastructure facilities are better in Chandigarh schools than the Mohali (Punjab). In few schools of Mohali (Punjab), facility of resource room was not available.
8. Facilities of modified toilets and ramps in Mohali (Punjab) and Panchkula (Haryana) were not available. Non-availability of ramps and improper sanitation facilities in few schools of the regions.
9. In majority of the sample, children with benchmark disability receive allowances and benefits.
10. Majority of the participatory schools reducing the difficulty level and the content were the major adaptations done. Assigning CwSN with other work instead of focusing on learning part was noted during the interviews. Reinforcement techniques—appreciating the child, clapping, recognition or providing chocolates to encourage the CwSN were used by the teachers.
11. Reducing the difficulty level and the content were the major adaptation done. Assigning CwSN with other work instead of focusing on learning part was noted during the interviews. Reinforcement techniques—appreciating the child, clapping, recognition or providing chocolates to encourage the CwSN were used by majority of the selected sample teachers.
12. Individualised education programmes are prepared by the resource teachers. Lack of coordination and collaboration between the resource teachers and general teachers was found.

13. School walls were beautifully painted with teaching-learning materials in all the Government schools of the three region.
14. Less emphasis on screening, identification and certification process for children with special needs to avail the supports and benefits.
15. Majority of the private schools had provision of extra-curricular activities for CwSN including personality and communication development. Few schools emphasised on the vocational skills and education to all children including children with special needs. Extra attention and care, using role plays, musical instruments and group activity, which focus on learning by doing, comfortable environment, reducing the content quantity and difficulty to make them part of the regular classroom. Buddy approach in the classroom was used by most of the schools to support CwSN in various activities.
16. Majority of the participatory private schools used oral assessment along with the concession and relaxation provided by CBSE board in Classes X and XII for children with disabilities.
17. During online classes, much cooperation from the parents was reported by the teachers to teach children with special needs at home than the Government schools.
18. The Government schools of Mohali showed inadequacy in all the categories of inclusive practices—school culture and philosophy (42 per cent), family involvement (44 per cent), school management committee (40.66 per cent), school infrastructure (24 per cent), classroom physical environment (29.9 per cent) and instructional practices (48.4 per cent).
19. Panchkula (Haryana) schools were inadequate in school administration and involvement (42 per cent), family involvement (18 per cent), school management committee (29.96 per cent), school infrastructure (38 per cent), classroom and physical environment (47.13 per cent) categories, whereas in instructional practices (58.17 per cent) category, schools are in the process of developing.
20. Chandigarh Government schools are performing better in the administration and involvement (70 per cent), family involvement (52 per cent), school infrastructure (72 per cent), classroom and physical environment (54.28 per cent) and instructional practices (61.81 per cent) categories which indicate the schools were in the process of developing the inclusive practices to implement the RPwD act. In school management committee (83.33 per cent), the schools are performing well.

21. The private schools of Mohali (Punjab) had not developed the school management committee (36.66 per cent) to provide support and facilitate children with special needs. Other categories indicating inclusive practices—school philosophy and culture (68 per cent), family involvement (58.66 per cent), school infrastructure (70 per cent) and classroom physical environment (74.26 per cent) are in the developing process.
22. The private schools of Panchkula (Haryana) also revealed the similar results as of Mohali (Punjab) schools. Inadequacy of schools in school management committee (26.66 per cent) category, and in school administration and involvement (60 per cent), family involvement (76 per cent) and instructional practices (65.45 per cent), school infrastructure (54 per cent) and classroom physical environment (67.65 per cent) categories the schools were in the process of development.
23. The private schools of Chandigarh had adequate school management committee (80 per cent), positive classroom environment (85.65 per cent), stimulating pedagogical resources, and techniques (even in pandemic) under instructional practices (96.336 per cent) with cooperation and involvement of family (96 per cent). However, in school administration and involvement (74 per cent) more efforts are required.

Challenges or Barriers Perceived by the School Stakeholders

1. Lack of a disabled-friendly infrastructure such as ramps, adequate lighting and availability of wheelchairs, lack of proper sitting arrangements, lack of transportation facilities, inaccessible buildings and the provision of friendly water and sanitation facilities along with the non-availability of resource materials for children with special needs.
2. Lack of awareness and non-acceptance of parents—parental ignorance, lack of understanding and awareness of disability, no time for proper diagnosis and certification of their children, lack of transportation facilities, lack of basic means of livelihood were the few parent-related factors.
3. Shortage of special educators along with visiting one school from another of their respective block, and dealing with loads of paperwork and field work are major barriers in inclusive education for CwSN.
4. Lack of coordination and collaboration among general teachers, and special educators and resource rooms were isolated from the school considered as a separate component.

5. Inflexible curriculum, shortage of time to complete the syllabus and incapability to teach CwSN due to lack of professional training, considered as major challenges by the school teachers.
6. Non-availability of concession or provision in board exams for slow learners.
7. Inadequate vocational skills for CwSN and non-availability of teachers, and experts to teach the vocational skills or courses.

To sum up, the present study found that there were gaps in the awareness and knowledge level of the Act, and implementation of inclusive principles in the participatory schools of three regions for the education of children with disabilities. The policy cannot be implemented, if the departments do not closely coordinate with the schools. The provisions and guidelines issued to the schools for the education of children with disabilities shall be monitored effectively with due support and facilities. The results of the study showed little adaptation done by the schools, however, few schools had adopted good practices in terms of pedagogical measures to teach children with disabilities. The findings of the study can be used as a reference by the NCERT and the concerned departments, while preparing the National Curriculum Framework for school and teacher education as per the NEP, 2020.



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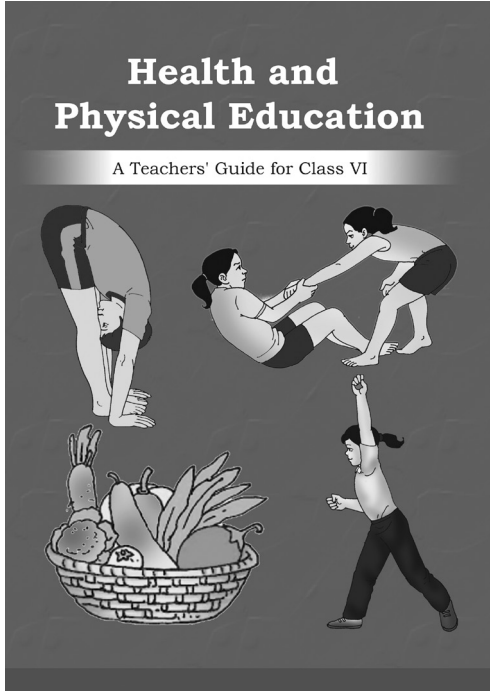
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