# NISHTHA

National Initiative for School
Heads' and Teachers'
Holistic Advancement

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## Heads' and Teachers' Holistic Advancement

National Council of Educational Research and Training
National Institute of Educational Planning and Administration
Central Board of Secondary Education
Kendriya Vidyalaya Sangathan
Navodaya Vidyalaya Samiti

रमेश पोखरियाल 'निशंक'
*Ramesh Pokhriyal 'Nishank'*

मंत्री
मानव संसाधन विकास
भारत सरकार
**MINISTER**
**HUMAN RESOURCE DEVELOPMENT**
**GOVERNMENT OF INDIA**

## MESSAGE

Teacher has an important place in school education. We remember our teachers with respect and gratitude. They have always been a source of inspiration for us. The Guru-Shishya tradition of India has kept many such examples in front of us which inspire our teachers and students even today. In the present scenario, our expectations from teachers have increased exponentially. We want our teachers to not only develop in our students twenty first century skills, but also promote in them the positive attitude towards social harmony and nation building. We also expect from our teachers to become a role model for the promotion of moral and ethical values in students and society.

It is a matter of great pleasure for me that the Department of School Education and Literacy in collaboration with National Council of Educational Research and Training, utilizing their innovative experiences in the field of curriculum and teacher education, is going to impart integrated training for 42 lakh teachers and school heads serving at the elementary level in government schools, who in turn will make collective efforts towards improving learning outcomes of students. This National initiative for School Heads' and Teachers' Holistic Advancement entitled NISHTHA is a praiseworthy step wherein National Council for Educational Research and Training, National Institute of Educational Planning and Administration, Kendriya Vidyalaya Sangathan, Navodaya Vidyalaya Samiti and Central Board of Secondary Education are working together for making this training successful.

This programme is being conducted in collaboration with the States and Union Territories. From this programme, teachers all over the country will not only get to know about the new initiatives in school education but will also learn how to teach subjects using child-centered pedagogies integrating concerns such as personal-social qualities, health and well-being, school based assessment, etc.
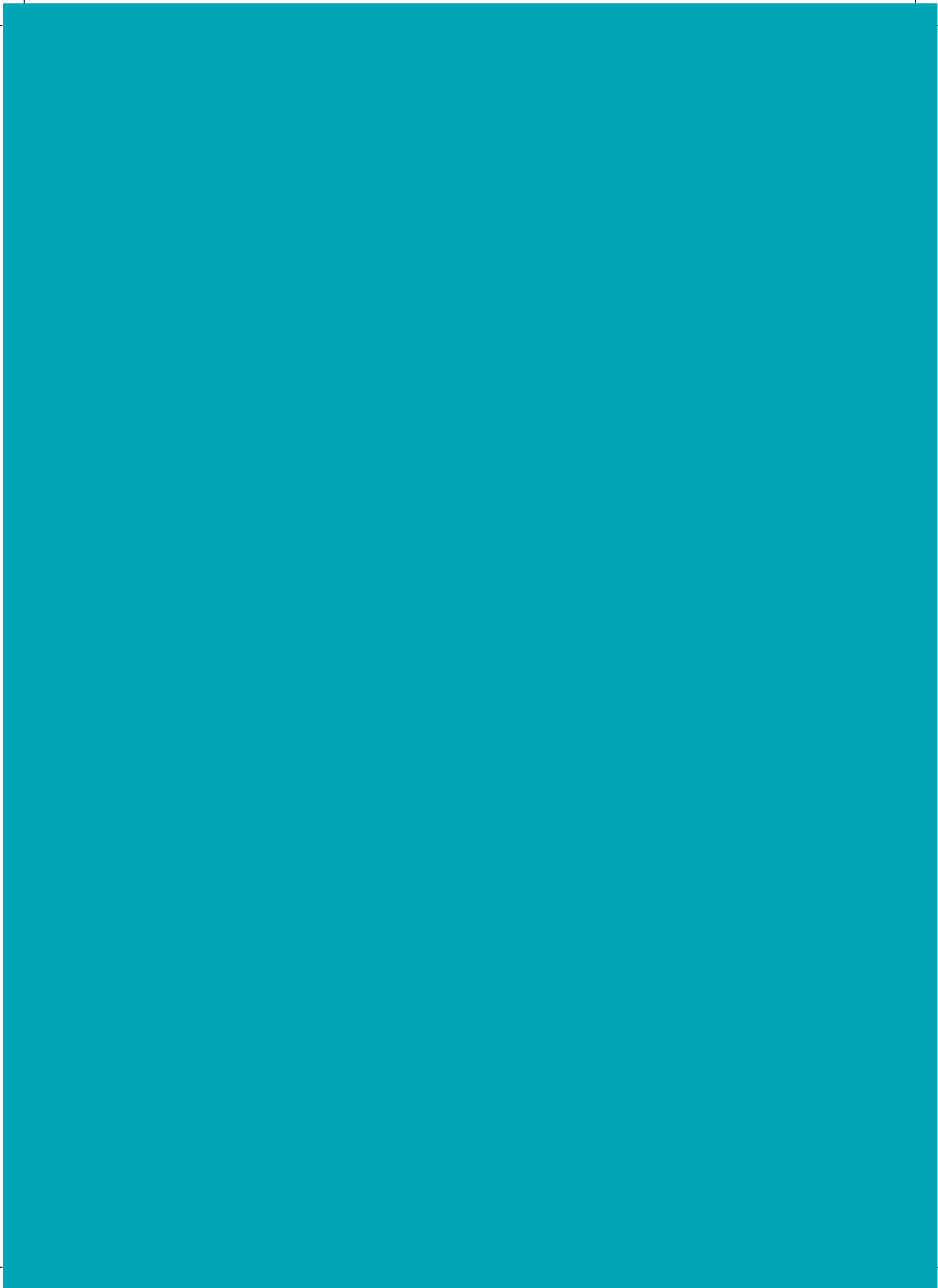
I expect NISHTHA to convey this message to every teacher at the elementary stage that it is important to keep in view the context of every student so that they stay connected to their cultural roots while we educate them to become global citizens. I extend my best wishes to all the officials and academicians who are involved in this training, for its successful implementation.

**(Ramesh Pokhriyal 'Nishank')**

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# 1. Introduction

The Department of School Education and Literacy is launching a **National Mission to improve learning outcomes at the elementary level** through an Integrated Teacher Training Programme called NISHTHA – National Initiative for School Heads' and Teachers' Holistic Advancement under the Centrally Sponsored Scheme of Samagra Shiksha in 2019-20. This **integrated programme aims to build the capacities of around 42 lakh participants covering all teachers and Heads of Schools at the elementary level in all Government schools, faculty members of State Councils of Educational Research and Training (SCERTs), District Institutes of Education and Training (DIETs) as well as officials and Resource Persons from Block Resource Centres (BRCs) and Cluster Resource Centres (CRCs) in all States and Union Territories (UTs)**. With this huge coverage, NISHTHA Programme is perhaps the largest such initiative in the world.

This training will be conducted directly by 33120 Key Resource Persons (KRPs) and State Resource Persons (SRPs) identified by the State and UTs, who will in turn be trained by 120 National Resource Persons identified from National Council of Educational Research and Training (NCERT), National Institute of Educational Planning and Administration (NIEPA), Kendriya Vidyalaya Sangathan (KVS), Navodaya Vidyalaya Samiti (NVS), Central Board of Secondary Education (CBSE), Non-Government Organisations and UNICEF.

The aim of this training is to motivate and equip teachers to encourage and foster critical thinking in students, handle diverse situations and act as first level counsellors. They will be oriented on and develop their skills on various aspects related to Learning Outcomes, Competency Based Learning and Testing, Learner-centered Pedagogy, School Safety and Security, Personal-social qualities, Inclusive Education, Information and Communication Technology(ICT) in teaching-learning including Artificial Intelligence, Health and well-being including yoga, Initiatives in School Education including library, eco club, youth club, kitchen garden, School Leadership qualities, Environmental Concerns, Pre-school, Pre-vocational Education and School Based Assessment in a joyful learning manner.

**The modules have been developed and designed for this training programme including aforesaid concerns by the NCERT and NIEPA in consultation with Kaivalya Education Foundation, Tata Trusts, Azim Premji Foundation and Aurobindo Society. The Department of School Education and Literacy acknowledges their support in the designing of these modules and partnering for the implementation of NISHTHA programme.**

In this training programme, integration of leadership concerns has been visualized to empower school heads for providing academic support to the teachers in the school itself along with their administrative leadership. The National Centre for School Leadership (NCSL) established in 2012 at NIEPA has been working towards transformation of schools in the country. With transformation of schools as the prime objective, NCSL-NIEPA has been addressing the leadership requirement and contextual school issues across the country. The Centre also focuses on evolving differential and workable leadership models. The Centre has conceptualized School Leadership Development

through operational activities along four components: Curriculum and Material Development, Capacity Building, Networking and Institutional Building and Research and Development. The entire programme is based on a practitioner-centric curriculum which is grounded in the needs and contextual issues of schools in the States and the diversity therein. In view of strengthening leadership capabilities of School Heads under NISHTHA, themes such as concept of leader in action, multiple roles and responsibilities of a school head, academic leadership and creating opportunities for team learning for improving student learning outcomes are included. Focus is also given on school development plan for head teachers to envision a transformed school and work towards turning the vision into reality.

**The NISHTHA programme has included some of the best practices of the Kendriya Vidyalaya Sangathan.** In this programme, need assessment of teachers will be conducted in the beginning and the need assessment formats will include questions based on the content as well as pedagogies from the modules provided to every teacher. As per the on-site need analysis, the sessions will be flexibly modified to cater to these needs. At the end of the programme, impact assessment will be conducted for providing further support to the teachers through the web-portal and other on-line support groups. Need assessment and impact assessment will be conducted through on-line or face- to- face mode.

This massive capacity building programme has been integrated with technology to ensure smooth facilitation, availability of digital content and technology enabled teaching methods to support the teachers. A Mobile App and Learning Management System (LMS) based on MOODLE (Modular Object-Oriented Dynamic Learning Environment) have been developed by NCERT **(https://nishtha.ncert.gov.in/)**. LMS will be used for registration of Resource Persons and Teachers, dissemination of resources, training gap and impact analysis, monitoring, mentoring and measuring the progress online.

This Primer has been prepared to introduce stakeholders about the salient features of the programme alongwith a glimpse of content to be transacted to participants of this programme with two exemplar modules.

This Primer will be helpful to disseminate information about the programme and its objectives, summarize the training modules and their expected outcomes.

## The main expected outcomes from NISHTHA are:
1) Improvement in learning outcomes of the students.
2) Creation of an enabling and enriching inclusive classroom environment
3) Teachers are trained as first level counselors to be alert and responsive to the social, emotional and psychological needs of students.
4) Teachers are trained to use Art as pedagogy leading to increased creativity and innovation among students.
5) Teachers are trained to develop and strengthen personal-social qualities of students for their holistic development.

6) Creation of healthy and safe school environment.

7) Integration of ICT in teaching-learning and assessment.

8) Developing stress-free School Based Assessment focused on development of learning competencies.

9) Teachers adopt Activity Based Learning and move away from rote learning to competency based learning.

10) Teachers and School Heads become aware of new initiatives in school education.

11) Transformation of the heads of schools for providing academic and administrative leadership in the schools for fostering new initiatives.

## Post training Activities

An important feature of this integrated training programme is the **embedded post training interventions including provision of mentoring at 2 levels**. After the completion of the training, the Key Resource Persons will be in touch with all the teachers through WhatsApp and Facebook Workplace groups, etc. **Once the training of a batch is completed at the block level, one Key Resource Person for every 130 teachers will be identified as a Mentor.** The Mentor will be responsible for providing continuous guidance, feedback and monitoring so that a **quality circle** is created enabling them in **building pedagogical skills and connecting with peers**, thereby, creating a **long- term sustainable impact** on classroom transactions. Similarly, National Resource Persons will be identified as Mentors for the Key Resource Persons, at the state level.

NISHTHA web portal is an interactive portal which will enable post training follow-ups. The cycle wise "Training Reports" of about two pages (as infographics) will be uploaded by each State/UT.

Post training, the best pedagogic practices adopted by each teacher can be shared on the portal. For this purpose, each school is required to create own YouTube channel, upload the best practices, success stories, videos (one/two minutes) first on their own channel and share the link on NISHTHA for showcasing purposes. The selection of best practices and State and UT wise playlist shall be done by NCERT.

Teachers' submissions will be evaluated by the Mentors. Appropriate feedback and also on-line support (reference material, interaction with Mentor, etc.) will be provided to the teachers.

To facilitate continuous interaction of National Resource Group (NRG) with State Resource Group (SRG), and SRG with Teachers, subject wise forums have been created to provide lifelong learning support and academic guidance to every single teacher. Teachers can share classroom problems and issues and help each other to have an inclusive environment and ensure learning by all.
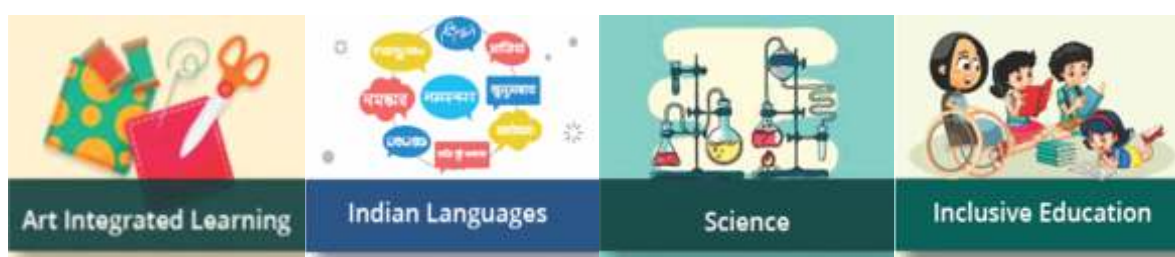


*Subject specific forums for Post Training Support*

The portal and mobile app has enabled feedback mechanism and a call center has been established to address the needs and concerns of teachers on a 24x7 basis.

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This regular follow-up up to classroom level will help in continuous assessment of needs of teachers for further basic or advanced level trainings.

Across the globe now, 21st-century skills for students such as critical thinking, creativity, problem-solving, an ability to collaborate, and to communicate are growing multifold in importance. Such skills train students in the art and science of complex problem-solving including high tech problems. This has been taken into cognizance while designing the NISHTHA programme. The suggestive activities included in the modules will help teachers to further design their own activities and challenging tasks for students. Besides, NISHTHA also emphasizes upon addressing personal and social skills in students for their holistic growth. The teachers and School Heads trained through NISHTHA will be able to inculcate these skills in their students and will make them future ready. As a next step to this integrated training, some specific advanced level trainings based on Artificial Intelligence, Data Analytics, etc. will be designed to enrich teachers' knowledge and skills in the following years.

## 2. Rationale and main features of **NISHTHA**

1) There is an imperative need to improve the learning outcomes of students especially till class VIII. Many studies have been conducted and much has been written about the low achievements in these classes. The piece meal training that was being conducted under the erstwhile Sarva Shiksha Abhiyan was not yielding the desired results and therefore, it was decided to conduct **an integrated programme to build the capacities around 42 lakh participants covering all teachers, Heads of Schools at the elementary level in all Government schools, faculty members of State Councils of Educational Research and Training (SCERTs), District Institutes of Education and Training (DIETs) as well as officials and Resource Persons from Block Resource Centres (BRCs) and Cluster Resource Centres (CRCs) in all States and UTs**.

2) In order to transform the Principal/Head of the schools into a key academic support including support **for experiential learning, all Principals and Heads of elementary level schools and those schools with any class upto class VIII, will also be part of the integrated programme**, as both trainees and trainers. In view of strengthening leadership capabilities of School Heads, training for Heads of Schools, Principals/Vice Principals and Key System level Functionaries at all levels will cover focus on Characteristics of an Effective leader, Academic Leadership, Building a Learning Culture in Schools and creating a School Development Plan. In addition, the School Leadership training will also include topics such as Pre-school education, Pre-vocational education, Gender issues and Initiatives in School Education in addition to topics covered for teachers and KRPs.

3) The very high level of marks being obtained in school board exams is a symptom of an education system, which relies almost totally on rote learning, under which students are not encouraged to think. The **teaching in the classroom therefore, as well as the methods of assessment (question setting and evaluation) all reflect this emphasis on rote learning**. Clever students have learnt to memorize the textbook knowing fully well that both the questions and the answers will come from this. Apart from creating generations of young people who have not been encouraged to think, this also leads to unfair situation where the same students have to sit for entrance tests to the IITs, Defense Services, Law Universities, which are largely based on **competencies and higher order thinking level** questions. This anomaly has encouraged coaching institutes to flourish, filling the vacuum created by the rote learning system in schools.

It will not be possible for schools to move away from this existing situation until and unless all teachers, the heads of schools and others involved in the running of schools are **oriented towards competency based higher order thinking skills teaching, whole child approach, and awareness about the diverse and multilingual needs of students and to carry out assessments accordingly**. The integrated programme seeks to achieve this objective.

4) It was observed that the expectations from teachers in the present day are different and includes

many new attributes. For example, in view of the increasing levels of stress in schools and increasing incidents of violence including murder, the modern day teacher and head of school need to be equipped with the skills to handle these situations. Activities such as, 'Safety Walk' of the entire school premises, in order to ensure compliance of safety measures are required to be undertaken by the School Heads. Therefore, the integrated programme **seeks to train all School Heads and teachers as first level counselors to be alert and responsive to the needs of the students, the school and themselves**.

5) Teachers, today, are also expected to be aware of the **provisions regarding gender, the Rights of Persons with Disabilities Act and the Protection of Children from Sexual Offences (POCSO) Act** in order to empower teachers and school fraternity to face challenges of increasing crimes against children, **in addition to promoting joyful learning and taking special care of the requirements of children with special needs** However, these elements were not part of the NCTE approved B.Ed. and D.El.Ed. curriculum prior to 2014 and **it would appear that teachers trained before 2014 are not familiar with these teaching methodologies. The Integrated Programme will train teachers in these critical areas**.

6) It has been noticed that in-service training of teachers included mostly subject-specific pedagogies, however, as per the finding of last National Achievement Survey (NAS) conducted in 2017, **it has been observed that the achievement increases: (i) when children go out and play during games period, (ii) medium of instruction is in the language spoken at home, (iii) children read material other than text books and (iv) children participate in classroom activities**. These findings need to be applied proactively to build capacities of
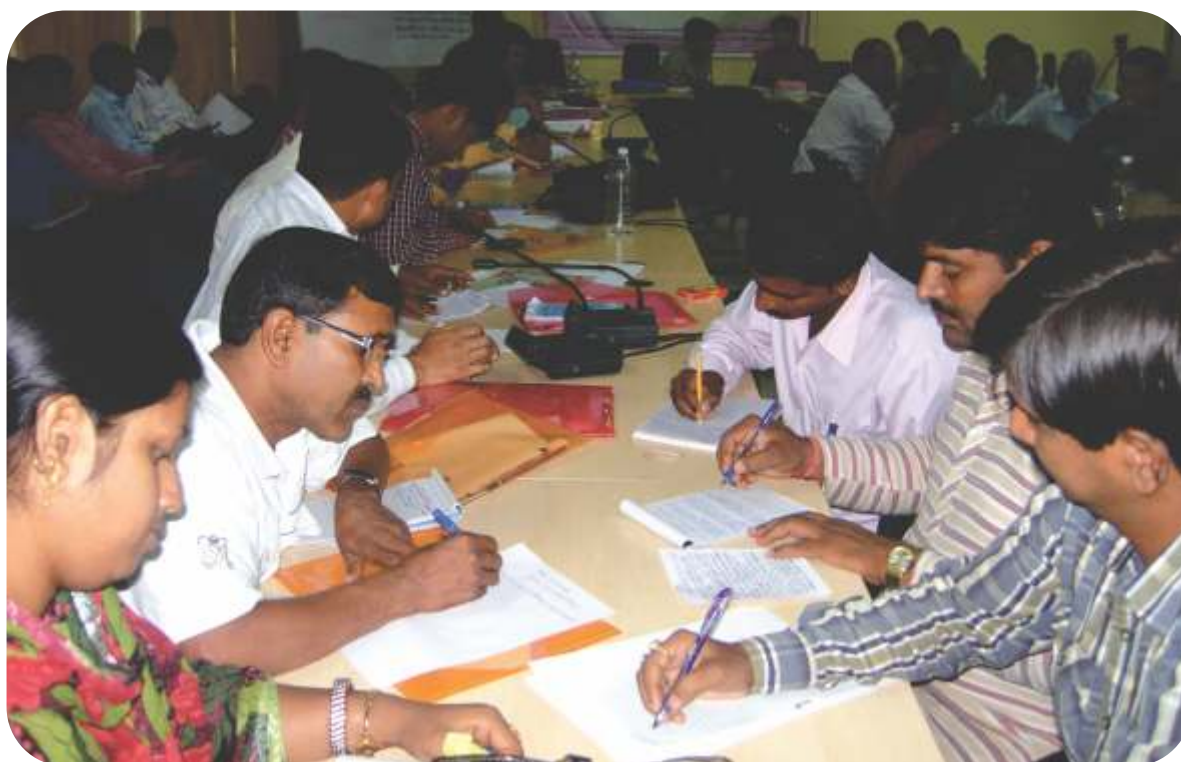
teachers and **promote critical thinking among students**; the integrated programme focuses on experiential and joyful learning and is aimed to **empower teachers to work with creativity**.

7) This initiative is first of its kind wherein standardized training modules are developed at national level for all States and UTs. Earlier, concerned States and UTs did the training of teachers using their own methodology. The prominent feature of this integrated programme will be **activity based modules including educational games and quizzes, social-emotional learning, motivational interactions, team building, preparation for school based assessment, in-built continuous feedback mechanism, online monitoring and support system, training need and impact analysis (Pre and Post training)**. Best practices in the Kendriya Vidyalayas pertaining to training of teachers have been included under NISHTHA.

8) In order to **enhance professional development of teachers**, special emphasis has been given on design and development of training modules. The Modules for NISHTHA have been developed through a consultative process involving the suggestions from the States and UTs and CBSE, KVS, NVS, School Principals and Non-Governmental Organizations, such as Kaivalya Foundation, Tata Trust, Azim Premji Foundation and Aurobindo Society.

9) This is the first time that all agencies of the Department have worked together for such an initiative. The **training programme will be conducted in a collaborative manner by the National Council of Educational Research and Training (NCERT) and National Institute of Educational Planning and Administration (NIEPA) with all the States and UTs involving resource persons drawn from NCERT, NIEPA, Kendriya Vidyalaya Sangathan (KVS), Navodaya Vidyalaya Samiti (NVS), Central Board of Secondary Education (CBSE), leading organisations in the field of education and UNICEF**.

10) The training under NISHTHA aims at enhancing knowledge, skills and attitudes of School Heads, Head Teachers and System level functionaries on Leadership with a focus on **academic supervision and developing a learning culture in schools**.

11) The training given in 'NISHTHA' will not be based on **'Chalk and Talk' method** rather it would be totally activity based. During the training, teachers will be encouraged to write essays, speak on a given subject and participate in games and quizzes. There will be short **ice-breaking/energizer sessions** and recaps during the training to keep participants motivated and attentive during the sessions. Further, digital content such as videos, presentations will be used for training session. The ultimate goal is to motivate and encourage teachers to use these activities in classroom transactions so as to ensure engagement of all students and bring the best out of them.

12) Department of School Education has been implementing Centrally Sponsored Schemes for over a period of time; however, it has been noticed that Principals and School Heads are not fully aware about these schemes and that has adversely affected their effective implementation. Therefore, **a specific module on various initiatives under Samagra Shiksha such as**

constitution of Youth and Eco Club, Display Board on School Safety Guidelines, Rangotsav, School Based Assessment (SBA), and School based Census (Shagunotsav), CRC Mentoring of Schools, Promotion of Reading, Sports and Physical Education, etc. **has been designed** to create awareness among Principal/School Heads, teachers and other key functionaries.

13) Integrated programme will also have subject-specific modules and its pedagogy **aligned to the common core** to improve foundational learning of students including literacy and numeracy skills. NISHTHA would prepare schools for the School Based Assessment (SBA) to be conducted throughout the country in the beginning of 2020 to assess the Learning Outcomes of all Children at the Elementary level.

14) **In case, a State or UT feels that it has access to better Modules/Materials, it is welcome to add and use them. However, there can be no change in the topics and expected outcomes (as listed in chapter 4) and the expected outcomes. The decision in this regard shall be taken by the Secretary, School Education in the respective State and UT.**

15) As per initial feedback obtained from the states and UTs, the other advantages foreseen from this training programme include greater **transparency in the system**, standardized training material with enough scope for contextualization, togetherness among different stakeholders, **self-evaluation of teachers and School Heads**. Through need assessment, the system will be aware of the gaps in the training of teachers and School Heads and can address those gaps through appropriate strategies. This integrated training programmme will help in **creating quality cadre of trainers, a support system for teachers, robust follow-up mechanism and a common platform for all States and UTs**, provide a **forum for teachers** to discuss their initiatives, challenges and solutions. This will bring teachers of all age groups and subject areas together for better peer learning. Also, the teachers in rural areas will also be aware of the various initiatives taken and provisions made by the Government under the schemes.

16) In addition, a comprehensive monitoring and mentoring mechanism would be ensured through **embedded post training interventions. After the completion of KRP training, NRPs will regularly be in touch with KRPs through WhatsApp/Facebook groups etc and personal interactions**. Once the training of one batch is completed at block level, one KRP for each 130 teachers will be identified as Mentor. Mentor will be responsible for continuous guidance, feedback and monitoring so that a **quality circle** is created enabling them in **building pedagogical skills and connecting with peers**, thereby creating **a long term sustainable impact** on classroom transactions.

In the light of the above and also on the request of States and UTs for a program which creates awareness in teacher educators, teachers, heads of schools and also key functionaries in States and UTs about emerging issues and initiatives in education, an integrated teacher training was designed and pilot tested in the State of Tripura, wherein 284 Key Resource Persons trained by NCERT, had further imparted training to 31,000 elementary stage teachers within two months.

## Pilot testing of Integrated Teacher Training in Tripura

The integrated model of teacher training was pilot tested in the State of Tripura from December 2018-March 2019. The State has decided to adopt NCERT textbooks for all the classes at the elementary stage from the session 2019-20. In view of need for training of teachers on learner-centered pedagogy, improving learning outcomes and new initiatives in the field of education, an Integrated Teacher Training was designed and conducted as under:

- A meeting was held in June 2018 with the Secretary Education, Tripura and other State level officials.

- An orientation programme was held in September 2018 with State, district, block and cluster resource officials of Tripura – on the conduct of massive training program for teachers.

- Two nodal officers were nominated by the State to facilitate this training programme under the guidance of Director, SCERT and Director Secondary Education, Tripura.

- Module development guidelines prepared by the NCERT were shared with faculty members of SCERT and DIETs. Training modules on Learning Outcomes, School Based Assessment, Pedagogy of Science, Pedagogy of Mathematics, etc. were prepared by the NCERT and SCERT/DIETs (Tripura) faculty members in the first week of December 2018 in workshop mode. These modules were translated by the State of Tripura from English to Bengali as well.

- These modules in English language were moderated by the NCERT faculty members in the third week of December 2018. Accordingly, modification in the Bengali version was done by the State.

- Identification of 284 Key Resource Persons drawing members from SCERT, IASEs, CTEs, DIETs, Block Resource Centre, Cluster Resource Centre, etc. was done by the State by 20th December 2018 and communicated to NCERT.

- Capacity building programme for 284 KRPs for five days from 26th-30th December 2018 was conducted by NCERT in collaboration with SCERT, Tripura.

- A National Resource Group consisting of 14 Resource Persons from the NCERT to build the capacity of these KRPs conducted the training programme in the state at a venue with adequate space to conduct four parallel sessions at a time in the last week of December 2018. During this training, the following activities were undertaken:

  ➢ Pre- training need assessment of the trainees was conducted before the inaugural session.

  ➢ Interactive and activity based sessions – on Curriculum, syllabus and textbooks; Learner – centered pedagogy; Understanding learner; Learning outcomes; School Based Assessment; Pedagogy of language, etc., were held.

  ➢ Inauguration of Web portal for tracking training of KRPs and for providing access to modules and e-resources.

  ➢ Groups of 4 KRPs together were made as State Resource Groups for the training of teachers at the block level.

  ➢ Group work was conducted by 284/4=71 SRGs for making a plan on conducting training at the block level and for transaction of a theme using learner-centered pedagogy infusing social concerns.

  ➢ Group presentations in parallel sessions were observed by the members of National Resource Group and also State level functionaries. Feedback was provided to each group.

- ➢ Programme schedule, time line and guidelines for the conduct of training at the block level were shared with the trainees during valedictory session.

- ➢ Post-training need assessment of trainees was conducted before the valedictory session.

- Honorable Education Minister, Tripura also attended this programme and interacted with the participants in one of the sessions

- Director, NCERT and many State functionaries were also present in the programme for observing different sessions.

- Eight Monitoring groups with two members each were created drawing members from NCERT and from the state of Tripura.

- Feedback form was created for the monitoring group to monitor and support the KRPs on the site of training programmes with teachers.

- The State of Tripura conducted training programmes for 31,000 elementary stage teachers in all the eight districts in a phased manner from February - March 2019.

- The training programmes for five days were conducted for the primary and upper primary teachers (around 100 teachers per batch) separately in two shifts at the same centre in each block.

- Monitoring groups visited each district making a random visit to different centres at the block level in the district. Largely, positive feedback about the training of the teachers was received, i.e., training was conducted using activity based approach; focus on learning outcomes, etc.

# 3. Procedure of the training programme

Generally, training programmes are conducted for teachers, school principals, SMCs and State/district/block/cluster level functionaries in isolated manner with different objectives and content. The NISHTHA programme attempts to bring all the stakeholders and target groups on the same platform integrating them and orienting them on similar content focusing on their specific roles and responsibilities.

• 8 National Resource Groups comprising of 15 Experts each will train Key Resource Persons (identified by the State and UT for further teacher training) and State Resource Person already trained by NIEPA (identified by the State and UT for further training of School Heads and other functionaries). These KRPs and SRPs will directly train teachers and School Heads. Therefore, the Master Trainer layer has been eliminated. This will help in reducing the high percentage of communication loss that occurs due to many layers. A flow chart of the methodology is depicted below:
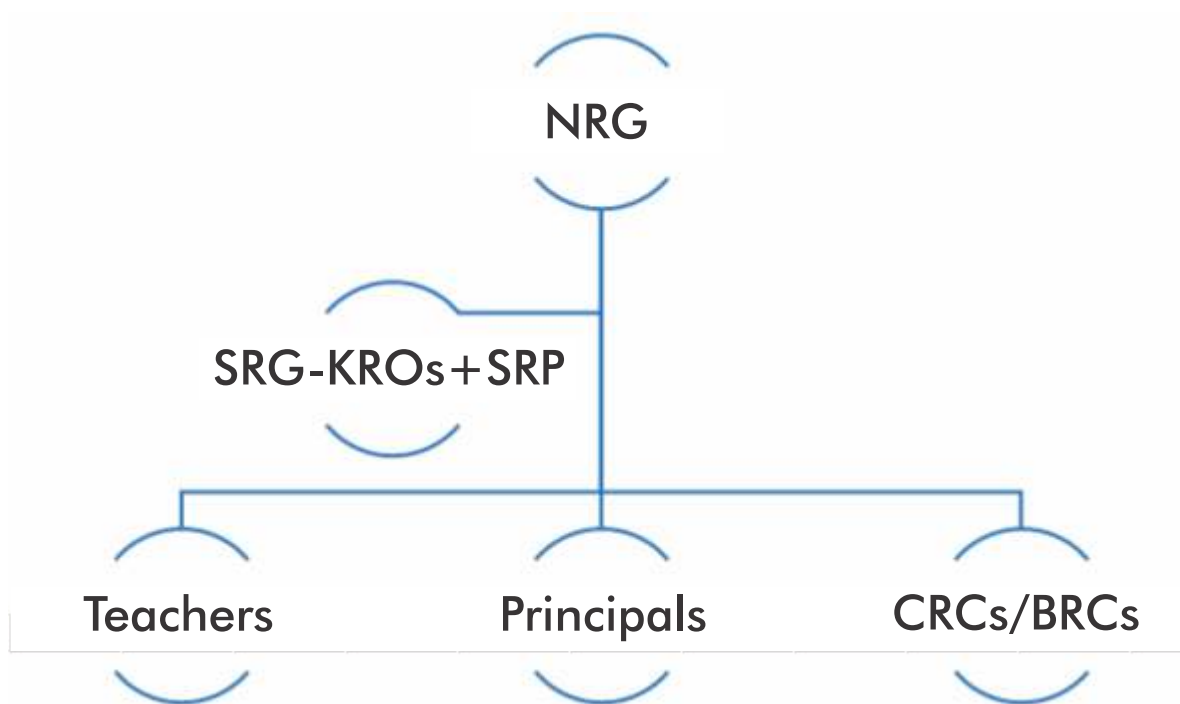


• Modules on the selected themes for the training programme will be disseminated to all concerned with the guidelines on their roles and responsibilities as well as calendar, time schedule and modalities for the conduct of different sessions. States and UTs may translate and print the modules for distribution among SRG members before the training programme, if required. However, States and UTs can also use their own training material along with NCERT material for contextualization.

• After receiving training from NRG, these Key Resource Persons will form a group called State Resource Group (SRGs), which will have 6 members (5 KRPs + 1 SRP) in each group and will

immediately start teacher training at the Block level. This group will also be responsible for follow-up and monitoring of the programme.
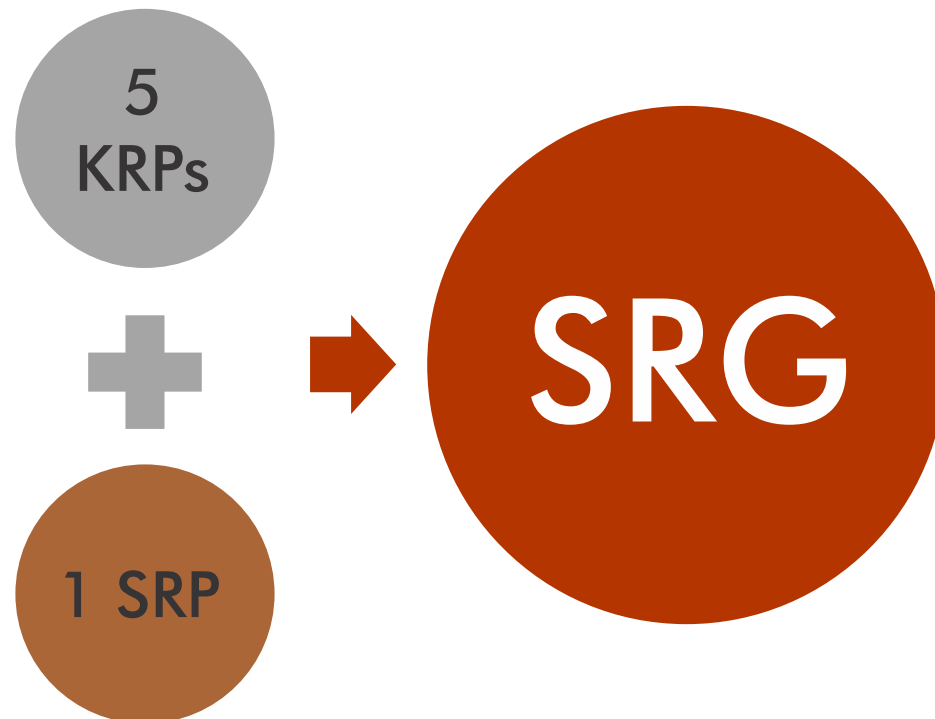


- These SRGs will provide 5 days training to the School Heads, Teachers, BRCs and CRCs at the block level. In order to ensure that all teachers in a particular State are covered tentatively within 6 months, one SRG will train a group of 100-150 people at Block level (Head teachers, Head Masters, Teachers, BRCs and CRCs) in one cycle and in the given time schedule, it needs to train 500- 750 teachers (5 cycles) on an average.

- Training of School Heads is of utmost importance, as they will have to work as a resource person for teachers, in their respective schools. Training given by NIEPA has been aligned with the training modules of NCERT. The training of State Resource Persons (SRPs), which includes School Heads, will be held with the training programme for KRPs. Therefore, the training programme has been designed for 6 days which will include 5 days for KRP training and 2 days (starting from the fifth day of KRP training) for SRPs and functionaries. Thus, there will be one overlapping day where both KRPs and SRPs will attend the programme.

- The State and UT may identify State Resource Persons (SRPs) from the School Heads who have already received training from NIEPA. After receiving Integrated Training, SRP will be a part of SRG.

- A schedule of training of KRPs and SRPs and teacher training at block level has been prepared. Training of KRPs from A&N Islands, Chandigarh, Dadra and Nagar Haveli, Daman & Diu, Puducherry, Lakshadweep and Goa as well as North -Eastern States such as Mizoram, Sikkim,

Meghalaya and Nagaland will be held at NCERT. The training for other States and UTs will be done at State level by the NRG.

- Every training round for teachers will have one session by outside experts who are doing some innovative work for the society in various fields such as use of bio-gas, solar panel, kitchen gardens, organic farming, motivation of teachers, etc.

- State will identify and provide venues with at least five spacious rooms for the training of 200 - 250 KRPs and SRPs at a time for conducting plenary and parallel sessions.

- A Learning Management System Portal and a Mobile App has been developed by NCERT for registration of NRGs, KRPs, SRGs and Teachers, dissemination of resources, training gap analysis (Pre and Post Training), monitoring and measuring the progress online. The portal will also have the facility for pre-registration for which the data in the required format should be sent to NCERT as per the timelines given. Integrated Monitoring and Support Mechanisms involving BRCs, CRCs, NGOs, KVs, NVs, and CBSE schools will be set up at each stage to see that the interventions provided during the training programme reach to classroom level.

- The actual conduct of the teachers' trainings and all other trainings will be done by the respective States and UTs.

- A Pre-Training Needs Analysis and Post-Training Impact Analysis will be carried out to assess the impact of the training programme.

**Expected Outcomes:** The following quantifiable outcomes have been envisaged to be achieved after the completion of integrated teachers' training:
- 100 % government elementary teachers will be trained.
- 100% Head Teachers, Head Masters, and Principals will be trained
- 100 % SCERT and DIET faculty will be trained.
- 100 % BRCCs and CRCCs will be trained.

# 4. Topics covered and expected outcomes

There are total 12 modules for teachers and 5 modules for School Heads, which are categorized below:

**Categories of the Modules:**
- Cross Cutting Concerns (Generic)
- Pedagogical Concerns
- Leadership Concerns

Following topics will be covered in above mentioned modules:

(i) **Moving away from Rote methods to Higher Order Thinking Skills:** Teachers will be oriented to focus on competency based and challenging problem solving tasks through experiential and joyful activities leading to development of higher order thinking skills in students.

**Expected Outcomes:**
- Teachers will be able to **create enabling and enriching classroom environment** wherein every child will be able to learn without any stress and anxiety.
- **Improvement in learning outcomes of the students**

(ii) **Activity Based Learning (ABL):** Teachers will be encouraged to write short essays, speak on a given subject and participate in games and quizzes, with short ice-breaking/energizer sessions and recaps during the training to keep participants motivated and attentive.

**Expected Outcomes:**
- Creating a long term sustainable impact on classroom transactions.
- Making teaching-learning process joyful

(iii) **First level Counselling Skills: Generic counselling skills will be developed** in teachers so that they can function as **first level counsellors** to address the increasing levels of stress in schools and increasing incidents of violence.

**Expected Outcomes:**
- Teachers alert and responsive to the needs of students, the school and themselves.
- Equip teachers to ensure health and well-being and development of **life skills and values in students**.

(iv) **Art Integrated Learning:** Teachers will be trained to develop understanding of 'Arts' as pedagogic tool and of its impact on the **holistic learning and development of every child**. It focuses on skill of planning and organizing age-appropriate art experiences to make learning of different subjects appealing. Integration of arts with other subjects means that arts become the medium of teaching and learning that is, visual arts, performing arts and literary **arts become an integral part of teaching-learning processes**.

**Expected Outcomes:**
- Teachers are trained to use **Art as pedagogy** for teaching all the subject areas and

integrate arts in the classroom transaction through various activities.
- Teachers are skilled to encourage **creativity and innovation** in young minds.
- Engagement of students in music, dance, role play, drawing, painting etc leading to holistic development of the students.

(v) **Improving Social-personal Qualities and Creating Safe and Healthy School Environment:** The training is designed for **Creating a Safe and Healthy School Environment**. It will also help teachers to build understanding about the personal-social qualities and improve personal-social qualities in students **imparting value education and life skills education**.

**Expected Outcomes:**
- Enhance the skills of teachers to ensure friendly and **inclusive environment** in the classroom and school.
- Teachers are trained to develop and strengthen **personal-social qualities** of students for their **holistic development**.

(vi) **School Based Assessment:** Various aspects related to school based assessment (SBA) based on learning competencies will be discussed. It aims to help different stakeholders to be aware of and use the child-centered approach to teaching-learning and assessment in school based assessment.

**Expected Outcome:**
- **Improvement in learning outcomes** of students will be assessed through **a stress free evaluation**.

(vii) **Integration of ICT in Teaching–Learning and Assessment:** The training aims to prepare a teacher to critically analyze the content, context and to identify appropriate ICT tools. It also enables to effectively plan the integration strategies. It will also help in designing and implementing an ICT integrated lesson plan.

**Expected Outcomes:**
- Teachers are trained to implement **Integration of ICT in teaching-learning** and assessment.
- Increased use of good quality e-content in classroom transactions.

(viii) **Pedagogy of Subjects (Language, Mathematics, Science, Social Sciences and Environmental Studies):** Subject specific modules and their pedagogy have been aligned **to the common core** to improve foundational learning of students including literacy and numeracy skills.

**Expected Outcomes:**
- Teachers are expected to adopt activity based teaching in different subject areas so as to move away from rote learning to competency based learning.
- Improvement in the numeracy and literacy skills of students.

(ix) **Initiatives in School Education:** The Department of School Education and Literacy, MHRD has been implementing Centrally Sponsored Schemes for over a period of time; the Principals

and School Heads need to be fully aware about these schemes. Therefore, **a specific module on various initiatives under Samagra Shiksha such as constitution of Youth and Eco Club, Display Board on School Safety Guidelines, Rangotsav, School Based Assessment (SBA), and School based Census (Shagunotsav), CRC Mentoring of Schools, Promotion of Reading, Sports and Physical Education, etc. has been designed**.

Expected Outcome:
- Create awareness among Principal/School Heads, teachers and other key functionaries about the various initiatives taken in school education to ensure their implementation in letter and spirit.

(x) **Health and Well Being:** Physical, social and emotional health and spiritual wellbeing will be discussed along with distress, illness and disorders using **case studies /experiences/ role play situation along with the accompanying questions, charts, photographs, videos, games, group work, discussion, demonstration, interaction, self-reflection, self-learning Activities, Question-Box, Quiz Contest etc**. This will help in providing accurate and adequate information to learners and inculcating positive attitude and ability to apply the concerned life skills.

Expected Outcomes:
- Create awareness about the importance of health and well-being for the students.
- Empower teachers to understand the need of emotional wellbeing, self-awareness, social awareness, and to handle situations involving violence and abuse.

(xi) **Leadership Concerns:** School Leadership has been covered in a very comprehensive module that encompasses the concepts of leadership, teaching learner-centered pedagogy and ICT initiatives in school education. This helps build a comprehensive understanding of the concept of leadership in the context of the school and the education system.

Expected Outcomes:
- Transformation of the Principal/Head of the school into a key academic support including support **for experiential learning for all teachers in the school**.

## 5. Description of modules developed for the training of teachers



### Structure of the Modules

**Each module will have the following structure:**

a. Learning Objectives

b. Brief introduction about the subject area

c. Class specific Learning Outcomes in the subject area- An Overview

d. A brief on the pedagogies to be used for achieving the learning outcomes

e. Example of a chapter/theme (from NCERT Textbook)- transaction modalities focusing on –

    i. Introduction of the chapter/theme- linking Learner's day to day experiences with the theme

    ii. Learning outcomes to be achieved through the theme/chapter (pedagogies preferred for achieving the learning outcomes)

    iii. Conduct of in-built activities using learner centered approach

    iv. Perspective of in-built evaluation

    v. Examples should be such that show integration of general issues (diversity, values, etc.,) wherever appropriate.

    vi. Exercises – with different types of questions, some open ended some divergent.

    vii. How to address issue of multilingualism during the training session/class?

f.  **Activities for the KRPs/Teachers**
    i.   Make a classroom plan for transacting one or two themes/chapters from one or two text-books (NCERT) linking it with learning outcomes.
    ii.  Develop an activity, which will focus on enhancing gender sensitivity/inclusion/environmental sensitivity/scientific temper and integrating it with subject-specific theme.

g.  **Evaluation**
    i.   What has been learnt through this module?
    ii.  What can be added?

## Categories of the Modules:

(a)  Cross Cutting Concerns (Generic)
(b)  Pedagogical Concerns
(c)  Leadership Concerns

## (a)  Cross Cutting Concerns (Generic)

Under generic issues, seven modules have been developed, the details are as under:

### Module 1:  Curriculum, Learner-centered Pedagogy, Learning Outcomes and Inclusive Education

This module deals with the themes and content, to motivate and empower teachers to reflect upon and address the following issues:

• How do children learn? How do varied contexts (socio-economic backgrounds and emotions) impact their learning? What role can teachers play?
• What is the role of curriculum, syllabus, textbooks and other learning resources in promoting children's learning in inclusive settings?
• How can the needs of each child be addressed by the teachers in inclusive classrooms?
• What are the learning outcomes? How can the progress in learning of children be tracked by the teachers? How can school ensure learning outcomes of students in each class.

### Module 2:  Improving Social-personal Qualities and Creating Safe and Healthy School Environment

This module deals with the following issues:

• What personal-social qualities are required to be developed and strengthened in students for their holistic development?
• What steps, teachers need to take for developing these qualities in students in a friendly and inclusive environment in the classroom and school?
• What skills and qualities teachers require to develop in themselves to provide emotional support to children?
• What activities can be taken up in the school to create a safe and healthy school environment?

- How schools will ensure health and well-being and development of life skills and values in students?

**Module 3:  Art Integrated Learning**

This module deals with the following issues:
- What is Art Integrated Learning?
- How it is used as pedagogy for teaching all the subject areas?
- What are the activities teachers can undertake to integrate Arts in the classroom transaction?
- How does it help in joyful learning by the students leading to their holistic development?

**Module 4:  School Based Assessment**

This module deals with the following issues:
- Concept and meaning of School Based Assessment?
- How does it help in the holistic development of students taking care of each and every aspect of their personality?
- Methodology of School Based Assessment
- Assessment in different subject areas
- How to develop activities and questions based on learning outcomes?
- How to implement SBA in school?

**Module 5:  Health and Well-Being in School**

This deals with **the following**:
- Importance of health and well-being for schools
- Various aspects of health and well-being
- Practices under health and well-being

**Module 6:  Integration of ICT in Teaching –Learning and Assessment**

This module deals with the following issues:
- Importance of ICT in schools
- Integration of ICT in teaching-learning and assessment

**Module 7:  Initiatives in School Education**

This module includes the following:
- Samagra Shiksha and initiatives and provisions made under this for improving quality of school education.
- Provisions of Samagra Shiksha related to Rangotsav, Library, Sports, Self-Defense, School Safety, Pre-school, Children with Special Needs, etc.
- UDISE+, Performance Grading Index(PGI), Shagun Repository.
- Best Practices in the States and UTs

**(b)  Pedagogical Concerns**

Under pedagogical concerns, the Modules deal with the following pedagogies of subjects:

**Module 8:  Pedagogy of Environmental Studies**

**This module addresses following issues:**
- What is the nature of Environmental Studies (EVS) at the primary level?
- What are the learning outcomes and pedagogical processes of EVS?
- What activities can be performed to develop deeper insights on different themes of EVS?
- How can assessment be integrated with the teaching-learning process?

**Module 9:  Pedagogy of Languages**

**This module addresses following issues:**
- Centrality of language in learning.
- Teaching of language as first, second, third and foreign language.
- Objectives of language teaching and meeting the learning outcomes
- Addressing national and educational concerns in languages.
- Language assessment and its processes

**Module 10:   Pedagogy of Mathematics**

**This module addresses following issues:**
- What is the nature of Mathematics?
- What are the learning outcomes and pedagogical processes of Mathematics?
- What activities can be performed to develop deeper insights on different components of Mathematics?
- How can assessment be integrated with the teaching-learning process in Mathematics?

**Module 11:   Pedagogy of Science**

**This module addresses following issues:**
- What is Science?
- What are the learning outcomes and pedagogical processes of Science at the upper primary stage?
- What activities can be performed to develop deeper insights on different themes of Science?
- How can assessment be integrated with the teaching-learning process in Science?

**Module 12:   Pedagogy of Social Science**

**This module addresses following issues:**
- What is the nature of Social Science?
- What are the learning outcomes and pedagogical processes of Social Science?
- What activities can be performed to develop deeper insights on different components of Social Science?

• How can assessment be integrated with the teaching-learning process in Social Science?

## (c) Leadership Concerns

### Modules for Principals and Key Functionaries deals with the following issues:

• Role of School Leadership in improving Quality of School Education
• Initiatives undertaken by the MHRD
• Learning Outcomes and National Achievement Survey
• School Based Assessment
• Pre-school Education
• Pre-vocational Education
• Inclusion and Gender Concerns in School Education

(**Note:** Activities given in all the modules are suggestive; KRPs and teachers may conduct many more activities as per their context)

# 6. Roles and Responsibilities at the National level

a) 15 NRPs will be identified by NCERT, which will include resource persons drawn from NCERT, CBSE, KVS, NVS, Other organisations and UNICEF for each NRG. Also, 1 NRPL will be identified by NIEPA for each NRG. Total 8 NRGs will be constituted for this training programme.

b) Core team of NCERT and NIEPA will train these NRGs. NRGs will conduct face to face training for Key Resource Persons (KRPs) in States and UTs for a period of five days. One NRG will train approximately 200- 250 KRPs at a time.

c) Each National Resource Group will have a Convener and a Member Coordinator. The Convener will be responsible for creating a communication network with all the members of the group for sharing the training material, guidelines, schedule of the training programme, etc. The Convener will provide the required guidance to Member –Coordinator for the conduct of training of KRPs and SRPs at the State and UT level and will also be responsible for the follow-up of this training up to the block level teacher training.

d) Each member of the National Resource Group, i.e., NRP will be responsible for taking the sessions allotted to them as per their expertise in the concerned area. They are expected to

    i. Collect time schedule and module much before the training programme and also discuss with the Convener about the programme.

    ii. Take the sessions following the modules provided for the session. They are expected to make the session interactive, activity based and joyful, by conducting games, riddles and quizzes and motivating the KRPs.

    iii. Use modalities such as role play, group work, group discussion, pair-share, poster making, etc. during the session for transacting the content.

    iv. Use relevant audios and videos made for this purpose in the sessions.

    v. Continuously assess through observations, the learnings of the participants. In case of joint sessions, they need to discuss with other resource persons prior to the session.

e) Modules on themes like pedagogy of science and mathematics, school based assessment, etc. have already been developed by the NCERT/NIEPA and shared with the States and UTs for translation and dissemination.

f) ICT resources will be mapped with the modules for developing better understanding and skills.

g) Guidelines for the training of KRPs, SRPs and Teachers have been prepared and shared with the States and UTs.

h) Calendar for training and a sample time schedule will be provided.

i) Launch and manage the Learning Management System for monitoring of the programme and providing a platform for continuous mentorship and interaction.

# 7. Roles and Responsibilities at the State and UT level

- Nominate three nodal persons to supervise and coordinate this programme. One of these nodal officers should be State Project Director of Samagra Shiksha and other may be Director SCERT and one technical person for the LMS Portal. Further, teacher training will be conducted at block level, therefore, Block Education Officers may be appointed as nodal officers at the Block level.

- Identify Key Resource Persons and State Resource Persons for leadership (HMs/Principals who have undergone leadership training from NIEPA). One KRP may be identified for every 130- 150 teachers in the State. 1 SRP will be identified per 5 KRPs. KRPs identified at State level will include all faculty members of DIETs, SCERTs, and some faculty members from IASEs, CTEs, Senior Secondary Schools, BRCs, etc.

## KRP Selection Process:

States and UTs conduct training of teachers under various schemes and programmes and they have their own mechanism for the selection of quality KRPs. However, in this integrated teacher training programme, KRPs are required to cover all the elementary stage teachers and School Heads in the States and UTs, therefore, selection of KRPs needs to be done in a more systematic manner with proper care. Some points, which need to be kept in view while selecting a KRP, are:

1) She/he should be regular employee (teacher educator or teacher) having more than five years of experience of teaching at the elementary or secondary stage.

2) She/he should have an experience of providing training for at least two years.

3) KRPs need to be selected from every subject area so that when SRG is formulated with five KRPs (one each from mathematics, science, social science, State language and English) and one SRP (to deal with leadership related issues along with subject area in which she/he has expertise) it will be able to deal with all the required sessions in the block level teacher training.

4) Further, to impart quality training and reduce the loss of knowledge while communicating, KRP should have the following competencies:
    - Active Listening
    - Participatory Engagement
    - Public Speaking

- 5 KRPs and 1 SRP will constitute a SRG. Each SRG will have a Member–Coordinator, who will be responsible for coordinating with all the members of the group for making a plan, time schedule for the block level training of teachers. KRPs and SRPs are expected to cooperate with Member-Coordinators, prepare their sessions with team spirit aiming at motivating teachers with interesting pedagogies.

- The Member-Coordinator for the SRG will also be responsible for the follow-up of the conduct of the training in an appropriate manner in tune with the modules developed for the programme. The Member-Coordinator will need to ensure the registration of teachers on the web-portal designed for this training programme and availability of modules to all the teachers before the program.

- The Member- Coordinator will be in the network of the NRG members for any further support required in the training programme.

- Each KRP and SRP will be responsible for taking sessions in his/her area of subject expertise in plenary and parallel sessions.

- SRP will conduct sessions to make every participant aware about leadership roles and qualities and also implementation of initiatives in school education.

- Identify venues for KRP training with at least five spacious rooms with capacity of 50 each and one hall with a capacity of 300 at State headquarters (e.g., Auditoriums of Colleges, Senior Secondary Schools, Private Schools, etc.). The venue should also be equipped with audio visual facilities, art and other training materials such as flip charts, crayons, etc. Further, minimum two computers with internet facilities should also be available at the training venues of KRPs and teachers.

- Arrange for translation and printing of training modules that will be shared by NCERT, in regional languages. Funds for printing of modules have already been approved in the PAB approvals under Samagra Shiksha.

- The nodal person with technical expertise will be responsible for managing the activities related to the NISHTHA Web Portal, for e.g., data based attendance, testing, participation in online forum, etc.

- Teacher training will be conducted at block level, therefore, Block Education Officer/District Education officer may be appointed as nodal officer for this training programme at the District/Block level. Their contact details are to be made available to the NCERT/NIEPA and also to the KRPs in the State and UT so that information gap should not be there.

## Duties of Nodal Officers:

✓ The nodal officers will be in continuous dialogue with NCERT/MHRD and also will take responsibility of responding to the communications from the NCERT/MHRD related to the conduct of the training programme.

✓ The nodal officers will also be responsible for getting the modules translated in the languages being used in the State/UT. They will also be responsible for managing the MIS on integrated teacher training at the State level, with the help of technical staff and also dissemination of modules among KRPs, Teachers, School Heads and Key Functionaries.

✓ They will also be responsible for monitoring of the training Programmes at all the stages i.e., up to the block level.

## Guiding KRPs on the 'Conduct of Sessions at the Block Level':

On the last day, group work participants need to form SRGs in which KRPs from the required subjects will join. In one room, 10-12 SRGs will conduct group work on the following aspects:

a) Planning training at the block level including deciding responsibility of each KRP.

b) Presentation on pedagogy of any subject–specific theme integrating generic issues, such as, personal-social qualities, school based assessment, inclusive education, etc.

c) Discussion on taking care of teachers' need, interest, principles of andragogy for conducting teacher training.

# 8. Learning Management System (LMS)

To further facilitate this massive capacity building programme, a Learning Management System (LMS) based on MOODLE (Modular Object-Oriented Dynamic Learning Environment) has been developed. Every member of the NRG, SRG, KF, Teachers, School Heads etc. will be registered on the portal through the portal link or mobile app for being a part of this network, as per details provided at **https://nishtha.ncert.gov.in/**. This portal would facilitate an effective capacity building programme through its Data Management System to track registration, training schedules and serve as a platform for delivering course material, for interaction between the Mentor and the learner and to manage learning in terms of assessing entry & exit behavior, tracking progress of learning, clarifying queries etc., to showcase the follow up activities-actual classroom intervention, sharing of experiences, testimonials etc. Thus, the LMS portal will be for registration of National Resource Groups, Key Resource Persons, and Teachers, dissemination of resources, training gap analysis (Pre and Post training), monitoring and support, etc. The States and UTs themselves, for keeping track of teachers' training and to provide the required support, will ultimately handle this Portal. In this regard, a nodal person with technical expertise is to be nominated for managing the activities related to the portal, e.g., data based attendance, testing, participation in online forum, etc.

# NISHTHA Mobile App

# 9. Monitoring and Mentoring Mechanism

- States and UTs will nominate two nodal persons to supervise and coordinate this programme. One of these nodal officers should be the State Project Director of Samagra Shiksha and other may be Director SCERT. Further, teacher training will be conducted at block level, therefore, District Education officer/Block Education Officer may be appointed as nodal officer for this training programme at the block level.

- There will be regular visits by the DEOs, BRCCs and CRCs to schools for continuous monitoring, follow-ups and to ensure that learnings from training are translated in classroom transactions. DEO should visit of at least one school from each block and similarly BRC should visit at least one school from each cluster. CRCs are expected to visit all schools under their jurisdiction. Mechanism for online reporting will be available and reports will also have two parts, (i) Administrative and Governance Issues (ii) Improvement in Learning Outcomes. BRCs and CRCs will send their reports on the Mobile App, which can be seen and analyzed across different levels.

- A system for continuous follow-up and mentoring will be devised in a way that at least once or twice a year, all school teachers in a cluster must come to the cluster school together, share experiences, discuss problems and pedagogical issues etc. and CRCs and Principals will Mentor them.

- After the completion of the teacher training programme, the follow up will be done by the following methods on the portal:
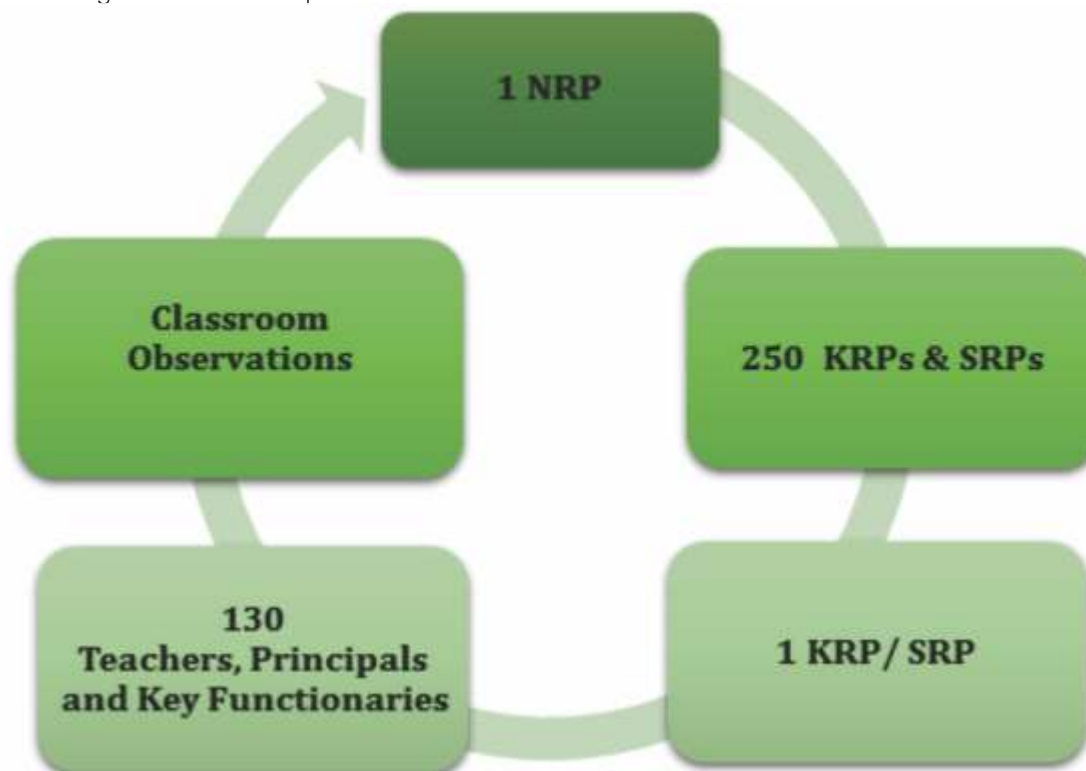
- ✓ A one-minute Video of Classroom Transaction, Activities at various levels can be uploaded by the teachers on the NCERT portal.

- ✓ Blog- A teacher can express the innovative practices taken up for classroom transaction.

- ✓ The teachers, preferably with photographs, can share any material such as Lesson Plan, Testimonials, and Case Studies.

- States and UTs will be given funding for training of KRPs and training of teachers through SRGs under Samagra Shiksha.

- Online monitoring of each activity and expenditure incurred will be done to ensure accountability and optimum utilization of resources.

- After the completion of KRP training, NRGs will regularly be in touch with KRPs through Whats App groups and Facebook Workspace and personal interactions.

- Once the training of one batch is completed at block level, one KRP for each of 130 teachers will be identified as Mentor for continuous guidance, follow-up, feedback and monitoring purpose. Formation of a WhatsApp and Facebook Workspace group is desirable for this purpose. It may also be taken care that newly recruited teachers are paired with senior experienced teachers and thus a quality circle is made to ensure continuous improvement in the system.

- This regular monitoring up to classroom level will help in continuous assessment of needs of teachers for further basic or advanced level trainings. As a next step to this integrated training, some specific advanced level trainings will be designed to enrich teachers' knowledge and skills.

# NISHTHA

National Initiative for School Heads'and Teachers' Holistic Advancement

# Section-I
# Module -1

Curriculum, Learner-centred
Pedagogy, Learning Outcomes
and Inclusive Education

## (An Exemplar)

*A teacher can never truly teach unless he is still learning himself. A lamp can never light another lamp unless it continues to burn its own flame. The teacher who has come to the end of his subject, who has no living traffic with his knowledge but merely repeats his lesson to his students, can only load their minds, he cannot quicken them.*

**Rabindranath Tagore (1994),**
**" The English writing**
**of Rabindranath Tagore: A miscellany".**
**p. 64, Sahitya Academy**

# Curriculum, Learner-centred Pedagogy, Learning Outcomes and Inclusive Education

## Overview

Over the years as an outcome of the Right to Education Act (RTE), 2009, and our education policies, the composition of our classrooms has changed dramatically. As teachers and teacher educators you must have observed this learners' diversity, which also must have made you realise that you cannot and should not teach all children in the same manner. The need to adopt teaching-learning practices, that provide challenging opportunities to all learners and let them experience success, stands out now more than ever before.

"if some children can't learn the way we teach maybe we should teach the way they learn….." - Ignacio Estrada [1]

The purpose of this module is to help teachers and teacher educators like you, to relook at the diversity existing in the classrooms and consider the pedagogies that are most suitable to make teaching-learning inclusive. The suggestions given are gathered from research and experiences and would help you develop more inclusive learning environments to meet the different learning needs in the same class. The content also provides an opportunity to look closely at National Education Policies, the curriculum, syllabus, textbooks, the National

Curriculum Frameworks (in particular NCF-2005), and the recently developed Learning Outcomes (establishing linkage with curricular expectations and pedagogical processes).

India is a multicultural society made up of numerous regional and local cultures. People's religious beliefs, ways of life and their understanding of social relationships are quite distinct from one another. All the groups have equal rights to co-exist and flourish, and the education system needs to respond to the cultural pluralism inherent in our society.

**- National Curriculum Framework (NCF) 2005**

**Important Note:** Teacher educators and key resources persons are expected to engage the participants during the training, in discussions while working in pairs and groups, brain storming and using other suitable forms of interaction and reflection. The 'Discussion Points' interspersed in the text can be used.

### Learning Objectives

**This module will help teachers:**

- Describe the educational policies, the National Curriculum Frameworks development, functions and the linkages among intended, transacted and assessed curriculum

[1] Ignacio Estrada, Director for Grants Administration at Gordon and Betty Moore Foundation; httpp://www.aids.org.

- Explain perspectives of the National Curriculum Framework-2005 and its translation into syllabi and textbooks
- Develop a richer understanding of diversity and acquire the attitudes for promoting inclusive education
- Strengthen existing skills to improve children's learning outcomes using appropriate pedagogies
- Use and adopt learning activities that foster gender sensitive classroom environment

### About the theme

### Unpacking Terminologies, Policies and Frameworks

In order to achieve the above stated objectives at the outset, let us take a closer look at the National Education Policies and the National Curriculum Frameworks and improve our understanding about - curriculum, syllabus, textbooks, and learning outcomes.

| National Education Policy | National Curriculum Framework | Curriculum | Syllabus | Textbooks | Teacher Support Material | Learning Outcomes |
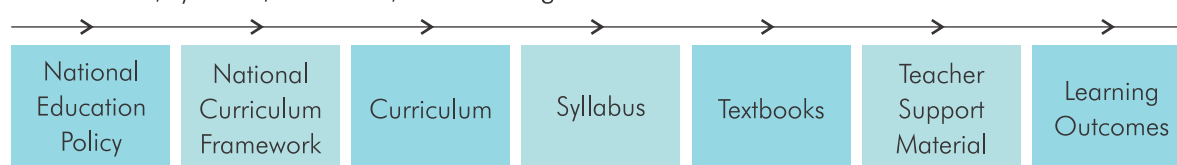
## National Education Policy

India has recently placed in the public domain the draft National Education Policy (NEP), 2019, covering various aspects of our large educational scenario. Discussions n the recommendations are taking place across the country (www.mygov.in). Among the various stakeholders, teachers' opinion hold great value. Prior to this two National Policies on Education were brought out in 1968 and 1986. The National Policy on Education of 1986, emphasises a national system of education implying that, up to a given level, all students, irrespective of caste, creed, location or sex, have access to education of a comparable quality'. The Policy had mandated the National Council of Educational Research and Training (NCERT) to develop the National Curriculum Framework in collaboration with concerned institutions. Visit the link http://www.ncert nic.in/newpolicy.html to read the Policy documents.

National System of Education will be based on a national curricular framework, which contains a common core along with other components that are flexible. The common core will include the history of India's freedom movement, the constitutional obligations and other content essential to nurture national identity. These elements will cut across subject areas and will be designed to promote values such as India's common cultural heritage, egalitarianism, democracy and secularism, equality of the sexes, protection of the environment, removal of social barriers, observance of the small family norm and inculcation of the scientific temper. All educational programmes will be carried on in strict conformity with secular values (National Policy on Education, 1986).

## Discussion Points

Policies change with time and this change is evident as we move from NEP1986 to draft NEP 2019.

For example, the schooling structure which was proposed in NEP 1986 is 10+2+3 while in draft NEP 2019 the suggested structure is 5+3+3+4. Discuss with your partner what is your understanding of the new schooling structure. Also, share one other point of difference in the two policy documents.

## National Curriculum Frameworks: Historical Perspective

NCF 2005 is a landmark document. Before dwelling deeper into its classroom implications a historical overview of various policies and frameworks is required. NCERT was established in 1961, with a mandate of developing curricular material and the first curriculum framework was developed in 1975. As a follow up of the NPE 1986, NCERT, in the year 1988, brought out another curriculum framework titled 'National Curriculum for Elementary and Secondary Education - A Framework'.

### Guiding Principles of Curriculum
#### (As per NCF-2005)

Connecting knowledge to life outside the school

Ensuring that learning is shifted away from rote methods

Enriching the curriculum to provide for overall development of children rather than remain textbook-centric

Making examinations more flexible and integrated into classroom life

Nurturing an over-riding identity informed by caring concerns within the democratic polity of the country

It highlighted the common core principles suggested by the NPE 1986. In the year 2000, The National Curriculum Framework for School Education–2000 was prepared. The major thrust of this curriculum was on learning that leads to education that would help fight inequality and respond to social, cultural, emotional and economic needs of learners.

## NCF 2005 : A Brief

In 2005, the NCERT brought out the National Curriculum Framework 2005 along with 21 position papers on different aspects of school education. The Right of Children to Free and Compulsory Education Act, in 2009, made a clear mention about the implementation of National Curriculum Framework 2005, with a focus on building learner-centered environment in which learners learn without any stress. For more details, visit the web link https://mhrd.gov.in/rte.

The National Curriculum Framework 2005 (NCF 2005), in view of the social and economic changes, identifies the following aims of school education:

• Making children independent in their thought and action and sensitive to others well-being and feelings

• Empowering children to respond to new situations in a flexible and creative manner and to participate in democratic processes

• Developing in children the ability to work towards and contribute to economic processes and social change.

For achieving these aims, schools need to focus on; equality, quality and flexibility. Given the diversity of the country, students' contexts are important to bring into the classroom. NCF 2005 emphasises on the role of teachers to go beyond textbooks so that children can learn from their own experiences through role play, drawing, paintings, dramas, field visits, and conducting experiments.

NCF 2005 also emphasises on the need to see assessment as learning and in-built in the classroom processes. This requires, teachers to continuously and comprehensively assess children in their own way with a purpose to provide children immediate support rather than waiting for their test results and spending time on recording and reporting. Further, it laid importance not only on learning mathematics, languages, sciences and social sciences but also on life skills, social, personal, emotional and psycho-motor skills. NCF 2005 highlights the Learner-centered pedagogy, which can be followed when the learner is the focus while developing the syllabus, textbooks and planning classroom activities. For example, if we want to include a description about 'Plants' at the primary level the syllabus ought to focus on plants that children can see, touch and talk about in their day-to-day life. The textbook ought to provide the description of the same. Teachers can plan opportunities where children share and make posters of plants they have seen in their homes, neighbourhood, schools, etc. In this process they will connect their experiences with what is given in the textbook. While doing so, teachers will observe the progress in learning outcomes of each child.

### Discussion Points

Work in pairs and peep into a typical school day of a teacher. Reflect if any of the above mentioned aims of education are being realised in the day to day teaching? How do you transact your day?

## School subjects and the NCF 2005

Let us take a close look at NCF 2005 and the teaching of different subjects. It highlights that during the

teaching of languages, the language needs to be used as a resource to promote multilingual proficiency. Language acquisition needs to be given importance in every subject area as it cuts across the curriculum. Reading and writing, listening and speech contribute to the child's progress in all curricular areas and must form the basis for curriculum planning. Mathematics needs to be taught in such a way that it enhances thinking, reasoning, visualising and handling abstractions, to formulate and solve problems. Teaching of Science should be recast so that it enables children to examine and analyse everyday experiences. Concerns for the environment should be emphasised in every subject and through a wide range of activities involving outdoor project work.

Social Science learning proposes to recognise the disciplinary markers while emphasising integration of the perspective of marginalised groups. Gender, justice and sensitivity towards children belonging to marginalised groups and minority sensitivities must inform all areas of Social Science. The NCF 2005 also draws attention to the four other curricular areas: work, art and heritage crafts, health and physical education and peace. It recommends bringing these areas in the curricular domain. Certain radical steps to link learning with work from the primary stage onwards are suggested on the ground that work transforms knowledge into experience and generates important personal and social values such as self-reliance, creativity and co-operation. Art as a subject at all stages is recommended, covering all four major spheres i.e., music, dance, visual arts and theatre with an emphasis on interactive approaches.

As a follow up of NCF 2005, syllabi and textbooks developed across subject areas attempt to translate perspectives of learner-centered pedagogy in inclusive settings. We need to keep in mind that every child has the ability to learn however the environment, situation and relevance of the material makes learning interesting. Therefore, while transacting any textbook, we need to reflect on the objectives and how it can be used with all children including those with disabilities and from disadvantaged home backgrounds.

## Discussion Points
- Can learner-centered pedagogy be used in large classrooms?
- Can all subjects be planned using learner-centered pedagogy?

Curriculum is understood as a set of planned activities, designed to implement a particular educational aim/set of aims; and consists of the content of what is to be taught, the knowledge, skills and attitudes which are to be developed among the learners. It includes syllabus, textbooks and other learning material, pedagogy and assessment together with statements of criteria for selection of content, and choice in methods, materials and evaluation. For further reading refer to 'Curriculum, Syllabus and Textbooks' - Position paper published by the NCERT.

## Curriculum

All of us have gone through the process of schooling. We know that all the activities that contribute to the holistic development of the learners in the school revolve around the curriculum. Understanding the curriculum and its transaction helps all stakeholders relate to the textbook content, development of cognitive and human values, and integrate concerns related to gender and inclusion of all learners in the learning process.

The basic factors which determine the curriculum are known to include: nature of learning, knowledge of human development provided by the accepted theories and societal influences. In

addition, the needs and aspirations of the society, to a large extent, determine the nature of the curriculum, the content, the subjects and their organisation. The curriculum also has a transformative role to play.

As teachers and teacher educators we know that there are certain aspects that are taught informally in a school system which is referred to the hidden curriculum.

The hidden curriculum includes behaviours, perspectives and attitudes that students acquire during the schooling process. It is important to realise that a hidden curriculum is what students absorb in school and that it may or may not be a part of the formal course of study.

## Syllabus

The syllabus provides a list of themes, topics — class wise and subject wise. It also provides the time duration within which to complete the topic and the assessment criteria. The syllabus is a document that communicates course information and defines expectations and responsibilities. It is a requisite document for teaching in that it serves to outline the basic elements of a course including what topic will be covered, a weekly schedule and a list of tests, assignments and the associated weightage. The syllabus articulates the connections between learning outcomes, assessments, content and pedagogical practices. It highlights the way in which the course is constructively aligned for guiding students through their learning. There are four essential components to an academic syllabus; themes and questions, objectives, suggested activities, resources and notes for teachers.

## Textbooks

Textbooks provide contents on the topics/themes included in the syllabus. Textbook is a printed/digital learning resource for all students. They need to be learner friendly and reflective of the perspective of NCF.

### Features of Learner-centered Textbooks

- Interactive with less information and more activities
- Provides space for learners to reflect and construct their own knowledge
- Covers the diversity of the country
- Demonstrate commitment to Constitutional Values
- Provide space for sensibilities towards the social concerns, such as gender, inclusion, etc.



Foods We Eat

- Attempt to provide space to work
- Attempt to provide space to ICT
- Have in-built evaluation
- Presents content in simple language
- Integrate arts, health and physical education

## Role of Library in schools

NCF 2005 advocated for a school library mentioning that 'the school library should be conceptualised as an intellectual space where teachers, children and members of the community can expect to find the means to deepen their knowledge and imagination." School Libraries can be the centre of all convergence of learning in schools for all curricular areas. Studies on literacy confirm what educators have known for years: the more contact children have with books, the better readers they become. Teachers can promote better reading performance by reading to children daily and by having them interact with books through the extensive use of libraries. They offer the possibility for children to explore sources of knowledge beyond textbooks. Today literature for children's libraries is not just about stories but also includes a wide array of books like fiction, non-fiction and poetry. Libraries can contribute to learning from children in the early grades to young adults as well and can be a great repository for teachers as well. School libraries can run in the form of a separate room or classroom library or any other way that the school thinks this could be made to work. What is important is that children's interaction with books is made possible. It is suggested that a Library Training module may be developed to provide some essential guidelines for setting up and running a library in school by school principals, teachers, librarians as per the context of the States/UTs by the SCERTs/SIEs.

### Discussion Points
- Share a teaching experience of going beyond the textbooks in your classroom. What are your views about students' participation and learning in such an experience?
- Libraries are an important component of schooling, but mostly these are considered as spaces full of books. Share your views on how to make library space a more lively and vibrant space.

## Learning Outcomes

NCERT has recently developed Learning Outcomes which are meant to move away from assessment based on rote memorisation of the content. The competency (learning outcomes) based assessment has been emphasised to help teachers and the whole system to understand what children will achieve across the year in a particular class in terms of knowledge, skills and change in social-personal qualities and attitudes. Learning Outcomes are statements that include the knowledge and skills children need to acquire by the end of a particular class or course and are supported by the pedagogies which teachers need to implement for enhancing learning. The statements are process

based and provide the check points that are measurable in both qualitative or quantitative manner for assessing the progress of a child on the scale of holistic development. Two learning outcomes for Environmental Studies as examples are given below -

Competency includes a cluster of related abilities, commitments, knowledge, and skills that enable a person to act effectively in a situation. Competence indicates sufficiency of knowledge and skills that enable someone to act in a wide variety of situations.

- Learner describes the need of food for people of different age groups, animals and birds, availability of food and water and use of water at home and in the surroundings

- Learner describes roles of family members, family influences (traits/features/habits/ practices), need for living together through oral/written/other ways.

    In order to attain the above learning outcomes, the learners have to be provided with opportunities to work in pairs, groups, individually and are to be encouraged to observe and explore the immediate surroundings; record and express them in oral/written/drawings/gestures. Children need to be allowed to discuss with elders and visit different places, collect information from them on the topic of their choice and discuss the findings in the groups.

    The Learning Outcomes at the Elementary Stage are meant to provide effective learning opportunities to all the students including children with special needs (CWSN) and those belonging to disadvantaged groups. These have been developed for different curricular areas for all children including those with special needs. The learning outcomes are linked with the curricular expectations and pedagogical processes. The provisions for children belonging to disadvantaged groups include the following:

- Ensure their participation in the learning process and help them progress like other children. Avoid comparing children.
- Modifying the curriculum and learning environment to suit individual needs.
- Provision of adapted activities in different content areas.
- Accessible text and materials to suit age and levels of learning.
- Appropriate management of classrooms, e.g., management of noise, glare, etc.
- Provision of additional support by using Information and Communication Technology (ICT), video or digitised formats.
- Mobility aids (wheel chair, crutches, white cane), hearing aids, optical or non-optical aids, educational aids (Taylor frame, abacus, etc.)
- Sensitising other children about the strengths and weaknesses of CWSN.
- Additional time and selecting suitable mode (s) for the successful completion of assessments.
- Respect for home language and relating to socio-cultural milieu (e.g., traditions and customary practices etc.)

> The problem is not how to wipe out all the differences but how to unite with all differences intact.
>
> **– Rabindranath Tagore**

## Pedagogies for Achieving the Learning Outcomes for all Children Inclusive Classrooms Role of Teachers

Part of the process towards education which is inclusive of learners with disabilities and other marginalised children requires a critical analysis of why the regular mainstream system is not successful in providing good quality education for all school-age children as it is currently organised. It also asks for identification of existing resources and innovative practices in local contexts, and examining barriers to access, participation and learning. Read the handout with the story 'Animal School' individually. Share your views with the whole class on each of the questions that follow the story.

Teachers ought to remember that effective and inclusive teaching is good for all children. It helps to focus on children's unique strengths and weaknesses, and thus for their individual learning needs. In order to give all learners effective learning opportunities to achieve learning outcomes, a dramatic shift from exclusivity to inclusivity is required. We need to take into account not only the cultural diversity but also diverse social and economic background and variations in physical, psychological and intellectual characteristics of children if they have to learn and achieve success in school (NCF 2005).

### Animal School: A Story for Analysis [2]

Once upon a time the animals decided they must do something heroic to meet the problems of a "new world" so they organised a school.

- They had adopted an activity curriculum consisting of running, climbing, swimming and flying.

- To make it easier to administer the curriculum, all the animals took all the subjects.

- The duck was excellent in swimming. In fact, better than his instructor. But he made only passing grades in flying and was very poor in running. Since he was slow in running, he had to stay after school and also drop swimming in order to practice running.

- This was kept up until his webbed feet were badly worn and he was only average in swimming. But average was acceptable in school so nobody worried about that, except the duck.

- The rabbit started at the top of the class in running but had a nervous breakdown because of so much makeup work in swimming.

- The squirrel was excellent in climbing until he lost interest as his teacher made him start from the ground up instead of the treetop down. He was made to over exert and then got a C in climbing and D in running.

- The eagle was a problem child and was disciplined severely. In the climbing class, he beat all the others to the top of the tree but was not liked as he insisted on using his own way to get there.

- At the end of the year, an abnormal eel that could swim exceeding well and also run, climb and fly a little had the highest average and was winner

- The prairie dogs stayed out of school and fought the administration as they would not add digging and burrowing to the curriculum.

[2]An adaptation of George Reavis' fable, "The Animal School", originally written in 1940, when he was superintendent of the Cincinnati Public Schools.

## Worksheet

Share views on:
- Why did the animals take the same subjects? Did they all benefit?
- Being average in all subjects was acceptable by the school. Did this suit all the animals?
- Why do you think the squirrel wasn't allowed to fly down from the tree-top?
- Why was the eagle seen as a problem child?
- Why do you think the prairie-dogs wanted digging and burrowing added to the curriculum?

In schools, there should be no fear of facing discrimination, corporal punishment, abuse or teasing/bullying. Also, the teachers need to plan their learning tasks and pedagogical practices in a way that all children are able to participate equally in the education process. The class environment should be such that every child feels happy and relaxed instead of feeling, bored, scared or alone. To uphold the fundamental right to education given to all children, creating safe and inclusive environment for all learners is critical.

Every child has the right to be supported to go to school in his/her community, be welcomed and included by teachers and peers alike. Studies have shown that inclusion is most cost-effective, and academically and socially more effective, than segregated schooling. When all children, regardless of their background or learning needs, are educated together, everyone benefits – and that is the cornerstone of inclusive education. School and teachers must take up their responsibility with greater rigour to provide quality teaching and learning opportunities for children. It is important to always remember that when seeking explanations for lack of achievement, teachers must be prepared to consider inadequacies in the teaching-learning conditions rather than inadequacies in children. We must understand the whole point of education is not only to create inclusive schools but also, inclusive societies.

## Discussion Points

- Can you think of other reasons why all children should attend regular schools?
- Discuss in small groups how educating all children together can help to build inclusive societies?

Teachers inadvertently inculcate gender based attitudes as a result of their own social interactions both formally and informally. Therefore all teachers themselves must leave their own prejudices/biases behind when they enter the classrooms. Girls, particularly those from marginalized groups such as SC and ST often feel segregated in their own learning environments due to inability to identify with content, bias stereotyping which may be there in textbooks, representation of women in passive roles and of men in progressive roles; discriminatory attitude of teachers in terms of selective distribution of roles and responsibilities and allocation of activities, use of derogatory language, etc. Such an attitude creates low self-esteem and feeling and feeling of isolation which in turn may affect their level of participation in classroom activities. It is here that the teacher can play a meaningful role. The teacher needs to make the teaching-learning environment participatory and ensure that girls are also actively involved in the learning process. The teacher should first identify the gender differences in all schooling activities and then plan and implement the activities in the classroom and outside accordingly. Such an effort is likely to create an enabling environment in the classroom where all students including girls can share their experiences, question existing prejudices and stereotypes and work out suitable solutions based on discussion and debate.
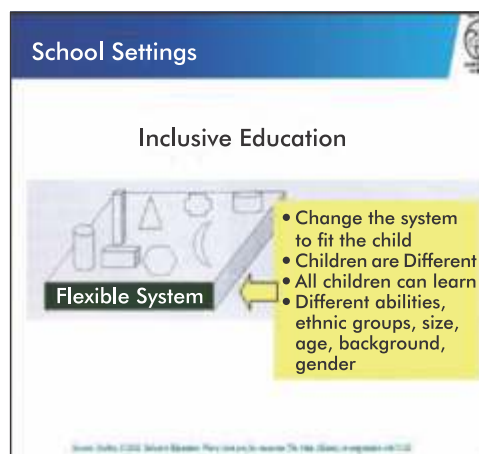


## Discussion Points

Discuss in groups how teachers can develop gender inclusive behaviour among children.

## Teachers' Skills

### Accept and Address Diversity

- Sensitivity for identifying differences in learners - being aware of the strengths and weakness, aptitude and interest of children, including those with disabilities.

- Acceptance of socio-cultural, socio economic, and physical variations among learners - understanding the social milieu, traditional, and cultural practices, natural habitat, environment at home and in the neighbourhood.

- Appreciating differences and considering them as resource — utilising the varied context and knowledge of children in the learning process.

- Empathy to perceive and act on the different learning needs — be considerate to the learning styles and respond accordingly.

- Ability to mobilise resources to provide various options to the learner — identify and organise various resources in print and digital forms, low cost material in the surroundings, artefacts, learning sites in the vicinity and supportive human resource.

- Use of technology to support learning - use of various apps for example, google art and culture, google sky, google earth, subject specific apps: geogebra, tux of math and Google speak.

- Dealing with inter personal relations/soft skills - skills of listening, responding, initiating and maintaining conversation, positive regard, body appearance and gesture.

**Discussion Points**
- Have you tried any of these skills while addressing diversity in your teaching?
- What kind of teaching skills will you use to encourage equal participation of all learners in your class?

## Gender-sensitive education

We all know that gender is a cross cutting concern across all disciplines and is basic to the construction of knowledge. Gender sensitivity is an important pedagogical concern which teachers should integrate in their teaching–learning processes. As facilitators through their positive attitude and pedagogical interventions they can help the students in unlearning of gendered and stereotypical attitudes which they acquire through the socialisation processes. Teachers also need to recognise the factors of gender bias in textual material and curriculum transaction; identify the biases with regard to the content or role allocation to male and female characters; explore linguistic bias and recognize the participation of women in all spheres including political, social and economic processes.

## Promoting Inclusion in Transaction of Disciplines

Read the six statements on "Myself as a learner" and working on your own, complete the statements.

## Myself as a learner [3]

**Working independently complete these sentences:**

I learn slowly when _____
_____

learn quickly when _____
_____

Learning from textbooks is _____
_____

Learning in groups is _____
_____

I learn well from someone who _____
_____

I enjoy learning when _____
_____

Share and collate your responses on each statement in the large group. It is amply clear that we all have our own preference to learn successfully. The above exercise can be undertaken with the children in your class to know more about them as learners and plan teaching accordingly. You can ask children to complete the sentences in writing or respond verbally.

## Inclusion in Teaching of Languages

Some children may have specific difficulties in learning languages. Teachers may need to adopt suitable strategies to overcome the difficulties. These may include

- incorporating content related to real-life situations which benefit all children,
- where there is more than one language used in any area, use of the preferred majority language,
- creating awareness and sensitivity amongst all children about, Sign language and Braille script,
- alternative communication systems to compensate for the difficulties faced in using spoken language,
- using ICT for children with difficulties in writing.
- Some children may require support for interpreting written information,
- provide more time and individualised attention for long passages and learning from visual inputs. Reading Braille text involves memorising and synthesising as wholeness of phrases, sentences, etc., is not possible. Children with visual impairment while reading Braille text thus require more time,

[3] Adapted from UNESCO Teacher Education Resource Pack: Special Needs in the Classroom

- teachers and others working with children with hearing impairment need to provide need based support for - comprehending new vocabulary, discriminating between words and understanding words with multiple meanings.

- Composing sentences involves producing grammatically and semantically correct text which may be difficult for some children. Grammar usage (past tense, prepositions, active and passive construction) may also pose challenges. Teachers need to focus on sentence construction, forming connections between ideas and concepts, organising thoughts and understanding and using phrases,

- teachers and others working with children with cognitive impairments need to provide support for: oral language (listening, expressing ideas and/or speaking) and articulation (ability to speak fluently and coherently), reading (including decoding, phonetic knowledge and word recognition). The student may skip words, lose place, mistake one word for another, and experience difficulty in understanding figurative language — idioms, metaphors, similes, etc. and

- language comprehension (new vocabulary, sentence structure, words with different meanings and concepts) especially when presented rapidly, may lead to difficulty in taking class notes. Teachers also need to remember that some children may face difficulty while organising thoughts, making revisions, pronouncing words and/or sequencing a story and while performing activities involving eye hand coordination and writing (illegible handwriting, frequent spelling errors).

## Inclusion in Teaching of Mathematics

To overcome difficulties of access some pupils may require simplification of the language, tactile material, and teaching aids for geometry, and making calculations while solving sums. Children may also need help in interpreting data in graphs, tables, or bar charts. There may be learners who may need help in interpreting oral directions or while making mental calculations. Use of ICT can help to overcome difficulties with quantitative and abstract concepts.

Teachers and others working with children with visual impairment need to provide support for developing spatial concepts and understanding the relationship between

spatial concepts, three-dimensional objects transformed into two-dimensional forms, and special characters (symbols) used in Mathematics. These children may face difficulty in interpreting audio recording of mathematical text( for example, equations), difficulty in transcribing and reading mathematical text in Braille because of spatial arrangement, colour codes and learning of Nemeth or any other Mathematical Braille Code.

- Teachers and others working with children with hearing impairment need to provide support for: delay in linguistic growth, which may lead to lack of general vocabulary and technical vocabulary of Mathematics (words like reciprocal, linear, etc.), understanding the wordiness (use of a number of words to explain meaning of mathematical problems, and distinguishing

words with multiple meanings like interest, table, credit, angle, rate, volume, power, point, etc. Student while lip/speech reading may face difficulties in distinguishing mathematical words (tens and tenths, sixty and sixteen, etc.). Difficulties may also be faced due to limited use of cognitive strategies to select the relevant information and apply rules necessary for solving problems.

- Children with cognitive impairments may face difficulties in sequencing, step-wise problem solving and in place value. Mathematical calculations (computations), number reversals, copying problems and confusion in operational symbols, such as $+$ for $\times$, and difficulty in recalling sequences of operations are also evident. Difficulties may be faced by children while comprehending abstract concepts in Algebra and Integers, etc., and identifying different shapes in geometry and directionality and comprehension of word problems.

## Inclusion in Teaching of EVS and Science

Some students may require support with mobility and manipulation skills to participate in experiments or other hands on activities being performed both indoors and outdoors. Students can benefit from adapted or alternative activities, adapted equipment, the use of ICT, adult or peer support, additional time, and support in lessons that may not be easily accessible to them.

Teachers and others working with children with visual impairments need to provide support for understanding visual inputs on chalkboard, demonstrations, presentations,

graphics and diagrams, experiments, involving physical safety, abstract and difficult concepts. There may also be a requirement for more time.

- Children with hearing impairment require support for understanding abstract words and the connections between abstract concepts. Science concepts like photosynthesis, habitat, and microorganisms without visual representations can pose difficulty. Solving problems that involve more than one dimension for example; comparing objects on the basis of multiple dimensions like number, size, shape, and colour may be difficult as compared to those with single dimension like size only.

- Understanding the technical language of science, and drawing meaningful linkages/relationships between concepts (for example, between pressure and force) need to be planned for proper comprehension for children with cognitive impairment. Support is required for understanding abstract concepts, planning, organising, sequencing and generalising. Peer support works well while conducting science experiments.

## Inclusion in Teaching of Social Sciences

In order to achieve learning outcomes in EVS and Social Sciences, some students may require support in the form of prepared tapes, talking books/DAISY books to access text; help in writing to communicate their ideas through alternative communication methods, such as ICT or speech; adaptation of content and activities; education aids to manage visual information; and/or support to understand various geographical concepts, features and the environment. Group activities such

as projects and assignments done through cooperative learning will enable all students to participate actively in all classroom activities. Resources such as tactile diagrams/maps, talking books, audio-visual and Braille material, etc., may be used.

Teachers need to plan carefully for children with visual impairment while explaining geographical terms and concepts, for example, latitude, longitudes, directions and providing graphic and visual descriptions like reading maps,graphs, diagrams, paintings, inscriptions, and symbols and while studying monumental architecture.

These children also require support for making observations of environment and space — land, climate, vegetation and wildlife, distribution of resources and services. Reference material like spelling lists, study questions, important references, and other information students may need for reference can be provided in enlarged, tactile or embossed formats or redrawn with proper contrast.

- Children with hearing impairment require support for understanding of terminologies/technical terms, abstract concepts, facts, comparisons, cause effect relationships and chronology of events, etc. They do well with help for reading loaded heavy text (textbooks/source materials) in History and Civics and drawing inferences.

- Illustrations, charts, graphs and maps can be difficult to understand for some children including those with cognitive processing problems. Extracting relevant information from long text can be a challenge for students with reading difficulties. Further the teacher needs to keep in mind that remembering the sequence of events and connecting them, making generalisation and relating information in the textbooks with the environment can pose problems. Some children may show limited ability to understand and interpret abstract concepts.

## Assessment for Inclusive Environment

The module presented some ideas and examples to help you create an inclusive classroom having children with diverse learning needs. This section presents some suggestions for implementing assessment in an inclusive setting, and prompts you to develop new ways to engage in inclusive assessment. While planning your teaching, it is good to remember that assessment occurs throughout the teaching of a lesson. This allows you, to recognise and plan the following steps in teaching of the topic. Assessment at the end of your teaching of the lesson helps you to understand how far your teaching objectives are realised.

### As per the NCF-2005, the purpose of evaluation is not
- to force children to study under threat.
- to identify or label children as 'slow learners', or 'bright students', or 'problem children'. Such categories segregate children, placing the onus for learning solely on them, and detract from the role and purpose of pedagogy.

- In a mixed ability group encourage varied responses for a question and give clear messages and pause after asking a question to give adequate time to respond. We must remember that activities done for explaining the content can be used again for assessment.

1, 2 & 3: Universal Design of Learning (UDL)
and inclusive Education based Barkhaa:
A Reading Series for All (In Print & Digital Forms)
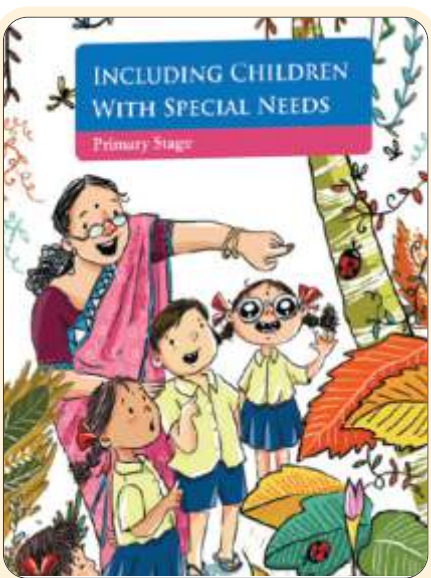


Including Children with Special Needs
Primary Stage (In Hindi & English)

- Allow flexibility in choosing answers, for instance, recognition and identification rather than recall, colouring the correct answer, cut and paste, matching, pointing the odd one out. For example, for responses requiring auditory processing, accept responses in monosyllables.

  replace tracing of alphabet activities in the textbook exercises with cut-outs of alphabets allowing the student to explore the contour and shape of an alphabet more closely.

  alternatively allow students with speech processing delays to demonstrate learning by use of pictures or stamps - allow the student to point to picture (s) as demonstration of learning.

- Use flash cards, word cards (for example, to introduce words or to construct a grammatically correct sentence), and pictures, real objects, to get response rather than only verbal or written response. For example, ask the child to pick up the flash card when you call the name of an animal. Activities, such as matching or checking answers can be done with the help of real objects.

## Discussion Points

### Share with your partner

- How will you make schools more inclusive?
- How does inclusive education help children to stay with their families and communities?
- To what extent does the inclusive approach strengthen teaching methods and improve the quality of education for all?

## Conclusion

This module will help teachers and all other stakeholders engaged in the task of making schools inclusive acquire knowledge, attitudes and skills needed to work effectively with students from diverse groups. The content will help readers take a closer look at the national policies, the curricular frameworks, in particular NCF 2005, learning

outcomes and appropriate pedagogies for achieving them. It will enable teachers to: use inclusive strategies and accept every child as a member belonging to the group, restructure the classroom physically and attitudinally to provide for the needs of all students, plan activities in such a way that the participation of ALL students in class is ensured and focus on practices in school to respond to the diversity of students.

## Self-assessment

- Summarise the changes you will make in your teaching subject wise to support diverse learners while teaching lessons.
- Place them in an order of priority starting with the change(s) you feel are most important
  1.
  2.
  3.
- Identify the support and guidance that would help you as teacher to make these changes.
- How can these changes be beneficial to all children? Compare your answers with other colleagues in your school and add ideas to your list.
- How will I make the assessment meaningful and inclusive for all children? Compare your list with that of your partner.

# NISHTHA
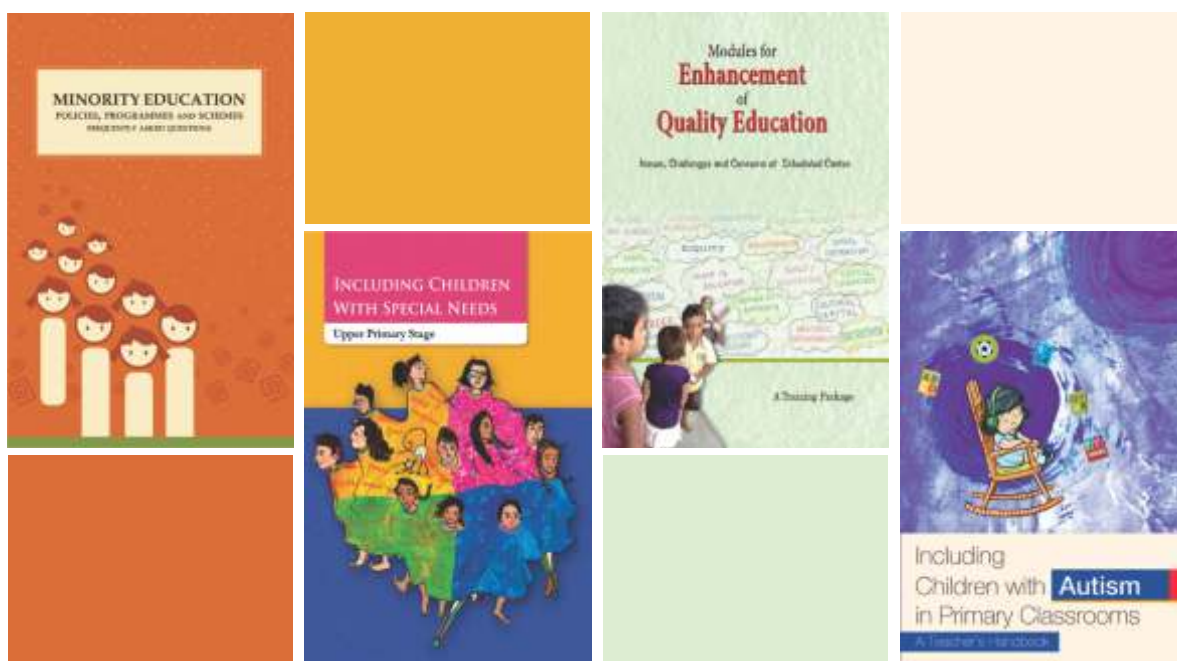
# Section-II
# Module - 11
## Pedagogy of Science

## (An Exemplar)

# Pedagogy of Science (Upper Primary Stage)

## 1. Overview

The module on pedagogy of science has been developed for teachers teaching science at upper primary stage. In this module focus is on how children learn science at upper primary stage. The module focuses on the following points -

- Learning objectives
- What is science?
- Curricular expectations at upper primary stage
- Learning outcomes in science at upper primary stage (Classes VI, VII & VIII)
- Suggestive pedagogical processes for achieving the learning outcomes
- Examples from NCERT, Science Textbook at upper primary stage
- Suggested activities for KRPs in the training programme

## 2. Learning Objectives

After going through this module, the learner is expected to

- have basic understanding of science as a subject at upper primary stage
- have basic understanding of curricular expectations and learning outcomes at upper primary stage
- apply science as a process of inquiry and knowledge construction
- explain how teacher can facilitate learning
- integrate content, pedagogy and assessment during teaching-learning process
- design various learning situations for students to transact concepts

## 3. What is Science?

Human beings have always been curious about the environment around them. One kind of response from the earliest times has been to observe the physical and biological environment carefully, look for any meaningful patterns and relations, and build conceptual models to understand the world on the basis of observations and thus arriving at theories, laws and principle. This human endeavour is science.

Science is a dynamic, expanding body of knowledge covering ever new domains of experiences. It is an organized system of knowledge which is based on inquiry evolved out of natural curiosity, logical reasoning and experimentation. In a progressive society, science can play a truly liberating role, helping people escape from the vicious cycle of poverty, ignorance and superstition. People today are faced with a fast changing world where the most important skills are flexibility, innovation and creativity. These different imperative have to be kept in mind in shaping science education.

## 3.1 Curricular Expectations at the Upper Primary Stage

At the upper primary stage, children get their first exposure to 'science' as a discipline. Science at this stage provides a gradual transition from environmental studies of the primary stage to the elements of science and technology at upper primary stage. Concepts of science to be taught at this stage should be chosen so as to make sense of everyday experiences. Activities and experiments should form the essential component part of the teaching-learning process.

Science concepts at the upper primary stage should not be governed by disciplinary approach. Science at this stage should be taught as an integrated subject and it is not to be regarded as a diluted version of secondary stage. The child should be engaged in learning the principles of science through familiar experiences, working with hands to design simple technological units and models. Focus should also be given to learn more about the environment and health, including reproductive and sexual health. Scientific concepts are to be derived mainly from observations, activities, experiments and surveys. Group activities, discussions with peers, teachers and community members, surveys, collection and organisation of data and their display through exhibitions, etc., in schools and the neighbourhood should be important components of pedagogy. Technological components such as design and fabrication of simple models, practical knowledge about common mechanical and electrical devices and local specific technologies are to be included in science curriculum.

Apart from simple experiments and hands on experiences, an important pedagogic practice at this stage is to engage the students (in groups) in meaningful investigations particularly of the problems they perceive to be significant and important. This may be done through discussions in the class with the teacher, peer interactions, gathering information from newspapers, talking to knowledgeable persons in the neighbourhood, collecting data from easily available sources (books, journals, magazines, television, internet, etc.) and carrying out simple investigations of which the students have a major role to play.

Science curriculum at the upper primary stage is intended to develop

- scientific temper and scientific thinking
- process skills of science which includes
- observation(s)
- posing question(s)
- searching various resources of learning
- planning investigations
- hypothesis formulation and testing
- using various tools for collecting, analysing and interpreting data
- supporting explanations with evidences and justifications
- critically thinking to consider, weigh and compare alternative explanations
- reflecting on their own thinking

- appreciation for historical aspects of evolution of science
- sensitivity towards environmental concerns
- respect for human dignity and rights, gender equity
- values of honesty, integrity, cooperation, concern for life and public property.

The science curriculum at the upper primary stage as per NCF - 2005 has been organised around the following themes that are cross disciplinary in nature -

- Food
- Materials
- The World of the Living
- How Things Work
- Moving Things, People and Ideas
- Natural Phenomena
- Natural Resources

## 4. Learning Outcomes in Science at the Upper Primary Stage

Learning outcomes identify what the learner will know and be able to do by the end of a course or class. Detailed class wise learning outcomes along with the examples are on the next page.

| Class VI |
|---|
| The learner - <br><br> • identifies materials and organisms, such as, plant fibres, flowers, on the basis of observable features i.e. appearance, texture, function, aroma, etc. <br><br> • differentiates materials and organisms, such as, fibre and yarn; tap and fibrous roots; electrical conductors and insulators; on the basis of their properties, structure and functions. <br><br> • classifies materials, organisms and processes based on observable properties, e.g., materials as soluble, insoluble, transparent, translucent and opaque; changes as can be reversed and cannot be reversed; plants as herbs, shrubs, trees, creeper, climbers; components of habitat as biotic and abiotic; motion as rectilinear, circular , periodic. <br><br> • conducts simple investigations to seek answers to queries, e.g., What are the food nutrients present in animal fodder? Can all physical changes be reversed? Does a freely suspended magnet align in a particular direction? <br><br> • relates processes and phenomenon with causes, e.g., deficiency diseases with diet; adaptations of animals and plants with their habitats; quality of air with pollutants, etc. <br><br> • explains processes and phenomenon, e.g., processing of plant fibres; movements in plants and animals; formation of shadows; reflection of light from plane mirror; variations in composition of air; preparation of vermin-compost, etc. |

- measures physical quantities and expresses in SI units, e.g., length.

- draws labelled diagrams/flow charts of organisms and processes, e.g., parts of flowers, joints, filtration, water cycle, etc.

- constructs models using materials from surroundings and explains their working, e.g., pinhole camera, periscope, electric torch, etc.

- applies learning of scientific concepts in day-to-day life, e.g., selecting food items for a balanced diet; separating materials; selecting season appropriate fabrics; using compass needle for finding directions; suggesting ways to cope with heavy rain/ drought, etc.

- makes efforts to protect environment, e.g., minimising wastage of food, water, electricity and generation of waste; spreading awareness to adopt rain water harvesting; care for plants, etc.

- exhibits creativity in designing, planning, making use of available resources, etc.

- exhibits values of honesty, objectivity, cooperation, freedom from fear and prejudices.

## Class VII

The learner -

- identifies materials and organisms, such as, animal fibres; types of teeth; mirrors and lenses, on the basis of observable features, i.e., appearance, texture, functions, etc.

- differentiates materials and organisms such as, digestion in different organisms; unisexual and bisexual flowers; conductors and insulators of heat; acidic, basic and neutral substances; images formed by mirrors and lenses, etc., on the basis of their properties, structure, and function.

- classifies materials and organisms based on properties/characteristics, e.g., plant and animal fibres; physical and chemical changes.

- conducts simple investigations to seek answers to queries, e.g., Can extract of coloured flowers be used as acid-base indicator? Do leaves other than green also carry out photosynthesis? Is white light composed of many colours?

- relates processes and phenomenon with causes, e.g., wind speed with air pressure; crops grown with types of soil; depletion of water table with human activities, etc.

- explains processes and phenomenon, e.g., processing of animal fibres; modes of transfer of heat; organs and systems in human and plants; heating and magnetic effects of electric current, etc.

- writes word equation for chemical reactions, e.g., acid-base reactions; corrosion; photosynthesis; respiration, etc.

- measures and calculates e.g., temperature; pulse rate; speed of moving objects; time period of a simple pendulum, etc.

- draws labelled diagrams/flow charts e.g., organ systems in humans and plants; electric circuits; experimental set ups; life cycle of silk moth, etc.

- plots and interprets graphs e.g., distance-time graph.

- constructs models using materials from surroundings and explains their working, e.g., stethoscope; anemometer; electromagnets; Newton's colour disc, etc.

- discusses and appreciates stories of scientific discoveries.

- applies learning of scientific concepts in day-to-day life, e.g., dealing with acidity; testing and treating soil; taking measures to prevent corrosion; cultivation by vegetative propagation; connecting two or more electric cells in proper order in devices; taking measures during and after disasters; suggesting methods for treatment of polluted water for reuse, etc.

- makes efforts to protect environment, e.g., following good practices for sanitation at public places; minimising generation of pollutants; planting trees to avoid soil erosion; sensitising others with the consequences of excessive consumption of natural resources, etc.

- exhibits creativity in designing, planning, making use of available resources, etc.

- exhibits values of honesty, objectivity, cooperation, freedom from fear and prejudices.

## Class VIII

The learner -

- differentiates materials and organisms, such as, natural and human made fibres; contact and non-contact forces; liquids as electrical conductors and insulators; plant and animal cells; viviparous and oviparous animals, on the basis of their properties, structure and functions.

- classifies materials and organisms based on properties/characteristics, e.g., metals and non metals; kharif and rabi crops; useful and harmful microorganisms; sexual and asexual reproduction; celestial objects; exhaustible and inexhaustible natural resources, etc.

- conducts simple investigations to seek answers to queries, e.g., What are the conditions required for combustion? Why do we add salt and sugar in pickles and murabbas? Do liquids exert equal pressure at the same depth?

- relates processes and phenomenon with causes, e.g., smog formation with the presence of pollutants in air; deterioration of monuments with acid rain, etc.

- explains processes and phenomenon, e.g., reproduction in human and animals; production and propagation of sound; chemical effects of electric current; formation of multiple images; structure of flame, etc.

- writes word equations for chemical reactions, e.g., reactions of metals and non-metals with air, water, and acids, etc.

- measures angles of incidence and reflection, etc.

- prepares slides of microorganisms; onion peel, human cheek cells, etc., and describes their microscopic features.

- draws labelled diagram/flow charts, e.g., structure of cell, eye, human reproductive organs; experimental set ups, etc.

- constructs models using materials from surroundings and explains their working, e.g., ektara, electroscope, fire extinguisher, etc.

- applies learning of scientific concepts in day-to-day life, e.g., purifying water; segregating biodegradable and non-biodegradable wastes; increasing crop production; using appropriate metals and non-metals for various purposes; increasing/reducing friction; challenging myths and taboos regarding adolescence, etc.

- discusses and appreciates stories of scientific discoveries.

- makes efforts to protect environment, e.g., using resources judiciously; making controlled use of fertilizers and pesticides; suggesting ways to cope with environmental hazards, etc.

- exhibits creativity in designing, planning, making use of available resources, etc.

- exhibits values of honesty, objectivity, cooperation, freedom from fear and prejudices.

In National Achievement Survey 2017, which was based on Learning Outcomes, percentage of correct responses (on an Average) for class VIII in Science at the National level was found as follows —

Class VIII - 44%

Do we know about state average achievement and district average achievement? Details are available on http://www.ncert.nic.in/programmes/NAS/SRC.html. We need to reflect on how to improve learning outcomes of our students in science.

## 5. Suggestive Pedagogical Processes for Achieving the Learning Outcomes

The learner is to be provided with opportunities in pairs/groups/individually in an inclusive setup and encouraged to

- explore surroundings, natural processes, phenomena using senses viz. seeing, touching, tasting, smelling, hearing.

- pose questions and find answers through reflection, discussion, designing and performing appropriate activities, role plays, debates, use of ICT, etc.

- record the observations during the activity, experiments, surveys, field trips, etc.

- analyse recorded data, interpret results and draw inference/make generalisations and share findings with peers and adults.

- exhibit creativity presenting novel ideas, new designs/patterns, improvisation, etc.

- internalise, acquire and appreciate values such as cooperation, collaboration, honest reporting, judicious use of resources, etc.

The pedagogical processes listed above are suggestive and intended to give directions to teachers to design various learning situations for students. It is expected that teachers will provide opportunities to children to engage in the practice of science and construction of knowledge by children. Learning as a process of construction of knowledge requires connecting new ideas to the existing ideas on the basis of materials/activities presented to them. Hence, teachers' understanding of learners' experiences and ideas are very important for designing teaching-learning situations. Thus, it is expected that teachers will design appropriate learning situations as per the experiences of the children and availability of resources and taking care of local context. Some exemplar concepts to integrate learning outcomes while transacting concepts in a classroom are discussed.

## 6. Examples from NCERT Science Textbooks - Upper Primary Stage (Classes VI–VIII)

Various strategies on how to transact concepts from NCERT Science Textbooks have been given. Teachers may have other ways of transacting the same concept. It is expected that teachers will use locally available material while transacting concepts. Various resources such as Science Kits, Information and Communication Technology (ICT), art education, etc., may be judiciously employed to enrich teaching-learning of science.

### 6.1 Example 1

Class VIII

Chapter 4 - Metals and Non-metals

Key Concept - Physical Properties of Metals and Non-metals (Page 44 Section 4 .1)

## Learning Outcomes

The learner —

- Conducts simple investigations
- Classifies elements into metals and non-metals on the basis of their properties
- Explains processes
- Draws labeled diagram
- Applies learning of scientific concepts in day to day life
- Exhibits honesty, cooperation and creativity
- Makes effort to keep surrounding clean

## Know Your Students

The availability of resources has always been a matter of great concern for activity based teaching-learning. The teacher may try to manage it by taking help of students who have always proved to be one of the greatest resources.

The first requirement for a teacher is to know about her students and establish a rapport with them. This will help her to plan students' involvement in various activities during teaching-learning process. Some students are good at art and craft, creative writing and some may be good in collecting materials and conducting investigations. If students show such kind of behavior, this means they have involved themselves in the learning process of science.

In the given examples efforts have been made to integrate pedagogy, content and assessment in a meaningful way.

## To Begin With!

In a science class, a teacher is thinking that students would have some idea of the word 'metal' from their daily lives and they have also studied about it in class VI. To gauge students' view of metals and their previous knowledge, she asks in the class. "Can you name some metals?"

Students may come up with answers like iron, silver, gold, aluminium, steel, copper, etc.

The teacher asks - What makes you call these things as metals? What do you think is the reason?

Students may say - They are hard. They shine. They give sound when we hit them.

Student 1 (who is visually impaired), teacher gives him iron key, lock, etc., in his hands so that he can feel and give his observations too.

Teacher motivates one of the students to hit wooden table with a wooden ruler and encourages all the students to observe. They observed that it also made sound. It is also hard and shining. Will you call it a metal?

Students may or may not be sure about the answer.

## Activity 1

The teacher asks one of the students to get a metal plate in the class and hit it with a wooden stick first and then with a metal spoon and motivates students to listen to the sound carefully.

**Student 1 (visually impaired) -** When you hit the plate with a spoon, it produces a loud ringing sound but the sound is dull when hit with wooden stick.

**Teacher -** Can any one of you tell about some property of metals from this?

**Student 2 -** Yes, when two metals hit each other the sound is sharper. When one metal hits a non-metal, it is less sharp and when there is no metal the sound is not sharp at all.

**Teacher -** Very good. We call this sharp ringing sound as sonorous. Metals are generally sonorous materials. Can you think of some use of this property of metals?

**Student 3 -** All bells are made from metals, for example, school bell, payal, ghungroo are also made up of metals (Fig. 1).

**Learning Outcomes -** Conducts simple investigations to seek answers to queries that metals are usually sonorous; applies learning of scientific concepts in day to day life.

**Teacher -** Provides materials such as aluminium wire, copper wire, iron nail, coal, sulphur powder. Out of these materials can you separate the materials with shiny surfaces?

Students are encouraged to work in groups of three to four.

Teacher makes sure that groups are heterogeneous in nature with children from different backgrounds and abilities.

They separate materials as Group I - shiny and Group II - without shine/dull.

**Student 4 -** Group I materials are mostly metals because they shine and produce sonorous sound whereas Group II mostly includes other materials.

**Student 5** is in cognitive conflict, she brings a rusted iron nail and asks "If iron is a metal, then why is the surface of this iron nail not shining?"

The teacher is very happy at her observation and questions to clear her doubts. This gives encouragement to other students that asking questions or expressing dilemma is an important aspect of teaching- learning.

The teacher gives sand paper to student 5 and asks her to rub the rusted iron nail with sand paper.

Student 5 (Starts rubbing with sand paper) - Wow! It is shining now.

**Teacher -** Metals often lose their shine and appear dull because of action of air and moisture on them. Most of the metals shine but shining is not the only property that metals show. When we see a collection of many properties, we conclude it's a metal.

## Activity 2

Before investigating, teacher motivates students to hypothesise if the given materials change their shapes on hitting. After hypothesising, she encouraged students to investigate.

Students take the materials and hit them one by one with hammer and record their observations. She also advices students to be careful and not to get hurt in this process.

> Since there was only hammer, one of the students gets a big stone from outside to hit the materials.

**Students -** Shape of iron nail, aluminium wire and copper wire change on hitting, whereas coal, sulphur roll break into smaller pieces on hitting.

**Student 1 -** feels that iron nail, aluminium wire and copper wire etc. are very hard, whereas coal, sulphur can break easily on pressing.

> Teacher appreciates the alternative given by student - using stone instead of hammer. She observes that how students are very particular in helping Student 1 by giving him materials to feel before and after hitting the materials with hammer, so that he can also observe the change.

**Teacher -** Can anyone tell me anything general about metals from your observation?

**Student 6 -** Metals are not easy to break into small pieces, whereas some other materials are.

(Learning Outcome - Conducts simple investigations to seek answers to queries and concludes that metals are generally hard; exhibits cooperation)

**Teacher -** Can you think of a metal beaten into very thin sheets?

She shows them sweet covered with silver foil. She can also show video film to the students that how malleable are metals.

This is a characteristic property of metals, if they are beaten hard and uniformly, they can be changed into thin sheets without breaking into small pieces. This property of metals is called malleability.

Student 6 takes out aluminium foil in which her chapatti is wrapped.

## Involving community/parents

- Students can be suggested to accompany her/his parents to a blacksmith or a goldsmith where tools or ornaments are made or school can arrange a visit to a shop of a goldsmith/ black smith.

- A skilled blacksmith or a goldsmith may request to visit the school and interact with students.

## Activity 3

The teacher now asks students to recall how they made an electric circuit in their previous class with cell, wires and a small bulb. She motivates them to complete a circuit with one of the materials such as, iron nail, copper wire, aluminium wire, piece of coal, sulphur, pencil lead as part of the circuit and then observe if they allow current to flow through the circuit or not. She encourages them to record their observations in the Table 1 and also draw labeled diagram (Fig. 2).



Fig. 2 - Simple electric tester

Students start doing the activity in groups of three to four. She makes sure that groups are heterogeneous in nature with children from different backgrounds and abilities. Teacher notices that some students are patiently doing the activity, some are helping others. Students are discussing among themselves.

Record of this table can be kept in students' portfolio for future reference

## Table 1 - Electrical Conductivity of Materials

| S. No | Materials | Bulb glows | Bulb does not glow |
|-------|-----------|------------|--------------------|
| 1. | Iron nail | | |
| 2. | Copper wire | | |
| 3. | Aluminum wire | | |
| 4. | Piece of coal | | |
| 5. | Suphur | | |
| 6. | Pencil lead | | |

**Students -** On placing iron nail, aluminum wire, copper wire and pencil lead, bulb starts glowing; whereas, by placing coal and sulphur, bulb does not glow. Student 1 with the help of peers could feel the bulb glowing by touching as it was little warmer than before. After discussion they could conclude that iron nail, aluminum wire, copper wire and pencil lead are good conductors of electricity, whereas coal and sulphur are poor conductors of electricity.

Teacher may explain that metals are good conductors of electricity, whereas non-metals are not; however, pencil lead (Graphite), which is a non-metal is a good conductor of electricity. The reason of its conductance is availability of free electrons in the allotropic form of carbon which students may understand in higher classes.

## Using ICT for further exploration

Teacher may also allow students to interact with simulations/ videos/animations related to the concept and explore the concept further. One such link of a simulation for electric circuit is given for the reference —

https://nroer.gov.in/55ab34ff81fccb4f1d806025/ page/5b4d793e16b51c01e4ec660a

**Assessment**

Teacher -

1. Where do you find use of copper and aluminum wires?

2. Can wires be made up of coal?

Teacher is amazed to see the discussion going on among students. She observes that students are placing the materials at their original places and taking care of cleanliness.

(Learning Outcome - Conducts simple investigations - provides explanation; draws labeled diagram; exhibits honesty by recording and interpreting data; exhibits cooperation and makes effort to keep surrounding clean).

Teacher -

1. Can you guess why metallic pans are usually provided with plastic or wooden handle (Fig. 3)?

Fig. 3 - Cooking in metallic utensil

2. Why do we find wooden/plastic handles less hot than metallic utensils?

Children start discussing about this. Teacher tries to listen to the discussion going in the class. After having a discussion, they collectively arrive at a conclusion that metals are good conductors of heat.

Once the discussion is over, Student 7 comes up with a Poem/Riddle

I am 1600 years old
My hometown is in Delhi
My Guardian is Chandragupta II
I am 7 meters tall
And my weight is 6.5 tonnes
My body is made up of a metal
I am still standing erect
and not turned into a pile of rust?
Who am I?
Who am I?

Teacher encourages the student 7 to read the Riddle loudly so that Student 1 (visually impaired) can also participate. She motivates other students also to compose poems, songs, riddles, anecdotes, etc.

Learning Outcome - Applies learning of scientific concepts in day to day life; exhibits corporation, creativity by posing a riddle.

> Teacher concludes that metals are hard, lustrous, sonorous, malleable, ductile, good conductor of heat and electricity, whereas, non-metals are not. Teacher may also inform students about some exceptions that metals like sodium and potassium are soft and can be cut with knife. Metals are usually solid but mercury is an exception, which is in liquid state at room temperature.

Once students have understood the properties of metals and non-metals along with their exceptions, teacher encourages them to do role play to strengthen the concept in a joyful way. She may also show them the video to know about important metals that we use in our day to day lives discuss about it. The link of one such video is given below.

https://nroer.gov.in/55ab34ff81fccb4f1d806025/file/58871312472d4a1fef810dbc

**Assessment**

- Motivate students to draw Venn diagram to show all possible relations between physical properties of metals and non-metals and discuss in class.
- Encourage students to find the locations of the deposits of iron and aluminium in India. In which form are the deposits found? Discuss in the class.

## 6.2 Example 2

**Class VI**

**Chapter 7 — Getting to know plants**

**Introduction**

Children are familiar with plants which grow all around them. They are also aware that all plants are not same but they differ in several ways such as height, flowers, fruits, shapes, color, texture of leaves, stem, trunk, etc. However, they might not be aware of the uniformity exhibited by some plants or the differences they exhibit when compared with other groups of plants. They are also not able to appreciate the diversity that exists amongst plants in terms of its forms and functions. This section of the module will focus on the concept of diversity that exists in the plant world. It is envisaged that through the activities provided here, students will be able to appreciate the diversity that exists in plants, recognise them and group them into herbs, shrubs and trees. It will also provide them opportunities to build competencies in other aspects.

**Key concept - Diversity exists in plant world**

### Learning Outcomes

The learner -
- appreciates and recognises the diversity of plants in their locality
- classifies plants into herbs, shrubs and trees
- measures height of plants

- draws labeled diagram of their observation
- exhibits care and concern for plants
- exhibits creativity by planning, drawing and making cards using paper
- exhibits values of honesty, objectivity and cooperation
- discusses and appreciates diversity of plants around the world

## Before the activity

The teacher may introduce the topic of plant in the class through some probing questions. She may ask the students if they have ever paid attention to see the plants around them. For example, whether some plants were small throughout their life and some plants keep growing? Whether the plants were similar or different? In what ways they were similar or different? Whether they thought about the reasons for the similarities or differences?

It is likely that students will respond and share their views in different ways. For example, some students may say that some plants are small while some plants are huge. Some will identify based on the flowers or leaves. Some may even make a mention of Bonsai plants.

The teacher appreciates all the answers and will take special care to give opportunity to students who are otherwise non-responsive or shy or introvert. Since this is a common topic, they will have no problem to share their views. After a few discussions on the topic, the teacher will now let the students do the following activities.

## Activity 1 - Exploring surroundings

The teacher may divide the class into groups. Each group may consist of about five students each. Teachers may give instruction to students to explore their school campus to observe the different plants that grow.

The teacher may give a clear instruction to students not to disturb the plants as far as possible and not to uproot the plants, break the stem or pluck the leaves or flowers.

The teacher may ask students to observe and note down the different plants based on various categories as they can think of. For example, height, whether they grow horizontally on the ground or they climb on other plants/walls/other structures, etc., texture of leaves and stem, flowers, smell, color of flower and stem, from where the branches grow, etc. Students may be given the opportunity to come up with as many different categories as they can think of to collect the information.

Every group may be asked to note down their own observation. It is likely that students may differ in opinion about what they observe. Hence, students in each group may be asked to discuss as they observe and come to a consensus about their observation. They may note down their observations accordingly in their observation sheet.

Students take extra care not to disturb the plants as they move around the school campus.

About 20 minutes may be given to students to explore their campus.

**Assessment**

Each group may be asked to share their observations in the classroom.

The teacher may ask the students to prepare a table (Table 2) and fill them. Students may be asked to add more columns based on their observations. Students may also compare their tables with their friends in other groups and discuss. This can form part of the assessment of students' understanding of the broad classification of plants. Teachers may note that there may be some confusion in grouping trees as shrubs or trees since the plants have not fully grown. This may be clarified by the teacher. It may be noted that this division is based broadly on the height of mature plants, the texture of the stem, and the position from where the branches appear (Fig. 4). It may be remembered that trees can be made very short e.g., Bonsai plants.

Some groups may have noted plants such as money plant, water melon plant, gourd plants, etc. but they are not sure where to categorise them. The teacher may help them in grouping such plants as climbers and creepers.

## Table 2 - Categories of plants

| Plant name | Column 1 Height of a fully grown plant | Column 2 Stem | | | | Column 3 Where do the branches appear | | Column 4 |
|---|---|---|---|---|---|---|---|---|
| | | Green | Tender | Thick | Hard | At the base of the stem | Higher up on the stem | Category of plant |
| Mango | Very tall | No | No | Yes | Yes | No | Yes | Tree |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

(Note -  This activity may be given as a project to be done by students at home before the class, especially if the school campus does not have plants around. In such case, it will be an individual activity).



(a) Herb          (b) Shrub          (c) Tree

Fig. 4 - Types of plants

(Learning Outcome - appreciates and recognises the diversity of plants in their locality; classifies plants into herbs, shrubs and trees; measures height of plants; exhibits care and concern for plants; exhibits creativity by planning, drawing and making cards using paper; exhibits values of honesty, objectivity and cooperation)

## Activity 2 - Drawing a plant

Students may be asked to draw a colorful, labelled diagram of their favorite plant and write its name in whatever languages they know. They may also be asked to write a few lines on why they like the plant.

### Assessment

More than the artistic skill, the teacher may pay attention to the observation skill and detailing in terms of leave venation, position of leaves in the stem/trunk, flower, etc. and see how proportionately the student has drawn in terms of size of the stem/trunk and leaves etc.

If the schools can afford, the teacher may provide a chart paper to each student to make the drawing. Students can use such cards to wish friends or relatives during festivals, birthdays or on different occasions instead of spending money on expensive cards.

Learning Outcome - exhibits creativity by planning, drawing and making cards using paper.

## Activity 3 - Plants of the world

The teacher may show photos or videos of the diversity of plants that are found in other parts of the country or in different parts of the world. Such diversity may also be shown in terms of the climatic condition, geographical locations, etc. For example, diversity of plants in deserts, coastal regions, mountains, polar regions, etc. If audio visual (AV) facilities are not available in the class, teachers



Fig. 5 - Plants of some countries

may prepare cards containing pictures of plants, their names, where they are found, etc. Teachers may laminate such cards and use them as a permanent resource to teach the topic year after year. This will avoid wastage of paper. Such efforts will widen the horizon of the imagination of students about diversity of plants. This activity also nurtures students towards becoming global citizens as they appreciate diversity around the world.

### Assessment

Students may be asked to write a few lines about the differences or similarities that they see in the plants in their surroundings and those that they see in the pictures or videos. Alternatively, students may be asked to share with the class about the different plants that they see in the pictures or videos. The teacher may provide additional information wherever necessary.

The teacher may assign a project to students to gather information about one plant found in other countries. Each student may be assigned one country. Students may be asked to gather information on the following — Name of the plant, place where it is found, whether it is a herb, shrub or a tree, their importance, etc. Students may be asked to write the information in their notebook and also draw a diagram of the plant. Let students put these up in the board in their classroom.

The teacher may also provide the students with some additional and useful information. For example, it may be interesting for the students to know that plants are also brought from one country to another for various reasons. Some of these plants that were brought to India from other countries are today integral part of our diet or economy. For example, cashew, tomato, chilli, potato, etc. But some plants such as Lantana camera which are invasive species have caused havoc. They prevent native undershrubs and other plants from surviving.

Lantana was brought to India by the British as an ornamental plant more than 200 years ago.

Learning Outcome - appreciates and recognises the diversity of plants around the world.

## 6.3 Example 3

**Class VIII**

**Chapter 13 - Sound**

**Key concept - How sound is produced!**

| Learning Outcomes |
| --- |
| The learner -<br>•      Conducts simple investigation to find the ways of producing sound<br>•      Relates process and phenomena with causes<br>•      Applies learning of scientific concepts in day to day life<br>•      Exhibits creativity in making use of available resources |

Fig. 6 - Various musical instruments

Students are already familiar with sounds they have heard from their surrounding such as the sound produced by animals, musical instruments, etc. Teacher may proceed classroom discussions with students as follows -

Think of an object that produces sound. You must have various experiences of sound produced by people, automobiles, gadgets, etc. in your daily life.

In this process teacher may ask students to

•       share their experiences on sound in their surroundings.

•       make a list of sounds they hear in their surroundings (of persons, animals, birds, breeze, rivers, mobile, school bell, transports, gadgets, etc.).

•       name some musical instruments they have seen in the music room of the school or at other places.

## Activity 1

Different ways of producing sound.

Students may be arranged in groups for doing this activity.

Learning Outcome - Explores surroundings; performs appropriate activities.

All the groups may be asked to explore different methods for producing sound.

Teacher will monitor the group work but in general will not intervene in the discussions carried out by the students, but she will try to make all the students actively participate in the discussion.

After allowing few minutes for discussion within the group teacher may ask different groups to summarise their findings.

Students may come out with different ways of producing sounds, such as by hitting a table, by plucking a rubber band, by scratching a rough surface, by blowing, etc.

(For summarising the findings of the students, teacher may ask each group to present it. Due care should be taken by the teacher to ensure active participation of all students).

Teacher may help them in grouping different ways in broader groups such as, sound produced by hitting, by plucking, by scratching, by blowing, etc. After grouping some of the ways she may involve students in completing Table 3.

## Table 3

| S. No | Method of producing sound | Examples given by the students |
|-------|---------------------------|--------------------------------|
| 1. | By hitting | By hitting a table with duster, …………. |
| 2. | By plucking | By plucking a string of sitar, ………… |
| 3. | By Blowing | ………….. |
| 4. | By Scratching | ………… |
| ---- | ------------ | ------------- |

For further exploration of this concept i.e., for finding out the most common thing in all these methods of producing sound, teacher may engage students by performing Activity 2.

## Activity 2

To show sound is produced by a vibrating object (The activity is to be performed by involving a student).

Learning outcome - Conducts simple experiment; relate process and phenomena with causes.

Teacher may involve students in arranging materials for performing the activity. Students may be asked to bring objects producing sound in the classroom. The activity described below is one among the many activities that a teacher can perform.

Materials Required - Metal plate, steel spoon

- Take a metal plate and place it as shown in Fig. 7
- Now strike the rim of the metal plate with a steel spoon.
- What do you observe? Can you hear any sound?



Fig. 7 - Sound produced by a vibrating metal plate

Teacher should link this concept with other concepts/topic such as the sonorous nature of metals, which students have already studied in chapter of metals and non-metals. In this way there may be integration of different concepts. She may also encourage student(s) with visual impairment to give his/her observations.

- Now, strike the rim of the metal plate again with a steel spoon. As soon as you strike, touch the rim of the metal plate with your finger. What do you feel?
- Do you feel the vibration on touching the steel plate?
- What can be inferred from the observation?
- Strike the rim of the metal plate again. Touch the plate after it stops producing sound. Can you feel the vibration now?

Teacher asks students, which part is vibrating? (Metal Plate) Teacher may help students conclude that sound is produced due to the vibration of the metal plate.

For further strengthening of the concept Teacher may ask students to perform the following activitiy in group and help them in arriving at the concept by performing Activity 3.

## Activity 3

Learning outcome - Relate process and phenomena with causes, conduct simple experiment.

Materials Required - Rubber bands, two pencils and a pencil box.

Teacher facilitates this activity using two rubber bands, two pencils and a pencil box.

- Take a pencil box and stretch a rubber band over it.
- Insert two pencils between the box and the stretched rubber bands as shown in Fig. 8
- Pluck the rubber band in the middle.
- Do you hear any sound?
- Does the rubber band vibrates?

Teacher may help the students in concluding that the vibration of the stretched rubber band produces sound.

Open Ended Questions

After this activity teacher may involve students in discussion by posing a question that 'What do you think, do all sound producing objects vibrate?

Students may give some of the examples of sound in which they do not easily find anything vibrating. Now teacher may allow students to engage in further discussion.

She will monitor the discussions and this will help the teacher to understand their thinking process or to check the development of alternative conceptions.

Teacher may help students in concluding that even if we are hitting an object such as table top by a scale/duster then also there is vibration associated with it, although we may not be able to see it. Vibration of the objects such as table top may be verified by sprinkling some chalk dust/green gram (Moong)/any type of grains on the table top and then hitting it with a scale or a duster. You can easily see the jumping of the chalk particles/grains on hitting the table. Visually impaired student(s) can observe the sound of jumping of grains while hitting the table.

Similarly examples of vibration of air columns may be shown using some animations.

After discussing and showing some examples using ICT tools, students may conclude that sound is produced by vibrating objects. Teacher may also use sound box/speakers and pop corn/thermocol balls for showing vibrations of the object by sound producing objects.

Likely misconception which may arise during the course of discussion could be -

All vibrations produce sound that are audible to humans. Teacher may give extended activities/projects to address these misconceptions.

### Assessment

Teacher encourages students to discuss among themselves and note down the vibrating part of various musical instruments in Table 4. The musical instruments given may be added or replaced.

Learning outcome - Identification and classifying of sound producing objects.

## Table 4

| S. No | Musical Instruments | Vibrating part producing sound |
|-------|---------------------|-------------------------------|
| 1. | Veena | Stretched string |
| 2. | Tabla | Stretched membrane |
| 3. | Flute | Air-column |
| 4. | Guitar | --- |
| 5. | Ektara | --- |
| 6. | --- | ---- |

*Teacher may motivate students to prepare simple musical instrument using locally available resources.*

*Learning outcome - Exhibits creativity in making use of available resources; applies learning of scientific concept in day to day life.*

## 7. Suggested Activities for KRPs/Teachers

**A. Teacher may design a classroom plan for transacting one or two concepts of his/her interest from Science at upper primary stage focusing on**

- learner centric approach
- linking with learning outcomes
- in built assessment
- enhancing gender sensitivity, inclusion and sensitivity towards environment

**The following points may be kept in mind while designing a classroom transaction plan**

- Classrooms must provide a suitable environment for interaction between students and teachers, so that meaningful learning can take place.
- The effectiveness of a class depends on the methodology adopted by the teacher and the extent of interactions the teacher plans and holds with the students.
- It is of utmost importance to recognise and value each learner and his/her diverse intelligence to provide an opportunity to bloom.
- There are various methods which can be used during teaching-learning process to sustain the inquisitiveness and interest among students, which may also help in recognising the abilities of the learners.
- Teachers may think over their teaching practices, analysing how concepts were taught and how the practices can be improved or changed for achieving better learning outcomes.

**B. Teachers may also take up planning of any one of the given task during the training programme**

Performing activities/Demonstrations - Activities motivate and nurture students' observations and experimental skills. A general discussion on the process and outcomes of the activity/demonstration enhances the interpretative and communication skills of the students. If learners are allowed to express their findings, it will enable them to develop good communication skills.

- Project work - Project work in science is usually an organised search, construction or task directed towards a specific purpose. It provides an opportunity to the students to identify a problem, to design a work plan, to address the problem, to search for appropriate resources, to carry out their own plan and to draw conclusion on the basis of data/ information collected. In the process, the students learn fundamental principles of science, methods and processes of science, and are exposed to the phases involved in a scientific investigation.

- Cross-word puzzles - Cross-word puzzles engage the students in a fun-filled and participatory form of teaching-learning process, students love to take up the challenge of filling up crossword puzzles.

- Quiz - Quiz is an entertaining mind game which tests students' mental ability, attention, general awareness and speed with which a person can recall and process the information. It

expands a person's horizon of knowledge, sharpens memory and prompts spontaneous communication. It is of equal interest to the participants and to the spectators.

- Science exhibitions - An exhibition can provide a forum for the display of the work done by the students throughout the year. It serves to motivate the students and provides a feedback to parents about their child's progress. It can also help students share their work with one another in order to build a better understanding of the concepts involved. The display of various models can provide a spark to other students to participate in such events. In addition this will also provide viewers a glimpse of what science can do.

- Field trips - Field trip is an educational activity that gives outdoor experience which cannot be provided in the classroom. It helps to relate concepts of science learnt in the classroom with real life and with the environment. It enhances their observation and data recording skills. Students are active, motivation is elevated and critical thinking is also enhanced. It is not necessary that a field trip be always conducted at a far off place. Even a visit to the school garden can be rewarding. There may be many interesting places in the vicinity of the school which may be worth visiting for the students.

- Science journals - The teacher may advise students to maintain a Science journal. She/he may encourage students to write their experiences and ideas on daily basis and collect information by consulting resources available to them. On topics related to the concepts dealt with in the class, science journal will help foster a sense of scientific inquiry in the child.

- Role plays - Role play among students develop the skills to handle social and scientific interactions. It builds confidence and communication skills among students. As a fun activity, it also allows students to get into character and act out real life roles Students when engaged in role play help to develop their way of thinking.

- Creative writing - The purpose of creative writing is to share human imagination, experience and innovation to tell a story, poem, song etc., through strong written visuals with an emotional impact.

- Portfolios - Student portfolio provides evidence of students' knowledge, skills and attitudes. It is a documentation of the students' growth. Portfolios are portraits of the students during a term or throughout the year. All tasks assigned to the students and assessed by the teacher should go into her/his portfolio.

- Anecdotes - Anecdotal record refers to written description of a child's progress that a teacher keeps on a day-to day basis. It provides observational narrative records of significant incidents in a child's life. During teaching-learning process, the teacher sometimes comes across enquiry-based questions, observed by the children whose validity is much beyond the classroom. The records of such anecdotes and the response of children to these anecdotes can be a powerful tool for assessment and guiding them to the right path.

## 8.    Evaluation

Evaluation may be done on the basis of following points -

- A performa may be given to the teachers for self evaluation.
- A concept may be asked to transact and observations can be made.
- An assignment can be given to test the understanding of the concepts.
- A task may be given to prepare the test items.

## 9.    Suggested Readings

National Council of Educational Research and Training. 2005. National Focus Group Position Paper on Teaching of Science. New Delhi.

——. 2012.    Source book on assessment in science classes VI-VIII. New Delhi.

——. 2006.    Textbook of Science, class VI. New Delhi.

——. 2008.    Textbook of science, class VII. New Delhi.

——. 2008.    Textbook of science, class VIII. New Delhi.

——. 2015.    Continuous and Comprehensive Evaluation Exemplar Package in Science for the Upper Primary Stage. New Delhi.

——. 2017.    Learning Outcome at the Elementary Stage. New Delhi.

## 10.    Web-based Resources

- https://nroer.gov.in/55ab34ff81fccb4f1d806025/ page/5b4d793e16b51c01e4ec660a
- https://nroer.gov.in/55ab34ff81fccb4f1d806025/ file/58871312472d4a1fef810dbc
- https://www.youtube.com/ watch?v=gbwCX011vFo&feature=youtu.be
- https://www.youtube.com/ watch?v=oIP4MqRQiSc&feature=youtu.be