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Gender gap in education and its impact on economic development: A case study of India

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Abstract

Gender gap in Indian education system is a critical issue which always leave a deep impact in economic growth. "Education for all" must be a main mantra in education system, and should be a driving force to the economic development of the country. The article describes the various issues related to gender gap in India's education system and offers the resiliencies to it.

Keywords: Gender Gap, education system, STEM, SDG, technology

Introduction

Education makes a man perfect. It helps building society Pestalozzi, J. H. (2022) ^[1]. A community which is highly educated can always bring new changes. They perfectly work aimed the development of the society. Unfortunately, our Indian society is completely male-dominated, and most of the remote places of the country do not encourage female education. Indian society has a belief that women are for managing home, nurturing children, and should be involved in household works. This concept is actually pushing our society backwards, and being an obstacle for economic growth and development Smith, D. G. (2024) ^[2]. The objective of the article is to discuss about the present scenario of Indian education system, gender gap and related issues in light of the economic development of the country.

Learning is an organized method of encouraging knowledge and the development of knowledge, abilities, attitudes, thoughts, and behaviors., A. Z. I., Marsidin, S., & Karneli, Y. (2024) ^[3]. In addition to informal contexts like families, businesses, and communities, it can happen in official ones like schools and universities. Education encompasses social, emotional, and practical components that are vital to both individual and societal well-being in addition to academic learning. Education has many uses, but it can be essentially divided into two categories: knowledge acquisition and personal development National Commission on Excellence in Education. (1983). Knowledge acquisition involves comprehending a wide range of topics, theories, and concepts. The process of developing one's talents involves improving one's cognitive, technical, and interpersonal abilities as well as critical thinking, moral and ethical growth, and the instillation of values, ethics, and social responsibility. Preparing individuals to participate effectively in society and governance, reserving and promoting cultural heritage and diversity are the other values of education. social cohesion, encouraging collaboration, empathy, and mutual respect among diverse groups in the education system Morris, E. W. (2012) ^[5].

The education system has always included economic growth as a fundamental component. The cornerstones of the educational system are workforce preparation and providing people with the information and abilities needed for employment Holt, J., & Holt, J. C. (2004) ^[6]. Innovation and entrepreneurship foster creativity and the capacity to create original concepts and ventures, provide chances for people to raise their socioeconomic standing. Educating individuals about sustainability and environmental stewardship. Promoting understanding and cooperation across national and cultural boundaries.

Education can be divided into groups according to its formality, organization, and goal: a. Formal education, which is instruction that is organized and methodical and is usually given by well-known establishments like colleges, universities, and schools Bourdieu, P., &

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Passeron, J. C. (1990) [7]. It follows a predetermined curriculum and results in degrees or certifications that are accepted.

Unstructured learning that takes place outside of official institutions is known as informal education. It involves picking up knowledge via day-to-day pursuits, professional experiences, interpersonal relationships, and hobbies. Examples include picking up cooking abilities from family members or picking up a language through discussion.

Non-formal learning, or NFLE, is organized learning opportunities outside of the formal system, frequently with a focus on particular populations or objectives Kessler, R. (2000) [8]. Community education initiatives, online courses, adult education classes, and vocational training are a few examples.

There are significant differences in education systems between nations and areas due to cultural, economic, and social.

The gender gap in education refers to the disparities between genders in accessing, participating in, and benefiting from educational opportunities. While significant progress has been made globally to close this gap, various challenges still persist, particularly in certain regions and contexts. Understanding the multifaceted nature of the gender gap in education involves examining historical trends, current statistics, underlying causes, impacts, and strategies for improvement.

Historically, education systems in many parts of the world were predominantly male-centric. Cultural norms, economic constraints, and societal expectations often prioritized boys' education over girls Gordon, G. (2006) [9]. In some societies, girls were primarily prepared for domestic roles, limiting their educational aspirations and opportunities Felten, P., & Lambert, L. M. (2020) [10]. 19th and Early 20th Centuries: The rise of public education systems gradually increased access for both genders, but disparities remained. In the Mid-20th Century, the global movement for women's rights and gender equality began to challenge educational disparities. Late 20th to Early 21st Century saw global interferences, like the "UN's SDG)", explicitly aimed to

eliminate gender disparities in education.



Fig 1: Sustainable Development Goal

Global Overview

As of the latest data (2023-2024), significant strides have been made in reducing the gender gap in education, but challenges remain: Primary Education: Enrolment rates for boys and girls are nearly equal in most regions, thanks to global efforts promoting universal primary education.

Secondary Education: While enrolment has increased for both genders, some regions still see higher dropout rates among girls due to economic pressures, cultural norms, and safety concerns.

Higher Education: In many developed countries, women now surpass men in higher education enrolment and graduation rates. However, disparities persist in certain fields, particularly in "STEM (Science, Technology, Engineering, Mathematics)".

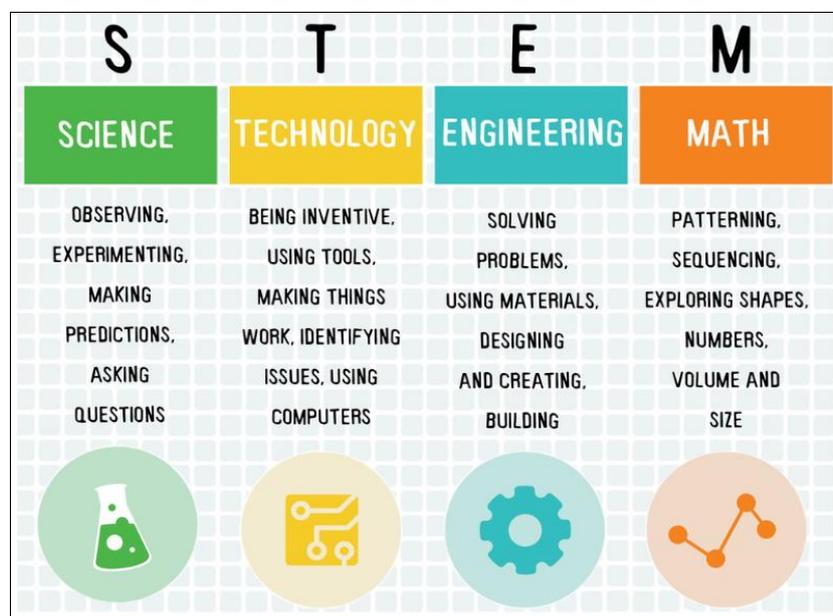


Fig 2: STEM Model

STEM represents the key areas of knowledge and skills that are vital for innovation and progress. Here's a detailed breakdown of each component:

Science

Science is the study of the natural world through observation, experimentation, and analysis. It seeks to know how matters are moved from the smallest particles to the vast universe. Science is typically broken down into different fields such as:

The study of biological things, including their composition, development, and evolution, is known as biology.

Physics is the study of energy, matter, and the basic laws of nature.

Chemistry is a scientific investigation of chemicals, including their characteristics, interactions, and reactions.

Earth science is an examination of the planet and its processes, such as marine biology, geological sciences, and climatology.

The study of space, the cosmos, and astronomical bodies is known as astronomy.

Scientists conduct research to expand knowledge and develop technologies that improve our understanding of the universe.

Technology

The practical application of information from science is referred to as tech. It entails the development and application of tools, structures, and gadgets that tackle issues and enhance social existence. Key areas within technology include:

Information Technology (IT): The use of computers, software, and networks for processing and storing data, communication, and automation.

Artificial Intelligence (AI): Artificial intelligence that mimics human intelligence, thinking, and ability to solve problems.

Robotics: The design and construction of robots that can perform tasks autonomously or with human guidance.

Cybersecurity: defending data, systems, and systems against illegal access and online threats.

Biotechnology: The use of living systems and organisms to develop products and technologies, such as medical therapies and genetic engineering.

Technology is integral to many industries and has a profound impact on society, from healthcare to communication and transportation.

Engineering

Engineering is the creation, construction, and maintenance of equipment, infrastructure, operations, and buildings using logical and math concepts. It emphasizes finding workable solutions for real-world issues in a variety of sectors, such as gadgets, production, and architecture. Among the main engineering specialties are:

Mechanical Engineering: The design and manufacturing of mechanical systems, such as engines, machines, and tools.

Electrical engineering is the study and use of electronics, electricity, and electromagnetic in everything from electronic devices to electricity production.

The design and development of infrastructure, including structures, roads, bridges, and drinking water systems, is

known as construction engineering.

Chemical Engineering: The development and production of chemicals, materials, and energy through the use of chemical processes.

Aerospace Engineering: The creation of satellites, airplanes, and associated technologies.

Biomedical Engineering: Combining biology and engineering to create medical devices, diagnostics, and treatments.

Engineers are essential for creating and improving technology that benefits society, from transportation and energy to healthcare and environmental protection.

Mathematics

The STEM areas are built on mathematics, which is the investigation of numbers, values, forms, and patterns. It offers the resources required to simulate and resolve challenging issues in technology, research, and innovation. Important topics in mathematics include:

The study of symbols used in mathematics and the rules governing their use in order to solve equations is known as algebraic.

The study of proportions, forms, and the characteristics of space is known as geometry.

Calculus is the study of motion and change, focusing on accumulation of quantities (cooperation) and rates of change (differentiation).

Making educated judgments based on data requires an understanding of statistics, which is the study of gathering information, analyzing it, interpreting it, and presentation.

Probability: The study of uncertainty and randomness, which is essential for risk analysis and prediction. Mathematics is not only used directly in scientific and engineering disciplines but also serves as a critical thinking and problem-solving tool in all areas of life.

Importance of STEM

STEM education and careers are crucial for innovation and economic growth. They drive technological advancements, medical breakthroughs, and solutions to global challenges such as climate change, food security, and healthcare. Proficiency in STEM is also key to understanding and shaping the future, as fields like AI, renewable energy, and biotechnology become increasingly important. STEM fosters teamwork, innovation, and critical thinking—all of which are necessary for solving complicated issues in an environment that evolves quickly.

Regional Variations: Sub-Saharan Africa and South Asia: These regions still experience significant gender disparities, with girls facing barriers such as poverty, early marriage, and limited school infrastructure. Middle East and North Africa: Cultural norms and security issues can limit girls' access to education. Developed Countries: While overall access is high, gender biases in specific academic disciplines and leadership roles in education persist.

Factors Contributing to the Gender Gap

Socioeconomic Factors: Poverty: Families with limited resources may prioritize boys' education over girls. **Economic Necessity:** In some contexts, girls may be required to contribute to household income or care for

siblings, limiting their educational opportunities.

Cultural and Social Norms: Gender Stereotypes: Societal expectations about appropriate roles for men and women can discourage girls from pursuing certain educational paths.

Early Marriage and Childbearing: In some cultures, girls are married off at a young age, interrupting or ending their education.

Educational Infrastructure: School Facilities: Lack of gender-segregated toilets, safe transportation, and female teachers can deter girls from attending school.

Curriculum and Teaching Practices: Gender-biased curricula and teaching methods can alienate girls and limit their engagement.

Safety and Security: Violence and Harassment: Concerns about safety at school or on the way to school can prevent girls from attending.

Conflict Zones: In areas of conflict, educational institutions may be targeted, disproportionately affecting girls.

Impacts of the Gender Gap in Education

Economic Impact: Labor Market Participation: Women with higher levels of education are more inclined to enter employment and support the economy.

Innovation and Productivity: Diverse educational backgrounds enhance innovation and productivity within economies.

Health and Well-being: Health Outcomes: Educated women tend to have better health outcomes, including lower child mortality rates and improved family health.

Empowerment: Education fosters greater autonomy and decision-making power for women.

Social and Political Impact: Gender Equality: Education is a key driver in achieving broader gender equality.

Civic Participation: Educated women are more likely to engage in civic and political activities, promoting inclusive governance.

Global Initiatives: UN Sustainable Development Goals (SDG 4 & 5): Aim to ensure inclusive and equitable quality education and promote gender equality.

Education for All (EFA): A global movement advocating for universal education access.

National Policies

Legislation: Laws have been passed in several nations to guarantee that both genders have comparable opportunity for learning.

Scholarship Programs: Financial incentives specifically targeting girls' education have proven effective in increasing enrolment and retention.

Community and Grassroots Efforts

Local Programs: Community-led initiatives that challenge

gender norms and promote the value of girls' education.

Role Models: Highlighting successful women in various fields to inspire young girls.

Technological Advancements:

E-Learning Platforms: Providing accessible education opportunities for girls in remote or underserved areas.

Mobile Education Units: Bringing education directly to communities with limited infrastructure.

Cultural Resistance:

Deep-seated cultural beliefs and practices continue to hinder efforts to achieve gender parity in education in certain regions.

Intersectionality: Gender intersects with other factors such as race, ethnicity, disability, and socioeconomic status, leading to compounded disadvantages for some groups of girls.

Quality of Education: Ensuring not just access but also high-quality education that is relevant and empowering for all genders remains a challenge.

Underrepresentation in STEM

Despite overall higher enrollment in higher education, women remain underrepresented in STEM fields, affecting their career opportunities and contributions to these areas.

Strategies for Closing the Gender Gap

Policy and Legal Reforms: Enforce Anti-Discrimination Laws: Strengthening legal frameworks to protect girls' right to education.

Compulsory Education: Extending compulsory education laws to higher levels can help retain girls in school.

Economic Incentives: Scholarships and Grants: Financial support targeted at girls can alleviate economic barriers. Conditional Cash Transfers: Programs that provide financial incentives to family's conditional on girls' school attendance.

Community Engagement: Awareness Campaigns: Educating communities about the benefits of girls' education.

Engaging Leaders: Involving local leaders and influencers in promoting gender equality in education.

Improving School Infrastructure

- Safe Facilities: Ensuring schools have safe, gender-sensitive facilities.
- Accessible Transportation: Providing safe and reliable transportation options for girls.
- Gender-Inclusive Curriculum: Developing curricula that challenge gender stereotypes and promote equality.
- Teacher Training: Educating teachers on gender sensitivity and inclusive teaching practices.

Support Systems

- Mentorship Programs: Connecting girls with mentors to

guide and inspire them.

- **Counselling Services:** Providing psychological support to address issues like harassment and discrimination.
- **Promoting STEM for Girls:** Encouraging Participation: Initiatives that specifically encourage girls to pursue STEM education and careers.
- **Role Models in STEM:** Showcasing successful women in STEM fields to inspire the next generation.

Closing the gender gap in education is essential not only for achieving gender equality but also for fostering broader social and economic development. While significant progress has been made globally, particularly in increasing enrollment and literacy rates among girls, persistent challenges remain. A diversified strategy that incorporates community involvement, governmental changes, financial incentives, and attempts to alter cultural norms is needed to address issues. Societies can unleash the full potential of all its citizens and create more wealthy and equitable communities globally by continuing to prioritize and invest in girls' education.

Gender Gap in Education in India

The GGE in India refers to the disparities between males and females in access to, participation in, and outcomes from educational opportunities. While significant progress has been made over the past few decades, various challenges persist that continue to affect the educational attainment of girls and women in the country. This comprehensive overview explores the current state, contributing factors, regional variations, government initiatives, progress achieved, ongoing challenges, and future outlook regarding the gender gap in education in India. Traditionally, Indian society has placed a higher value on male education due to patriarchal norms and economic considerations. Historically, girls were often expected to prioritize household responsibilities over formal education, leading to lower literacy rates and educational attainment compared to boys.

Current Statistics

Enrolment and Literacy Rates: Primary Education: The gender gap at the primary level has significantly narrowed. According to ASER' 2022 report, the enrollment rate for girls in primary schools is nearly on par with boys.

Secondary Education: While enrollment rates have improved, girls still lag slightly behind boys. ASER 2022 indicates that about 92% of girls are enrolled in secondary education compared to 95% of boys.

Literacy Rates: As per the National Statistical Office (NSO) 2023 data, the female literacy rate stands at approximately 74%, compared to 84% for males.

Higher Education

Undergraduate and Graduate Levels: The gender gap widens in higher education, with male enrollment in tertiary institutions being higher. In 2022, women constituted around 48% of undergraduate students and 40% of graduate students in India.

Contributing Factors

Socio-Economic Factors

Poverty: Economic constraints often lead families to prioritize the education of sons over daughters.

Early Marriage: Early marriage interrupts or halts girls' education, with India having one of the highest rates of child marriage globally.

Cultural Norms and Gender Stereotypes

Persistent gender stereotypes discourage girls from pursuing certain fields, especially in STEM (Science, Technology, Engineering, Mathematics).

Safety Concerns

Concerns about safety in schools and during the commute deter families from sending girls to school, especially in rural areas.

Infrastructure and Accessibility

Lack of adequate sanitation facilities and separate toilets for girls in schools can discourage attendance, particularly during menstruation.

Quality of Education

Gender biases in teaching materials and lack of female teachers can impact the educational experience for girls.

Regional Disparities

The gender gap in education varies significantly across different states and regions in India

Southern States (e.g., Kerala, Tamil Nadu): These states exhibit smaller gender gaps due to better infrastructure, higher literacy rates, and progressive social norms. **Northern States (e.g., Uttar Pradesh, Bihar):** These regions face larger gender disparities influenced by entrenched patriarchal norms and lower socio-economic development.

Rural vs. Urban: Rural areas generally have a wider gender gap compared to urban centers, where access to educational resources and progressive attitudes are more prevalent.

Government Initiatives and Policies

“Beti Bachao Beti Padhao (Save the Daughter, Educate the Daughter)”: It was launched in 2015, this campaign aims to address the declining child sex ratio and promote girls' education through awareness, policy changes, and community engagement.

“Sarva Shiksha Abhiyan (SSA)”: An initiative to provide universal elementary education, SSA includes specific measures to encourage female enrollment and retention in schools.

Kanyashree Scheme: Implemented in West Bengal, this scheme provides financial incentives to girls for continuing their education and delaying marriage.

“Right to Education (RTE) Act 2009”: Mandates free and compulsory education for children aged 6 to 14, with

provisions to ensure gender parity in enrollment.

Progress Achieved

Increased Enrollment and Retention: There has been a steady increase in female enrollment at all educational levels. Dropout rates for girls have decreased, particularly at the primary and secondary levels.

Improved Literacy Rates: Female literacy has risen substantially over the past few decades, contributing to greater female participation in the workforce.

Higher Education Participation: More women are enrolling in higher education, including in fields traditionally dominated by men.

Ongoing Challenges

Quality of Education: Ensuring that girls receive a quality education that equips them with necessary skills remains a challenge.

STEM Fields: Women are underrepresented in STEM disciplines due to societal stereotypes and lack of encouragement.

Higher Dropout Rates at Higher Levels

Despite improvements, dropout rates increase again at higher education levels, influenced by factors like employment pressures and societal expectations.

Employment Outcomes

Even with higher education, women often face barriers to employment, affecting the perceived value of education. While India has made commendable strides in reducing the gender gap in education, significant challenges remain. A complex strategy that incorporates community involvement, legislative measures, and a persistent dedication to gender equality is needed to address them. In addition to helping people, promoting females with learning also advances the general growth and development of society.

Conclusion

The gender gap in education is a significant barrier to India's economic development, affecting various dimensions of growth and societal well-being. A complex strategy that incorporates community involvement, legislative measures, and a persistent dedication to gender equality is needed to address them. In addition to helping people, promoting females with learning also advances the general growth and development of society. By investing in girls' education, India can unlock substantial economic potential, enhance human capital, and promote inclusive and sustainable growth. Bridging the gender gap not only benefits individual women but also contributes to the broader economic and social advancement of the nation.

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