Research Paper

Gender Inclusion in Education in India: Challenging the Status Quo

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ABSTRACT

Amongst the multiple obstacles faced on the path to equitable education in India, one of the pertinent challenges is gender inclusion and equality. The present paper aims to highlight the socio-psychological facets of gender dynamics in order to chart out any kind of effective gender inclusive policy. In a patriarchal society, the hegemonic masculine ideology of men being more powerful and competent than women pervades throughout the social life. A classroom represents a microcosm of the society and provides a stage for the gendered scripts to unfold. Thus, it is important to question the ontological absolutism that has been ascribed to gender roles and understand how this influences the interpersonal relations during the transactional process of education. The gender roles are social constructions, which can be subject to constant deconstruction and reconstruction. It is only through the reconstruction of the gender norms that inclusion and equality can be conceptualized and internalized. Mere systemic reforms through policy refinements may provide cosmetic level changes. This paper attempts to understand the complex issue of gender inclusion in education, particularly in STEM, from a psychological perspective using Bronfrenbrenner's bio ecological model of human development (1999) and suggests focused strategies through involvement of the various stakeholders at multiple levels to achieve gender inclusion and equality in the fulfillment of Sustainable Development Goal 4, which pertains to the provision of quality education for all to create a better world.

Keywords: *Bio ecological Model, Education, Focused strategies, Gender-Inclusion, Social Construction*

Amongst the multiple obstacles faced on the path to equitable education in India, one of the pertinent challenges is gender inclusion and equality. Changes in policy and legislative frameworks have translated into outcomes that have not been able to fully address the dynamic and changing context of learning with issues of equitable and inclusive education still in question. The present study uses Bronfenbrenner's ecological model to suggest how each system and its components can help improve the status of female participation in STEM careers and alleviate the gap between genders in the field.

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The Current Scenario

Despite signing many international covenants, ratifying Education for All (EFA) goals and devising specific policies at the national and state level, the major roadblock in the country still lies in the form of gender disparity concerns in the education system. Many studies have constantly reiterated the role of gender biases, which spread throughout the life course of the girl-child including high dropout rates and low attendance for girls in early childhood as there is a wide gender-based gap in enrolment in STEM as well as other technical courses in higher education (Gragnolati et al., 2005).

In addition to this, other major problem areas which reflect gender disparities in the Indian education system include the discrepancy in enrolment ratio across all the levels, poor learning outcomes for girls in mathematics and science courses in school, skewed literacy rates, gender bias in the design of the curriculum and so on.

Quite paradoxically with all the aforementioned issues, trends of board examination results over the years have shown that girls have outperformed boys consistently at the school level. In 2023, girls recorded a pass percentage of 94.23% against the pass percentage of boys that stood at 92.23% (Raghav, 2023). However, their numbers dwindle significantly when it comes to higher education and careers in STEM highlighting a serious problem that needs urgent attention.

There is a significant gap in STEM with women making up a mere 28% of the workforce. World over, this figure stands at 24% in the USA, 17% in the European Union, 16% in Japan and 14% in India giving us ample reasons to pause and introspect.

One of the main reasons for this barrier to women's education is socio-psychological, rooted in gender stereotyping and gender segregation.

A major outcome of gender stereotyping is that women are likely to participate more in courses and programs related to domestic roles such as arts education, home science, nutrition, food technology, etc. and less in courses related to science and technology. Even though it must be noted that according to a survey by edtech platform, Avishkaar, 57% girl students are interested in pursuing STEM. (Agrawal, 2021)

Likewise, enrolment in vocational and technical fields has been gender skewed and often training tends to relate to women's domestic role rather than their productive role.

Nandita Jayaraj, science communicator and co-founder of the feminist science media project, The Life of Science, said: "In Indian STEM, the primary concern has never been with the number of women graduates, but with the proportion of those who ultimately land STEM jobs. (Agrawal, 2021).

In many cases, women internalize their roles as per societal standards. According to a literature review by Verdugo-Castro, Garcia-Holgado, & Sanchez-Gomez, 2022, it was found that gender stereotypes lead to gender gaps in general and give particular rise to stereotype threat due to which women start fearing a rejection in fields of study pertaining to STEM. This is because this sector has long been ascribed to men.

Their participation in education working on preconceived notions that they will be not be able to strike a balance between personal and professional life, assuming that work timings,

travelling, etc. in employment can cause strain at the home front, or to explicitly conform to socially prescribed gender roles.

It has also been found that after joining the STEM sector, women have found it difficult to continue working, which might lead to dropping out. A 2016-2017 NITI Aayog report, which was designed to understand the reasons for the loss of trained female scientists from scientific manpower in India noted that more scientists want age relaxation in eligibility criteria, an extension of institutional provision of non-academic infrastructure and medical help and flexibility in employment contracts allowing for choice regarding time commitment. Many females would therefore, not apply for certain positions or are likely to discontinue working due to the above reasons.

In the past few years, a lot of government initiatives have tried to address this concern. Several programs have been launched to encourage women to pursue scientific education and careers such as Indo-US fellowship for women in science, technology, engineering, mathematics and medicine to participate in international collaborative research in premier institutions in America; a variety of female-centric programs under the Knowledge Involvement in Research Advancement through Nurturing (KIRAN) initiative; a Bio-technology Career Advancement and Reorientation (Bio-Care) scheme for women and provision for 5 year relaxation for the upper age limit for women candidates for junior and senior research fellowships awarded by the Council of Scientific and Industrial Research to name a few. Further various premier institutes such as IITs have increased the percentage of supernumerary seats for women from 14% to 17% in 2019 to encourage more women enrolments. Along similar lines, Project Udaan launched by Central Board of Secondary Education (CBSE) under the guidance of Ministry of Human Resource Development (MHRD), has been designed to address the low enrolment of girl students in prestigious engineering institutions and the teaching gap between school education engineering entrance examinations.

But despite all these legislative efforts, there are still gaps in female enrolment in STEM careers. This is indicative that an exclusive focus on numbers is not going to address the underlying factors that have been sustaining gender disparity in education, particularly in STEM. The HRD Ministry released data for the All India Higher Education Survey (AIHES) for 2017-28. According to this data, 49% female students are enrolled in Bachelors of Science while for Bachelors of Technology; the figure is a dismal 29% and even lower for courses like management and law. The gender disparity becomes even more prominent in the Ph.D. enrolment; especially in Engineering and Technology courses where it is only six percent and even lower for the Science stream with three percent women opting for Ph.D. in that stream. These figures mirror the gender-based exclusion prevalent in the education scenario in our country. Hence, it is crucial to address these educational inequalities.

The figures are alarming; given women constitute almost half the population.
Thus, there is an imperative need to go beyond the numbers and try to unravel the gender dynamics that is the perpetuating force behind it in order to realize the ambition of fulfilling the sustainable development goals for a better world of prosperity and development.

Enablers of Gender Disparity in Education

Socialization and Internalization
Gender beliefs constitute the universal representations of women and men and define it by a narrow set of features. Individuals are socialized throughout their lives into these hegemonic gender beliefs as absolute realities, which act as unstated rules of interaction in public contexts. In a patriarchal society like ours, status has been attached with genders and men and women enter the mainstream society with fixed gender stereotypes in mind, which hint towards men being more competent than women. (Ridgeway and Correll, 2004).

The omnipresent gender evokes the pre-existing beliefs about stereotypes quite automatically and contributes to the biases in people's behavior and thought processes in almost every socio-relational context, education being one of the ubiquitous one.
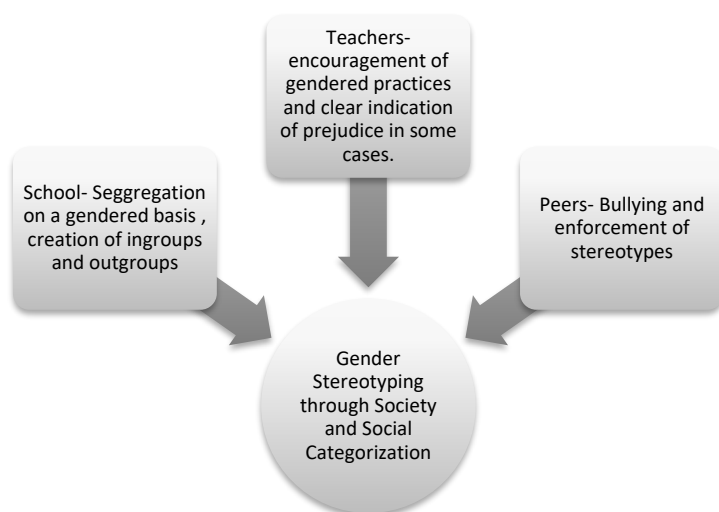

Fig 1- Gender Stereotyping

Schools provide a major context for socialization. They can either increase or decrease differences based on gender by promoting gender homogeneity and instilling confidence in students to be able to challenge incorrect belief systems wherever found. Teachers and students directly influence gender differentiation by providing gender specific learning opportunities and feedback. A study by Blakemore, Berenbaum and Liben (2009) presents curricular materials that contain gender stereotypic Behavior, and peers too exhibit gender stereotypic attitudes and behavior due to which students often internalize gender stereotypes and prejudices, which in Turn guide their own preferences and behaviors.

It has been noticed that many teachers themselves encourage and promote gender stereotypes and are prejudiced towards one gender over the other. They might hint towards males being more capable of performing in STEM related subjects than girls. These beliefs shape the classroom discourse as they unintentionally end up serving as a role model for gender stereotyped behavior- e.g. not many sports teachers are female, not many art and craft teachers are male etc.). Also, teachers often communicate their differential expectations implicitly or explicitly (eg. expecting girls to participate in, 'girly events' such as "fancy dress competitions"; and boys in more 'macho events' such as sports competition).

Social Categorization
There is another primary source through which the gender stereotypes are,
Strengthened in the most innocuous manner. i.e. by engaging in social categorization on the basis of gender. Social categorization refers to the process through which people tend to classify themselves and others into differentiated groups. When these categories become salient, they can give rise to problematic biases and accentuate stereotypical perceptions of different categories. Gender stereotypes thus can be reinforced through various pathways.
While all aspects of the society play an important role, school- teachers and peers have a pivotal role in carving students' outlook and attitudes towards gender equality.

Teachers
In a study by Bigler and Liben (2006), teachers were asked to use gender to explicitly label children in their classroom exchanges and to organize classroom activities, e.g., they asked children to form lines according to their gender. Other teachers were asked to downplay students' genders while interacting with them. It was found that young children whose teachers used gendered labels showed high levels of stereotyping than the other students. Another study revealed that labels used by preschool teachers' increases their pupils' gender stereotyping and leads to an avoidance of them choosing cross-gendered playmates. (Hilliard and Liben, 2010).

Peers
Like teachers, peers too contribute significantly to the socialization of gender difference often by modeling traditional gender behavior. In addition, gender segregation occurs in classrooms, in playgrounds, in school buses as children gradually tend to select same sex seat partners, same sex play mates and so on.

A study by Martin and Fabes (2001) concluded that playing with same-sex peers led to stronger gender-based stereotypes in children. Peers and friends also have an important role in gendering attitudes (e.g., "Boys don't cry") and any form of disconfirmation is met by disapproval and ostracism.

Implicit gender stereotypes inadvertently become activated in various exchanges both inside and outside the classrooms. There has been a considerable amount of research on how implicit stereotypes affect our judgments and behavior. (Bargh, 1999; Blair, 2001; Greenwald & Banaji, 1995). Social role theory proposed by Eagly and Wood (1999) provides a strong basis to understand how gender stereotypes are formed from society's gendered division of labor and subsequently influence behaviors in terms of gender roles and schemas. These cognitive frameworks exert a pivotal and tough influence on how social information is processed and enable us to pay attention to certain types of information that is in line with the existing stereotypes (Yzerbyt, Rocher & Schradron, 1997; Locke and Walker, 1999) rendering them with a self-fulfilling or self-confirming nature.

Thus, a self-sustaining system continues to perpetuate the implicit gender-based biases and stereotypes in the education system. A study by Jrene Rahm and Paul Charbonneau in 1997 probed stereotypes through undergraduate and Postgraduate students' drawings of scientists. The results of their study suggest that stereotypes related to science as well as scientists are formed during childhood and become quite resistant to change, so much so that they are unaffected by the passage through high school and college, highlighting the perseverance effect of such schemas.

The Positives
According to the AISHE report, there has been an increase of about 4% (38.4% in 2014-15 to 42.6% in 2021-22) of Indian women who have opted for STEM as a field of study.

According to an article by the Pew Research Center, half of those employed in STEM jobs are women, which happens to be slightly higher than their share in the overall workforce (47%). There are variations amongst their representation within the STEM sector- they are heavily overrepresented in health related jobs, which is the highest STEM cluster. (Fry, Kennedy, & Funk, 2021)

In 2021, the union education minister Dharmendra Pradhan informed the Lok Sabha that there were 42.72% of women STEM graduates in India in 2016 as compared to 33.99% in the USA, 27.14% in Germany and 38.10% in the United Kingdom.

Further, there have been many positive examples of women who have made it big in the field of STEM. American-Indian scientist and inventer Gitanjali Rao, who at just 15 years of age, was selected from over 5000 applicants as TIME magazine's Kid of the Year for 2020; the award's inaugural year. Additionally, in 2019 she was selected for the Forbes 30 under 30 list and in grade seven, she was recognized as America's Top Young Scientist.

Another important role model is Professor and biologist Chandrima Shaha, who began her tenure as the first woman president of the Indian National Science Academy (INSA) in its 85 years of existence on January 1, 2020. She in cell biology, has authored over 80 research papers, and has notably conducted extensive research and work on the disease kala azar. Chitra Srinivasan, who is a control and software engineer at the UK Atomic Energy Authority (UKAEA) fusion research lab, being hailed for her work on a team developing fusion energy as a carbon-free source of electricity with potential to be used worldwide. (manjunath, 2020)

Year on year, these figures are getting a bit better but there is still a long way to go and a strong need to understand the reasons for these gaps and thereby, to alleviate them.

Present Study
The education research literature so far has focused on the relative contributions of both social background and school environment to learning and academic achievement (White, 2015). However, there's a need to have an eclectic approach that studies the impact of the interaction of various stakeholders at multiple levels within the child's developmental context on education outcomes. This paper attempts to use Urie Bronfenbrenner's bio ecological model (2005), a theory that studies human development over time, as a conceptual framework to shed light on various challenges in achieving gender inclusive education and suggest strategies to overcome these challenges.

Bronfenbrenner described five major systems in which an individual develops, namely:
1. Microsystem consisting of the immediate relationships and surroundings of the individual- e.g.: parents, peers, school, etc.
2. Mesosytem encompasses the interaction of the constituents of the microsystem- e.g.: interaction between the parents and teachers of the child;
3. Exosystem includes the components of microsystem that do not affect the individual directly-e.g. : Parents' job loss or job roles.

4. Macrosystem being the outermost all encompassing layer incorporates the larger societal, cultural, legal aspects- eg: gender norms, policies, and media, etc.
5. Chronosystem focuses on the interaction between the various systems and their impact on one another over time.
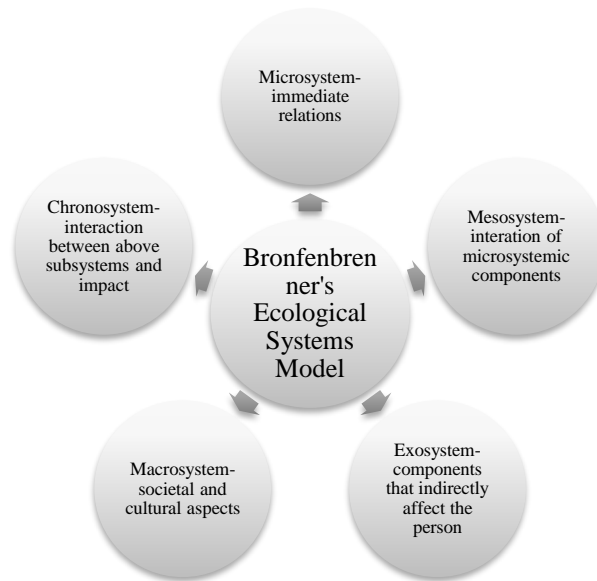

Fig 2- Bronfenbrenner's Ecological Systems Theory

The different systems have been discussed in detail in the context of issues pertaining to gender inclusivity in education as given below.

Microsystem
Microsystem refers to the individual's interpersonal relationships, interactions and immediate surroundings. For the purpose of this study, microsystem includes family, peers and school.

Family
Family is the first and the foremost institution, which directly impacts the child's development. Teachman and Paasch (1998) have described the family to be a microcosm of the society and its environment, which has a great influence on the future that the child would choose for himself/herself.
The socialization and role modeling offered by the family tends to inculcate certain values, attitudes, aspirations, and expectations in the child. In India, studies have shown that girls get affected and socialized by observing biases against themselves at home.

The ground is set for gendering of education in the family right from the preschool years when children are socialized into the constructed gender roles through the exposure to various toys and games, specific to each gender. According to Marks, Bun, & NcHale, 2009, parents are very clear about communicating firm gender beliefs to their children through guidance and instruction. They also reinforce sex-based behaviors by encouraging their children to participate (or not) in certain kinds of activities.

For example, children learn that mothers spend more time while taking care of the family through their mother's activities while fathers spend time on leisure activities with their

children. Hence, parents must ensure congruence in their as well as the child's behavior about gender and pass their attitudes and perspectives to them. Further examples include kitchen sets for girls and cars/trucks for boys emphasizing on the notions of gendered division of labor.

Children are introduced to the specific traits that are associated with being 'masculine' or 'feminine' and expectations to act according to these roles are ingrained in them through symbolic play activities. According to a study by Ram, Strohschein, & Gaur, 2014, even observing adults at home leads to internalisation of gender based behaviors leading to active socialisation. It is highly likely that obstacles on the path to success are removed for males without the regard to the cost for female children.

According to a study by Hoominafar, 2019, parents instill geneder related stereotypes in children by diferentiating between toys purchased for the two genders, clothes, decorations and even while selecting sports to be played. These gendered toys, games and stories can strongly influence children's interests and even the careers they would choose later in life. This is because these are points for children to identify with either of the genders and classify appropriate behaviors. In line with the same, parents have different expectations from a boy and a girl, which leads to the internalization of these attitudes and their future preferences. Both the genders tend to lose out when children are restricted and limited in opportunities for their play activities to explore the world, thus significantly impacting later career interests and choices.

Peers
Peers tend to have a profound influence on the various choices of the child through their interaction and further impact their educational aspirations and outcomes (Buchmann & Dalton, 2002; Cheng & Starks, 2002) as well as choice of courses (Crosnoe, Riegle-Crumb, Frank, Field, & Muller, 2008).
According to research, boys show more interest in math/science related activities while playing with other peers than when girls playing alone or with peers. (Fabes, et al., 2007). Studies have shown that even young boys are likely to subscribe to masculine ideas of jobs such as those related to the STEM field. (Liben & Bigler, 2002). Thus peers tend to play a significant role in fostering gendered educational choices or aspirations.

School setting
The school setting provides avenues for teacher-student interaction and other extracurricular activities, which have tremendous impact on the growing child's psyche. Within schools, interaction with girls may be colored with the lens that schools must follow traditional notions in preparing girls to follow the said traditions in future. There is also a lack of role models as girls might have lesser female teachers to look up to, especially when it comes to rural areas. This results in experiencing gender stereotyping and less attention at schools. (Basu 1996; Nayar 2002; Probe Team 1999; Rampal 2002).

Abundant research points towards the lack of instructional time given to girls in classrooms as well as fewer curriculum related challenges. This is likely to result in low self-esteem and confidence and thus, persistence to pursue STEM courses decreases. (Burke & Mattis, 2007; Colbeck, Cabrera, & Terenzinin, 2001; Klein, 2004; Morozov, Kilgore, Yasuhara, & Atman, 2008; Sadker et al., 2009).

These kinds of social constructions about gender roles and expectations impact children's behaviors, both inside and outside the classroom. This is seen through the decrease in female participation in outdoor activities like sports, which require expenditure of physical strength and effort, and is often relegated as a male terrain. Sports eventually become a male bastion and the overall growth and development of the girls in education is restricted by their withdrawal from such endeavours. Similarly, boys have to pay a price too through the expectations that are placed on them for conforming to the 'masculine role'. Those boys who are interested in vocations like dance, music, cooking are often rebuked by parents, bullied by their peers, called names like 'sissy' and tagged as being effeminate. Their pursuit in these fields gets restricted, again compromising on the holistic development of the individuals which is the basic aim of education

Mesosystem
Mesosystem consists of the associations and processes occurring between two or more microsystems. For the purpose of the current paper we focus on the interaction of parents and teachers in the classroom, which shapes the future educational outcomes for the child.

Role of Interaction between Parents and Teachers
According to a longitudinal study conducted at the University of Michigan's Institute for Social Research, a positive correlation exists between parents and teachers' attitudes about the interest and achievement of a child in mathematics. This study reveals that parents and teachers provide a more supportive environment to boys when it comes to mathematics. It is also found that in naturally occurring conversations between parents and teachers about the child, they are three times more likely to discuss science and related issues with reference to boys in comparison to girls (Crowley et al. 2001).

Because of high expectations, boys are more likely to participate in sports than girls. These expectations are quite evident from parent-teacher interactions at school. (Braddock, Sokol-Katz, Greene, & Basinger-Fleischman, 2005; Messner, Duncan, & Cooky, 2003). This tends to reflect how the gender stereotypes held by teachers and parents undermine their support and expectations in girls' ability to participate in sports, thus compromising the quality of education being extended to children.

Gender stereotyping is encouraged through subtle cues and indications from parents, teachers, counselors and peers. These indications are based on their understanding of gendered notions that prefer boys' interest in math and science than girls', and hence, limit opportunities for girls in these fields. (Adya & Kaiser, 2005). Thus, the continuous interaction amongst the microsystems consisting of parents and teachers who themselves are gendered beings tends to perpetuate the constructed norms and impact the child's interest and choice of career and restrict opportunities based on gender roles and expectations.

Exosystem
The exosystem will consist of the links between various habitats in which the child does not interact directly but which influence him/her in an important way such as influences their understanding of gender roles and expectations. The exosystem in the present study includes the link between parents' workplace and occupational choices and the indirect influence of the neighborhood and community on the child.

Parents' Workplace and Occupational Choices
Children are often exposed to gender roles and division of labour through their parents' gender typical job descriptions and specifications. Further even the nature of their parents' professional relationships and same sex bonding strengthens gender dichotomy. Not many children are exposed to counter stereotypical role models at home. Parents have a significant impact on their child's occupational choice and as is indicated by a review of literature, girls do get inclined towards STEM related careers if a parent is employed in the field. (AAUW, 2010, 2004, 1998; Burke & Mattis, 2007; Clewell, Anderson, & Thorpe, 1992; Corbett, Hill, & Rose, 2008; Jeffers et al., 2004), thus underscoring the significant impact parents' workplace and occupational choice has on the child's education.

Neighborhood and Community Influences
The impressionable minds of children is not left unmarked even by the neighborhood where gender based segregation of task oriented and relationship oriented roles is rampant. For instance, RWA (Residents Welfare Association) are often headed by males despite the fact that women are more likely to spend proportionately longer time in their 'residences' to be able to think more productively about the 'welfare'. These hierarchical and gendered role prescriptions often provide the broad socio-cultural context that children tend to carry over to their families and schools as well.

Macrosystem
Macrosystem provides a social context to a particular culture. It talks about a society's influence on a culture including its belief systems, laws, and policies. For the present paper, we focus on culture (norms and beliefs) and policies as the major aspects of macrosystem.

Role of Culture and Belief Systems
Gender differences in educational outcomes are also related to the prevailing attitudes regarding the education of girls. These attitudes are embedded in cultural norms and are influenced by existing social structures including marriage and kinship patterns. These attitudes also account for the low attendance and higher dropout rates of girls from schools due to their added responsibility of managing the household and young ones in the family. A report by MHRD (2000) pointed out that historically, Indian girls enrolled in school at lower rates than boys, and when they did enroll, they tended to "enter late and dropout earlier" (Nayar, 2002).

Several factors influence negative attitudes toward the education of girls. One concern relates to the financial savings required for dowry to be given in the marriage of girls. This may limit the amount of money that parents would be willing to spend on daughters' education. In some cases, it also tends to create a fear from the notion that having educated daughters would result in having to pay higher marriage costs and dowry. In addition, differences in educational investment may result from the prevailing social norm that sons' are the only source of support for parents in old age. This leads to a differential investment in the child who would be responsible for the parents' financial security as they grow older (Desai et al. 2010; Probe Team 1999).

Moreover, there are two stereotypes that are prevalent in the culture: that boys perform better at maths and science and hence, engineering and science related careers are better suited for them.

Societal culture has a major role to play in shaping gender identity and girls' participation in science is highly influenced by their gender identity. Throughout the middle school years, students begin to identify and categorize different professions according to gender-based notions (Fung, 2002). Physical science and engineering are perceived as masculine disciplines, in both boys' and girls' views (Farenga and Joyce 1999). Such biases are translated into poor participation of girls in STEM fields despite continuously outshining boys in the central and state board examinations year after year.

Role of Policies and Design of Curriculum
Policies that are made are inherently enmeshed with gender scripts and roles as reflected in their language and structure. Most of the cartoons and caricatures in textbooks and learning materials tend to shape and reinforce the stereotypes by displaying the gendered division of labor, depicting women engaged in household chores and men in paid occupational roles. Velkoff (1998) has also shown that even in today's day and age, men continue to be treated as protagonists in books and are more likely to take charge of higher positions while female achievements still remain under-recognized. Thus the gender stereotyping present in textbooks and learning materials highlight the deep seated presumptions that are prevalent in the draft of curriculum and policies.

Another important factor to note is period poverty and stigma related to menstruation. Lack of understanding and awareness regarding this has led to difficulties for women in various aspects of their lives. The culture of silence around this builds up shame and embarrassment. Due to a lack of access to menstrual products, girls face psychological stress and tend to suffer. According to an article by Rueckert, 2018, many girls is forced to drop out of school due to the taboo and lack of resources. This is true for many girls around the worls and if they are missing from classrooms while menstruating, they are divested of a very fundamental right to education. As per UNESCO, over 131 million girls in the world have dropped out of high school and an alarming 100 million girls belong to high scholl age. There definitely are a bunch of other reasons for this but periods do play a vital role in this dropout rate. (Rueckert, 2018)

Chronosystem
The chronosystem in the model refers to the environmental events and temporal changes within an individual's life course. In light of the current study, the life course of children is embedded in the socio-cultural context as they undergo various transitions during their education. The timing of the transitions tends to influence the education outcomes as well as the career choices differently for both the genders. Timing of different biological and cultural transitions like marriage and childbirth can restrict females' education and employment opportunities as opposed to males. This is quite evident in the huge gender gap enrolment in higher studies, especially in STEM fields, as girls tend to discontinue higher education because of the cultural role expectations. Another example includes the transition to adolescence and young adulthood where girls as opposed to boys are expected to lend a helping hand for household chores, compromising their time and involvement in their education. In addition to this, the cultural norm of 'Beti-Paraaya Dhan' (A daughter belongs to the family she gets married off to) often makes parents reluctant to invest time and money in their education in contrast to that of a son.

The above bio ecological model attempts to understand the issues of gender inclusion in education from an eclectic perspective by identifying the various environments and agents that influence and contribute to the problem. It elucidates and exemplifies the reasons for

disconnect in the practice of developing a culture of equitable quality education. There are numerous gender-based challenges that exist at multiple levels and need to be dealt with before true gender equality and inclusion in education can be achieved. In order to create a more balanced and equal learning environment for everyone, it is imperative to address the socio-psychological facets of the problem by intervening at various levels by involving all the stakeholders.

Way Forward

It is important to realize that education has an immense inherent ability to bring about social change in the context of gender relations. The various agents have powerful societal influences but are not working alone. Hence it is important to focus on the strategies through an eclectic approach by keeping all the forces in tandem. Some of the focused strategies to achieve gender inclusion in education have been discussed below.

Reconstructing Gendered Scripts

The interaction of the various stakeholders (teachers, students, parents, policymakers) in the classroom, which provides a social relational context, is guided by the cultural beliefs they value. These beliefs and expectations are mere scripts that have been constructed over time. They can be reconstructed and it is through the change or reconstruction of these norms that ideas about inclusion and equality can be conceptualized. Mere systemic reforms through policy changes may work up to some extent, beyond which they hold no value or fail to get the desired outcome as the system is rooted in the traditional patriarchal setup. This requires that change is to be targeted at the societal level by revising the notions and concepts about gender hierarchy and stereotypes.

Multilevel Stakeholder Approach

Micro Level Grassroots Approach (involving parents, teachers and peers and other socializing agents)

This approach calls for involvement of the primary socializing agents of the child including the parents, teachers, peers and other providers of education.

Teacher training

Teachers need to be sensitized and made aware of their own biases and how it impacts the students. The significance of use of gender-neutral language and disconfirmation of stereotypes in classroom discourses needs to be stressed. There has been a greater stress in academia on the pivotal role of gender-neutral classrooms as a means to better the educational experiences of students as well as prevent the possibility of gender-based inequalities. A prominent bias identified in classrooms is gender dichotomy that expects males to act in one way and females in another. This differential treatment results from an ideology that is harmful for students. Literature review on this subject has identified various areas that teachers should focus on such as the one present in course materials; enactment of standardized punishments/praise; and emphasizing awareness of unconscious biases. (Giolandino & Michael, 2019)

Parent coaching

Parents have to be trained to be conscious of the transmission of gendered ideas in the kind of socialization practices they use, ranging from the stories they narrate, the toys they buy for their children to the implicit and explicit transmission of gender scripts they engage in.

Parent-Child counseling

Counseling Parents and Children to look at any conflicts and help establish a positive relationship will help strengthen the effects of parent coaching and will also enable the provision of different points of view.

Publishers and content developers
The schools need to be cautious about the reading material they prescribe for students. The language must not encourage transmission of gender stereotypes and prescriptive notions.

Mesolevel Intermediate Approach (involving exposure to effective role models and challenging stereotypes)
Exposure to effective role models
Children need to be exposed to positive role models, some of which have been mentioned in this paper, in their childhood about the success of women in every field. For instance, the budget in the year 2017 announced a scheme- The Vigyan Jyoti scheme, advanced by the Department of Science and Technology (DST). The aim of this scheme was to arrange a meeting between girl students of classes 9, 10 and 11 and women scientists. IITs and Indian Institutes of Science Education and research served as nodal centers.

Challenging gender stereotypes
Strategies have to focus on challenging the prevailing stereotypes and gender norms, otherwise the status quo remains.

Macro level Legislative Approach
Policy makers need to be sensitized to revisit the traditional social constructions and concepts before embarking on drafting educational policies. The classroom needs to be recognized as a social context for transfer of such ideas and measures have to take care that the gendered ideas are reconstructed in this very social context to enrich the learning and bring about the real inclusion and equality. For instance, no form of affirmative action with an exclusive focus on ' fixing numbers' can ensure a successful conversion of enrolments to employment. Also, the issue is not merely of underrepresentation, in fact it is a complex socio psychological phenomenon that is being equally fuelled by both the 'haves' and the 'have-nots'. Hence policy makers need to take into account the socio-cultural milieu against which all the stakeholders are operating to be able to come up with an effective intervention to bridge the disconnect between policy and practice.
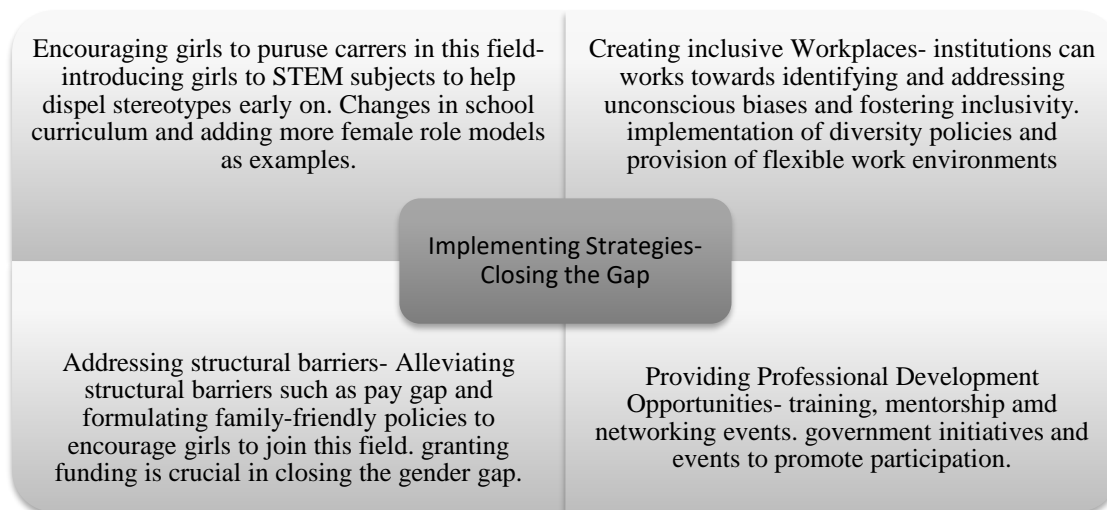

Encouraging girls to puruse carrers in this field- introducing girls to STEM subjects to help dispel stereotypes early on. Changes in school curriculum and adding more female role models as examples.

Creating inclusive Workplaces- institutions can works towards identifying and addressing unconscious biases and fostering inclusivity. implementation of diversity policies and provision of flexible work environments

Implementing Strategies- Closing the Gap

Addressing structural barriers- Alleviating structural barriers such as pay gap and formulating family-friendly policies to encourage girls to join this field. granting funding is crucial in closing the gender gap.

Providing Professional Development Opportunities- training, mentorship amd networking events. government initiatives and events to promote participation.

Fig3- Implementing Strategies to close the Gap. (Piloto, 2023)

CONCLUSION

The present study focuses on the concerning gap between men and women in STEM related professions and uses Bronfenbrenner's ecological systems' model to understand the various factors that affect gendered notions and development of children and influence the choice of their academic endeavors and hence, professions. The study further gives suggestions in the light of various components in the model to help bridge this gap.

Education has the inherent ability to bring about social change by impacting cognitions, attitudes and behaviors at an individual and collective level. It is important for children to grow without stereotypes and prejudices to create a more equitable society. Gender inclusion and equality in education, therefore, cannot be seen as a standalone goal. It is linked with better learning outcomes for all and contributes to economic gains and overall development of the whole country. The gains are immense and indivisible as it can lead to transformation of the whole culture with enhanced education outcomes and better life and work opportunities. So far, most of the efforts to tackle this serious issue have been centered on legislative grounds. Mere systemic reforms through policy refinements have provided cosmetic level changes, which have done little to correct gender inequalities. However, to address the issue that is deeply rooted in the traditional patriarchal psyche, the interventions need to be comprehensive and eclectic and target all the stakeholders at multiple levels in order to achieve Sustainable Development Goal 4 to create a better world for everyone.

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