

Mission Popular Science 2019



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**Department of Science, Technology & Environment
Govt. of Punjab**

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Chapter 1 - Introduction

1.1. The need to Popularize Science

1.1.1. Significance

Popular Science refers to creating scientific temper in the society by promoting the spirit of enquiry, observation, analysis and logical reasoning by individuals and society while arriving at decisions pertaining to daily life and solving routine problems. A scientifically literate society is free of superstitions, thinks logically and can significantly contribute to its own social and economic development, as well as, of its State / Country.

1.1.2. The need to promote Scientific Temper

Scientific temper helps to empower people through knowledge as it fosters critical thinking, examining assumptions, evaluating evidences and arriving at decisions. Since, science & technology are major drivers in the growth of a State / Country, promoting scientific temper ensures that the benefits of science and technology percolate to the grass roots and enrich the lives of people through holistic development, reducing drudgery and overcoming inter and intra-generational gaps.

1.2. Constitution and Scientific Temper

- (i). Article 51A (h) of the Constitution of India mandates that *“It shall be the duty of every citizen of India to develop scientific temper, humanism and the spirit of inquiry and reform”*.

1.3. Existing Policies

- (i). To achieve the Constitutional Goals, the erstwhile Ministry of Education, Government of India, made ‘Science Education and Research’ an integral part of the National Education Policy (NEP), 1968, with a view to accelerate the growth of national economy. The NEP was reframed in 1986 and modified in 1992. The new National Education Policy draft, 2018, by the Ministry of Human Resource Development, with a 20 year vision (2020-2040), is under consideration.
- (ii). The Department of Science & Technology, Government of India also plays a pivotal role in promotion of Science and Technology in the country. India’s Scientific Policy Resolution of 1958 resolved to *“Foster, Promote and sustain”* the *“cultivation of science and scientific research”*. The Science and Technology policies of 1983 and 2003 called for integrating programs of socio economic sectors with national R & D system. The Science, Technology and Innovation Policy, 2013, has identified *“promoting spread of scientific temper amongst all sections of society”* as a key element and seeks to promote public understanding of science through effective communication methods as an important dimension for faster delivery of science led solutions for sustainable and inclusive growth.

1.4. Existing Instruments and Current Status of Science Education

Science Education is currently being imparted through:

1.4.1. Formal curriculum at School and College level guided by Ministry of Human Resource Development at Central Government level and Ministries / Departments of School and Higher Education at State level. Though there has been a considerable increase in science education, since independence, however, recent studies indicate a worrisome declining trend in enrolment in Science courses:

(A). National Scenario:

- (i). The NEP 2018 recognizes that low enrolment in science is leading to constraints in developing scientific manpower in the country and that 80% students fail in 10th class due to poor Science and Maths education.
- (ii). The All India Survey on Higher Education (AISHE) by MHRD also indicates that in undergraduate courses, whereas only 16% students enrolled in Science and 15.6% enrolled in Engineering and Technical Education in 2015-16, more than 54% students enrolled in Arts / Humanities / Social Science / Commerce. Further, the trend is declining.

(B). State Scenario

- (i). Only 9% students in Punjab Government Schools and 21.25% students in non government schools opted for science subjects in Class 11 in 2018 even though the government set a target to increase admission in science subjects in schools by 20% and the number of schools offering science were increased by 6%. Even among meritorious students (who are offered special facilities), only 92% of Science Stream seats could be filled up (Source: Indian Express 18.07.2018)
- (ii). The National Achievement Survey Report of NCERT (2014) for Class V students of Punjab has reported poor understanding of concepts in Environment Science subject (which includes Science and Social Studies education).

1.4.2. Non-formal education through extra-curricular activities:

Studies indicate that extra-curricular Science activities encourage students to study science at school and pursue science careers. To address the present situation MHRD and State Government are promoting initiatives, like;

- (i). Interschool competitions
- (ii). Science Fests and Science Olympiads
- (iii). Science, Maths and Technology Clubs

- (iv). Teacher Training
- (v). Development of resource material, etc.

1.4.3. Joint programs with other Ministries / Departments:

Joint initiatives of MHRD / Department of Education include:

- (i). With Department of Science and Technology
 - (a). Children Science Congress
 - (b). IRIS – Intel Programs
 - (c). ISRO Science Competitions
 - (d). INSPIRE fellowships and internships
 - (e). Vigyan Prasar Science Mentoring program
- (ii). With Ministry of Culture
 - (a). Science Centres
 - (b). Innovation Hubs

1.4.4. Policy Guidelines from Department of Science and Technology, Govt. of India and Punjab State Council for Science & Technology in the State

1.4.5. Role of Science Centres / Cities / Musea

- (i). Studies indicate concrete impact of Science Centres / musea on visitor learning and that such visits:
 - (a). Stimulate enquiry
 - (b). Improve understanding
 - (c). Provide free choice of learning
 - (d). Foster interest in Science
 - (e). Create scientific attitude
- (ii). Recognizing this, MHRD, Government of India, plans to promote the following initiatives:
 - (a). Organized visits to Science Centres / musea, fairs and Innovation Hubs
 - (b). Rashtriya Avishkar Abhiyan
 - (c). Community-Scientist Interaction programs (including on Radio & TV)
 - (d). Expand outreach

Chapter 2 - Target Audience and Stakeholders

2.1. Target Audience

The target audience of the Mission is students at all levels including higher education and general public.

2.2. Government and Non-government Stakeholders

2.2.1. Government of Punjab

- (i). Department of Science, Technology & Environment through:
 - (a). 'Vision Document' for promoting science & technology
 - (b). Creating instruments like Pushpa Gujral Science City
 - (c). Promoting projects
- (ii). Department of School Education – Promoting formal science education supplemented with non-formal mechanisms as per MHRD, Govt. of India guidelines
- (iii). Department of Technical Education and Industrial Training by
 - (a). Promoting science, technology and environment education
 - (b). Adopting All India Council for Technical Education (AICTE), MHRD guidelines
- (iv). Department of Higher Education by promoting science and environment education as per
 - (a). University Grants Commission (UGC), MHRD guidelines
- (v). Department of Tourism and Cultural Affairs –
 - (a). Integrating science tourism with cultural tourism
- (vi). Other State Government Departments:
 - (a). Conducting outreach programs on behalf of client departments in project mode.

2.2.2. Government of India

- (i). Ministry of Science & Technology –
 - (a). Defining National Policy for Science, Technology & Innovation
 - (b). Promoting scientific temper,
 - (c). Promoting research and innovation in project mode
- (ii). Ministry of Culture –
 - (a). Setting up Science Cities & Centres
 - (b). Innovation Hubs
- (iii). Ministry of Human Resource Development –
 - (a). Defining National Education Policy,

- (b). Providing guidelines for formal curricula in school, higher and professional education
- (c). Providing avenues for non-formal education.

2.2.3. Non-Government Stakeholders

- (i). General Public - Beneficiaries of S & T based development
- (ii). NGOs as partners of the government in creating scientific temper and building a knowledge society through outreach activities:
 - (a). Network of Organizations for S & T Communication, Delhi
 - (b). Society for Promotion of Science & Technology in India, Panchkula
 - (c). World Wide Fund for Nature – India, Delhi and regional chapters
 - (d). PAHAL, Jalandhar
- (iii). Corporates, CII, PHDCC and other industrial Associations - through CSR sponsorship

Chapter 3 – Vision, Mission and Goals

3.1. Vision

To inculcate scientific temper in the masses.

3.2. Mission

- (i). To create avenues to experience non-formal learning of Science and Technology
- (ii). To increase visitation of Science City
- (iii). To extend the reach by Mobile Exhibitions
- (iv). To establish deeper engagement with the Schools
- (v). To hold regular events
- (vi). To promote networking and synergy of organizations with similar objectives

3.3. Goals

3.3.1. To create avenues for non-formal learning of Science and Technology

- (i). To establish at least two new galleries or undertake major up-gradation in two existing galleries in PGSC in five years
- (ii). To set up one new Science Centre at SAS Nagar Mohali and work with Science Clubs and Eco Clubs

3.3.2. To increase visitation to Science City

- (i). To motivate two Lac students from government schools from Punjab under Vigyan Yatra
- (ii). To motivate one Lac students from private and other schools from within & outside State
- (iii). To motivate 75,000 students from Higher Educational Institutions to visit PGSC especially as a preferred destination for curriculum based field visits for mandatory “Environment Studies Course”
- (iv). To attract 1.25 Lac family visitors and tourists

3.3.3. To extend the reach by Mobile Exhibitions

- (i). To reach out to 70,000 students and 30,000 general public per annum in rural areas through Mobile Science Exhibition
- (ii). To reach out to 5,000 people per annum through Night Sky Watching activity

3.3.4. To establish deeper engagement with Schools

- (i). To establish linkages with all Atal Tinkering Labs and conduct at least 24 programs/events under Innovation Hub
- (ii). To make at least 300 student members per annum in schools and colleges and develop 10 student ideas per annum under mentorship program in Innovation Hub

3.3.5. To hold regular events

- (i). To organize at least 24 student based events every year
- (ii). To hold State Children Science Congress annually
- (iii). To conduct one (1) Science Fest and one (1) INNOTECH each year for School and Higher Education students, respectively
- (iv). To organize at least six Teacher Training programs per annum
- (v). To organize at least four public interest programs / shows per annum at PGSC
- (vi). To promote networking and synergy of organizations with similar objectives

3.3.6. To position Science City as a one stop shop for scientific communication and outreach programs of State Government Departments

- (i). To undertake outreach projects of client State departments (like, the Department of Water Supply and Sanitation, Punjab Medicinal Plants Board, Punjab Biodiversity Board, Tandrust Punjab Mission, etc.) on scientific issues.

Chapter 4 – Roadmap for Popularization of Science

4.1. PGSC to Spearhead Mission Popular Science

- 4.1.1. The Pushpa Gujral Science City (PGSC) is run by Pushpa Gujral Science City Society since 1998. The Society has successfully set up the Science City which was opened to the public in 2005. Subsequently, the PGSC Society introduced the facilities of Mobile Science Exhibition and Innovation Hub. Since then, PGSC is successfully creating scientific temper, disseminating information on key scientific areas, explaining complex scientific concepts to students and general masses through edutainment and promoting innovative thinking in the Society. PGSC has developed considerable expertise over the years in development and operation of interactive exhibits on subject specific science-based galleries, theatres etc. as well as, in organizing outreach programs. PGSC is, therefore, in a position to undertake larger responsibility. To give a further thrust to science communication in the State, a need is now felt to expand the mandate of the Society to enable it to extend its activities and support other State departments in their outreach programs. The PGSC Society may, therefore, be renamed as 'Society for S & T Communication' (SSTC).
- 4.1.2. Punjab State Council for Science and Technology is also engaged in popularization of Science. Keeping in view that both organizations are under the Department of Science and Technology and to bring consolidation of efforts and focus, it has been decided to consolidate the activities of popularization of science in PGSC while PSCST will focus on Innovation and Technologies. PGSC will sign an MOU with PSCST for execution of various programs, which were earlier being organized by PSCST and the requisite grant will be passed on to PGSC with some amount being retained by PSCST for providing overall guidance and support to PGSC for popularization of Science.
- 4.1.3. The Society for S & T Communication could also partner with other State, National & Global institutions to achieve the above objectives and sign MoUs for cooperation.
- 4.1.4. The Society will be guided by the Governing Body as per existing rules, as well as, expert committees.
- 4.1.5. The Society will work in partnership or in project mode.

4.2. To create avenues for non-formal learning of Science and Technology

- (i). To identify new STEM areas and establish at least two new galleries or undertake major up-gradation in two existing galleries in PGSC in five years
- (ii). To set up one new Science Centre at SAS Nagar Mohali as a window to Science City and work with Science Clubs and Eco Clubs

4.3. To increase visitation to Science City

4.3.1. Aggressive Marketing

In order to increase visitation, PGSC will carry out aggressive marketing and would follow a multipronged approach

- (i). Strengthening of digital marketing - This will include Website improvement, Google ads, Search engine optimization, You tube videos, advertisement through Whats App, Facebook, True caller, Newsletter, bulk mails, etc.
- (ii). Direct Marketing with educational institutions
- (iii). Public targeted marketing:
 - (a). Hoardings to be placed at bus shelters, malls, along the highways, on interstate buses and auto-rickshaws, etc.
 - (b). Advertisement through print, TV and Cinema, etc.
 - (c). Marketing Materials
- (iv). Marketing drives in conjunction with Tourism and Hotel Industry, including Tour Operators and service providers (especially for visitors from outside the State)
- (v). Innovative marketing campaigns / strategies, discounts and special offers, media partnerships and Open house and fund raising events
- (vi). Memoranda of Association with stakeholder departments, industry and other similar organisations involved in Science popularization activities
- (vii). Strengthening of in-house Marketing Division, preferably through incentive based mechanism

4.3.2. To promote the concept of Edutainment

- (i). Through interactive exhibits in galleries at PGSC, Mobile Science Exhibition Bus and Mobile Inflatable Planetarium
- (ii). Through Theatres, Simulators and scientific films
- (iii). Regular updation of Large Format Films, Planetarium shows, etc.
- (iv). Programs on Science behind miracles and magic
- (v). Cultural activities on scientific themes

4.4. Extend the reach by Mobile Exhibitions

- (i). To take Mobile Science Exhibition Bus to 50 sites covering approximately 750 schools in their catchment so as to reach out to 70,000 students and 30,000 general public per annum in rural areas
- (ii). To organize minimum 50 Night Sky Watching activities in PGSC (*in-situ*) or in schools and public places (*ex-situ*) so as to reach out to 5,000 people per annum
- (iii). To develop and operate two new Mobile Science Buses for:
 - (a). Conducting Science Experiments in impoverished schools
 - (b). Computer Training of rural women and girls

4.5. Establish deeper engagement

- (i). Mobilizing Vigyan Yatra for government school students through Department of School Education
- (ii). Mandatory visit of under-graduate students from Higher Educational Institutions and Professional colleges, especially under Environment Studies curriculum
- (iii). Involving students through activities and competitions
- (iv). Membership and mentoring through Innovation Hub activities and liaison with Atal tinkering labs
- (v). Promoting science experiments in rural schools through Mobile Science Exhibition Bus
- (vi). Utilizing the existing infrastructure of Eco Clubs, IPR Clubs and Science Clubs in schools and colleges for enhanced students engagement
- (vii). Promotion of Family tickets scheme

4.6. Hold regular events

- (i). Workshops and Trainings
 - (a). Basic Science and Mathematics concepts
 - (b). New areas of Science & Technology like, AI, IoT, etc.
 - (c). Capacity building of teachers
- (ii). Celebration of Specific Days
 - (a). National Science Day
 - (b). National Mathematics Day
 - (c). National Technology Day
 - (d). World Environment Day
 - (e). Earth Day

- (f). International Biodiversity Day
 - (g). World Water Day
 - (h). Other relevant days
- (iii). Interaction with experts
- (a). Popular Science Lectures
 - (b). “Meet the Scientists” program (like, Dr. Har Gobind Khurana Lecture Series) in collaboration with other scientific institutions
- (iv). School based activities
- (a). Motivational program for talented school students
 - (b). WASH (Water, Sanitation and Hygiene) activities
 - (c). Competitions
 - (d). Science and Nature Camps
 - (e). Science Dramas
 - (f). Eco and Science Brigades, etc.
- (v). Public Targeted Programs
- (a). Programs / Shows / Exhibitions of general interest, like, Biodiversity, Health, etc.
 - (b). Events for special target groups, like, Senior Citizens
 - (c). ‘Science & Society’ Projects
 - (d). Skill Development Programs

4.7. Promote networking and synergy of organizations with similar objectives

- (i). State Govt. institutions like Departments of School Education, Higher Education, Technical & Vocational Education, Medical Education, Department of Tourism, Punjab State Council for Science & Technology, etc.
- (ii). Central Govt. institutions like Ministries of Culture, Science & Technology, Environment, Forest & Climate Change, Renewable Energy, Railways, etc.
- (iii). Industry (especially w.r.t. CSR) and industrial bodies like CII, PHDCC, etc.
- (iv). Other Science Cities and Science Centers in the country and abroad (through International Association of Science - Technology Centers)
- (v). Universities and Professional Institutions
- (vi). Research Organizations
- (vii). NGOs and Voluntary groups

Chapter 5 – Monitoring and Governance

5.1. Implementing Agency

- (i). Mission Popular Science will be implemented by Pushpa Gujral Science City (PGSC) under the patronage of Department of Science, Technology & Environment, Government of Punjab.
- (ii). PGSC will work in close collaboration with Ministry of Culture - Govt. of India, Ministry of Science & Technology - Govt. of India, Punjab State Council for Science & Technology, State Departments of School Education, Higher Education, Technical & Vocational Education, Medical Education, State Department of Tourism and other client State Government Departments to implement the Mission.
- (iii). The Punjab State Council for Science and Technology will support PGSC through policy inputs and get DST, GoI sponsored science communication programs under SSTP (State Science and Technology Program), NCSTC (National Council for Science & Technology Communication), etc. conducted through PGSC.
- (iv). Director General, PGSC will work out financial and human resource requirement to implement the Mission.

5.2. Advisory Committee for Popular Science Mission under the Chairmanship of Science and Technology Minister:

- (i). Finance Minister
- (ii). School Education Minister
- (iii). Higher Education Minister
- (iv). Technical Education Minister
- (v). Tourism and Culture Minister
- (vi). Administrative Secretary, Department of School Education
- (vii). Administrative Secretary, Department of Higher Education
- (viii). Administrative Secretary, Department of Technical and Vocational Education
- (ix). Administrative Secretary, Department of Finance
- (x). Administrative Secretary, Department of Tourism and Culture
- (xi). Administrative Secretary, Department of Science & Technology – Member Secretary

Scope: The Committee will guide the mission, give strategic direction and foster cooperation between implementing agency (PGSC) and stakeholder / user departments and funding agencies.

5.3. Steering Committee under the Chairmanship of Chief Secretary

- (i). Administrative Secretary, Department of Science & Technology, Govt. of Punjab
- (ii). Advisor, NCSTC, Department of Science & Technology, Govt. of India or his representative
- (iii). Administrative Secretary, Department of School Education
- (iv). Administrative Secretary, Department of Higher Education
- (v). Administrative Secretary, Department of Technical and Vocational Education
- (vi). Administrative Secretary, Department of Finance
- (vii). Administrative Secretary, Department of Tourism and Culture
- (viii). Director , Vigyan Prasar
- (ix). Executive Director, Punjab State Council for Science & Technology
- (x). Invited Experts in Science Communication (to be nominated as per requirement)
- (xi). Director General, PGSC – Member Secretary

Scope: To guide, support and oversee the progress of activities and give recommendation to achieve mission outcomes, including suggest midterm corrections, if required.