



Government of Maharashtra

School Education and Sports Department

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**Procedure to give your contribution for Position Papers for**

**New Education Policy 2020**

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Last date of filling of your response is 30th May 2022

**Curriculum Development Department,**

**State Council of Educational Research and Training, Maharashtra, Pune**

# Science Education

**e-Template for the Position Paper of the Focus Group**

1. **Preliminary information**

This section contains preliminary information regarding the focus group.

* 1. **Executive Summary/Abstract** (0-500 words)
1. **Introduction**
	1. **Introduction to Science Education**

(What is the present status/position regarding Science Education? This also needs to include a brief on historical perspective and prevailing practices at the National or State or UT level) (0-300 words)

# National Education Policy 2020 and Science Education

**(**Please respond to the NEP 2020 points above on science education, including any suggestions you may have regarding additions or modification-#1) (0-300 words)

# Current Challenges

**(**What are the problems currently faced in the curriculum and pedagogy of science? #2) (0-300 words)

# Addressing Current Challenges

(How can we ensure that the problems listed in 2.3 are addressed/overcome? What is currently being done well in science education, and how can these present good practices/innovations/initiatives be strengthened /scaled up? #3 and #4) (0-300 words)

# Science Curriculum and Pedagogy: Cross Cutting themes

* 1. **Science Curriculum for Holistic Development of Learners**

(How will the new science curriculum be reoriented towards developing holistic learners? What would be the horizontal connections that the science curriculum will have with other curricular areas for such holistic development #5?) (0-300 words

# Science Curriculum for Deeper Learning

**(**What would be the approach to science education that would respond to the requirement for reduction of content in science to its core essentials, in order to make room for deeper learning and greater creativity, problem solving, discussion, and

critical/analytical thinking? How would the skill of communicating science be incorporated in the curriculum? #6 and #8) (0-400 words)

# Moving towards Process Model in Science Curriculum

**(**How would the science curriculum and pedagogy move from an “Impression Model” where the emphasis is on remembering scientific facts, to a “Process Model” where the emphasis is on developing scientific temper and evidence-based thinking? #7) (0- 300 words)

# Integrating Indian Knowledge Systems in Science Curriculum

**(**How will Indian knowledge systems be incorporated in an accurate and engaging manner into the science curriculum? How will local and relevant tribal knowledge systems be incorporated into the science curriculum? #9) (0-300 words)

* 1. **Integrating Scientific Temper in Science Curriculum**

**(**How can scientific temper be incorporated in curriculum and pedagogy from the Foundational Stage itself?#12) (0 -200 words)

# Science Curriculum for 21st Century

(How can the science curriculum be made more engaging, multidisciplinary, and its learnings relevant to the child and help in developing 21st century skills? What are other subject areas under the Sciences that should be introduced at the secondary stage to fulfil present day demands and needs and provide appropriate linkages with higher education? How can this be implemented? #13) (0-300 words)

# Developmental Stages (5+3+3+4) and Science Curriculum

**(**The 4-stage design of Foundational (ages 3-8), Preparatory (ages 8-11), Middle (ages 11- 14), Secondary (ages 14-18) is critical for realizing the vision of NEP 2020. In this section, please give specific proposals and illustrations for the 4 stages of this curricular area)(0 - 400 words)

* 1. **Core Learning Objectives of Science Education**

*(What are the core learning objectives and outcomes, i.e., key concepts, skills, values, dispositions, and capacities, that all students must develop in this subject by Grade 12? How should these capacities be developed across each stage (Foundational, Preparatory, Middle, Secondary? #14*) (0 -200 words)

* + 1. Foundational stage (0 -200 words)
		2. Preparatory stage (0 -200 words)
		3. Middle stage (0 -200 words)
		4. Secondary stage
			1. Classes IX and X (0 -200 words)
			2. Classes XI and XII (0 -200 words)
	1. **Pedagogy for the achieving Learning Outcomes in Science Education**

(for each of the concepts/capacities and stages described in 3.3.1 (for as many as possible), describe, stagewise, experiential/ play-based/ toy-based/ discovery-based/ experiment-based/ art-based/sports-based/ storytelling-based/ interactive/ less- textbook-centric/ creative/ enjoyable activities and pedagogy that will enable students to develop these capacities through less rote and greater creativity and analytical/critical thinking. What specific strategies/provisions may be used for providing science education to Children with Special Needs?#15)(0 -200 words)

* + 1. Foundational stage (0 -200 words)
		2. Preparatory stage (0 -200 words)
		3. Middle stage (0 -200 words)
		4. Secondary stage
			1. Classes IX and X (0 -200 words)
			2. Classes XI and XII (0 -200 words)
	1. **Multidisciplinary and Interdisciplinary Experience in Science Education**

(Describe how to develop useful/interesting/illuminating horizontal connections in the curriculum and pedagogy of this subject (with other subjects and with “real life”) for each of these concepts (or for as many of these concepts as possible) that would promote a more holistic and multidisciplinary experience for students#16)(0 -200 words)

* + 1. Foundational stage (0 -200 words)
		2. Preparatory stage (0 -200 words)
		3. Middle stage (0 -200 words)
		4. Secondary stage
			1. Classes IX and X (0 -200 words)
			2. Classes XI and XII (0 -200 words)
	1. **Stage-wise integration of Indian Knowledge Systems in Science Education** (*Describe ways in which each of these concepts (or as many as possible) can be rooted in India, such as through Indian and local traditions (including stories, poems, music, dance, drama, games, toys, etc. and Knowledge Systems #17*)(0 -200 words)
		1. Foundational stage (0 -200 words)
		2. Preparatory stage (0 -200 words)
		3. Middle stage (0 -200 words)
		4. Secondary stage
			1. Classes IX and X (0 -200 words)
			2. Classes XI and XII (0 -200 words)
	2. **Local Knowledge in Curriculum and Pedagogy**

**(**Describe ways in which local knowledge and flavor could be included in the curriculum and pedagogy of this subject area #18) (0 -300 words)

# Indian Scientists

**(**How would the work and contribution of Indian scientists be included in the curriculum? #10) (0-300 words)

# Inclusion for Children from SEDs

(Approaches to inclusion for children from SEDGs that are necessary for this curricular area need to be elaborated #21). (0-300 words)

# Assessment in Science Education

(Describe how assessment in the subject may be transformed from one that primarily tests rote memorisation skills to one that is more formative, promotes learning and development for our students, and tests higher-order capacities such as analysis, critical thinking, and conceptual clarity #22) (0 -400 words)

* + 1. Foundational stage (0 -200 words)
		2. Preparatory stage (0 -200 words)
		3. Middle stage (0 -200 words)
		4. Secondary stage
			1. Classes IX and X (0 -200 words)
			2. Classes XI and XII (0 -200 words)
	1. **Science Education and Multilingual Perspective**

(Describe practices by which students may achieve bi- or multi- lingual proficiency in the discussion of this subject #20) (0 -300 words)

* 1. **Time allocation for science in school time table**

(Time to be allocated (in percentage) for science education in the time table across the stages also keeping in view bag-less days-internship, practical’s, experiential learning, etc.?) (0 -300 words) ( SE, TE)

* + 1. Foundational stage (0 -200 words)
		2. Preparatory stage (0 -200 words)
		3. Middle stage (0 -200 words)
		4. Secondary stage (0 -200 words)
	1. **Family and Community Participation in Science Education**

**(**Describe ways in which families and local communities could be involved in the teaching and learning of this subject area #19) (0 -300 words)

# Educational Technology for Science Education

**(**Describe ways in which technology could be used to enhance teaching-learning in this subject in an effective and equitable manner?#22) (0 -300 words)

# Teacher Capacity Building

**(**How should teacher capacity, support, and education be re- formed in order to effectively enable all the above transformations? #25) (0 -300 words)

# Enabling Conditions for Quality Science Education

**(**What enabling conditions (e.g., school culture, practices, infrastructure, equipment, governance, etc.) should be in place in order to effectively enable all the above transformations?#26) (0 -200 words)

* 1. School Culture and Practices (0 -200 words)
	2. Infrastructure and Equipment (0 -200 words)\
	3. Human Resource – Teaching as well as supporting (0 -200 words)
	4. Teaching Learning Material (0 -200 words)
	5. Technology related (0 -200 words)
	6. School Governance (0 -200 words)
	7. School Complex (0 -200 words)
	8. Any other (0-200 words)
1. **Guidelines for textbook and TLM Developers**

(Describe the approach to textbook and TLM development keeping in mind the curricular and pedagogical shifts #23) (0-300 words)

* 1. Foundational stage (0 -200 words)
	2. Preparatory stage (0 -200 words)
	3. Middle stage (0 -200 words)
	4. Secondary stage (0 -200 words)
1. **Role of Various Agencies for providing Quality Science Education in Schools**

(What roles, various agencies for example, SIETs, SCERTs, DIETs, CTEs, IASEs, NIEPA, NCERT, KVS, NVS, CBSE, School Education Boards, Universities, CSR initiatives, philanthropic organizations, NGO, SIEMAT, local administration etc., can play in providing science education at different stages in schools?) (0-200 words)

* 1. Local organisations (0 -200 words)
	2. State level organisations (0 -200 words)
	3. National level organisations (0 -200 words)
	4. Any other (0 -200 words)
1. **Specific Recommendations for the National/State Curriculum Frameworks**

(What are your specific recommendations for four curriculum frameworks with regard to science education?) (0-300 words)

* 1. Specific recommendations for NCF/SCF ECCE (0 -200 words) **10.2**Specific recommendations for NCF/SCF SE (0 -200 words) **10.3**Specific recommendations for NCF/SCF TE (0 -200 words) **10.4**Specific recommendations for NCF/SCF AE (0 -200 words)
1. **Any other Comments and Suggestions on this Theme**

(In this subsection, please provide other suggestions about science education that are not covered in the above questions. It is recommended that these suggestions are in alignment with the vision and specific anchors provided above from the NEP 2020). (0 - 200 words)

# Bibliography and References

**(**Please include references (research papers, studies, pilots, or anecdotal evidence) throughout to help substantiate recommendations wherever applicable. A bibliography would also be most helpful for easy reference.**)**

***(Here, the system will allow the user to insert references in the APA format while filling up the document and will collate all the references in this section.)***

Filled by system.

Annexures

(Not mandatory. Please put in a title for an annexure along with a one- line description)