

In-Service Training Programme for Secondary Science Teachers Belonging to Tibetan Schools

Content, Pedagogy and Emerging Trends

August 8 – 17, 2016

REPORT



Organised by the

Department of Education in Science and Mathematics, NCERT
in collaboration with the
Department of Education, Central Tibetan Administration, Dharamsala

Funded by the



Department of Foreign Affairs,
Trade and Development (DFATD),
Canada



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**In-Service Training Programme for Secondary Science Teachers
of Central Tibetan Administration**

CONTENT, PEDAGOGY AND EMERGING TRENDS

August 8 – 17, 2016

Jointly Organized by:

Department of Education in Science and Mathematics, NCERT, New Delhi and
Department of Education, Central Tibetan Administration, Dharamsala (HP)

Venue: DESM





Group Photo of Participants

with

Mrs. Pasang Chokpa; Dr. Gagan Gupta; Prof. Sunita Farkya; Prof. H.K. Senapaty;
 Director, NCERT; Prof. A.K. Wazalwar, *Head*, DESM; and Dr. Sashi Prabha
 (Sitting in second row from left to right)

Index

Programme Banner	3
Group Photo of Participants	5
Index	7
List of Participants	9
Resource Persons	11
Brief Report	13
Programme Schedule	15
Materials Distributed	17
Training Needs	19
Day-Wise Reports	21
Pre-Test	37
Post-Test	40

List of Participants

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Central School for Tibetans,
Dalhousie, Chamba (H.P.) 176304
2. Ms. Malathy. V.N.
Central School for Tibetans, Gurupura
Hunsur Taluk
Mysuru, Karnataka
3. Ms. Bhawna Verma
Central School for Tibetans, Sonada
Darjeeling, West Bengal
4. Ms. Manju Kaushal
Sambhota Tibetan School,
Paonta Sahib
Sirmaur, H.P.- 173025
5. Sh. Hari Prasad Bhandari
Stongtsen B.B.H.S. Kathmandu,
Boudha, Kathmandu, Nepal
6. Sh. Tsultrim Chopel Lama
Namgyal Higher Secondary School,
Gokarna, Kathmandu, Nepal
7. Sh. R.P. Singh
Central School for Tibetans, Middle- Bakrota,
Dalhousie, Chamba (H.P.) 176304
8. Sh. B.M. Chaware
Central School for Tibetans, Kollegal,
Chamarajanagar, Karnataka, 571457
9. Sh. Lobsang Tsering
Tibetan Children's Village School, Chauntra,
Teh Joginder Nagar, Distt. Mandi, H.P.
10. Sh. Jamphel Tsering
Tibetan Children's Village SOS School
Bylakuppe, Mysuru, Karnataka
11. Sh. Tsering Lhakpa
SOS Tibetan Children's Village School
Bylakuppe, Mysore, Karnataka

12. Sh. Tenzin Chodak
Tibetan Homes School, Happy Valley
Mussoorie, Uttarakhand
13. Sh. Tenzin Legmon
Tibetan Homes School, Rajpur
Birgidwala Road, Dehradun, Uttarakhand
14. Sh. Tenzin Phuntsok
Tibetan Homes school, Happy Valley
Mussoorie, Dehradun, Uttarakhand
15. Sh. Tenzin Choeden
Tibetan Homes School, Gohrimafi
Raiwala, Rishikesh, Uttarakhand
16. Mrs. Dechen Tsomo
Tibetan Homes School, Birgiwali,
Rajpur, Dehradun, Uttarakhand
17. Mrs. Sonam Bhutti
Tibetan Homes School, Happy Valley
Mussoorie, Dehradun, Uttarakhand
18. Mrs. Ngawang Tenzin
Upper Tibetan Children's Village School
Dharamsala Cantt., Kangra, H.P. 176216
19. Sh. Tenzin Namgyal
Middle Section, Upper Tibetan Children's Village School
Dharamsala Cantt., Kangra, H.P. 176216
20. Sh. Lhundup Namgyal
Lower Tibetan Children's Village School
Khanyara Road, Dharamsala, Kangra, H.P.
21. Sh. Sherab Gyatso
SOS Tibetan Children's Village School,
Choglamsar, Leh- Ladakh, Jammu and Kashmir
22. Ms. Passang Chokpa
Education Officer (Science)
Department of Education, Central Tibetan Administration,
Gangchen Kyishong,
Dharamsala, Kangra, H.P.

Resource Persons

Professor B.K. Tripathi, Joint Director, NCERT, New Delhi
Professor Saroj Yadav, Dean (Academic) NCERT, New Delhi
Professor Dinesh Kumar, DESM, NCERT, New Delhi
Professor Sunita Farkya, DESM, NCERT, New Delhi
Professor R.K. Parashar, DESM, NCERT, New Delhi
Professor Alka Mehrotra, DESM, NCERT, New Delhi
Dr. Anjni Koul, DESM, NCERT, New Delhi
Dr. Rachna Garg, DESM, NCERT, New Delhi
Dr. Shashi Prabha, DESM, NCERT, New Delhi
Dr. Ruchi Verma, DESM, NCERT, New Delhi
Dr. Rama Meganathan, Department of Education in Languages, NCERT, New Delhi
Dr. C.V. Shimray, DESM, NCERT, New Delhi
Dr. Pushplata Verma, DESM, NCERT, New Delhi
Dr. Pramila Tanwar, DESM, NCERT, New Delhi
Dr. Rejaul Karim Barbhuia, DESM, NCERT, New Delhi
Dr. AK Srivastav, DESM, NCERT, New Delhi
Dr. Gagan Gupta, DESM, NCERT, New Delhi (Programme Coordinator)

In-Service Training Programme for Secondary Science Teachers

CONTENT, PEDAGOGY AND EMERGING TRENDS

August 8 – 17, 2016

Brief report

On a request from the Department of Education (DoE), Central Tibetan Administration (CTA), Dharamsala, H.P., the Department of Education in Science and Mathematics, National Council of Educational Research and Training (NCERT), New Delhi organized a need-based In-Service Training Programme for Secondary Science Teachers belonging to Tibetan Schools in India and Nepal on Content, Pedagogy and Emerging Trends during August 08 – 17, 2016. DoE, CTA had collected the training needs from the teachers in advance and forwarded to the NCERT. Accordingly, the schedule of the training programme was prepared. DoE, CTA has suggested DESM to take a Pre- and Post-Tests of the participating teachers to measure the immediate outcome of the training programme. The programme began on August 08, 2016. Besides the curricular areas in Science, the topics dealt during the programme included the sessions on National Curriculum Framework, Nature of Science, NCERT's On-Line Programme in Science, Science Exhibitions, Science and Herbal Parks, Learning Science through Games and Art Forms, Disaster management, Adolescent Education. One-day excursion trip to National Science Centre, New Delhi was also arranged. This training programme concluded on August 17, 2016. Twenty-one secondary science teachers belonging to different categories of Tibetan Schools viz., Central Tibetan School Administration, Tibetan Homes Foundation, Tibetan Children's Village, Sambhota Tibetan School Society and Snow Lion Foundation, Nepal participated in this In-Service Training programme.

On August 08, 2016 the Inaugural Session began with introduction of the aims and objectives of the programme by Dr. Gagan Gupta, Programme Coordinator, followed by the welcome speech by Mrs. Passang Chokpa, Education Officer (Science), DoE, CTA and a keynote speech on importance of understanding science by the Head In-Charge, DESM, Prof. Sunita Farkya.

The training program on Content, Pedagogy and the Emerging Trends empowered the teachers with exposure to multi-dimensional approach towards teaching-learning process. The need on mastery of skills in judicious mixing of

pedagogy, content, curriculum, technology, prior knowledge of students and their possible misconceptions or alternative conceptions were strongly emphasized throughout the programme.

Considering the gravity of professional development of Teachers, every care for systematic inclusion of the key parameters for an objective oriented program were taken.

The interactive sessions with many articulate resource persons with in depth intellect and yet with all the humility were true reflections of what really does teaching of a good science education mean. The visit by the Education Kalon (Minister), Mr. Ngodup Tsering from Department of Education, CTA on August 11 and the subsequent visit by the Director of NCERT, Prof. H.K. Senapati Ji and the Joint Director, NCERT, Prof. B.K. Tripathiji were very powerful boosters for the teachers who are real facilitators in nation building. The visits to Science Park, Herbal garden and National Science Centre, New Delhi widened the horizon of the participants towards innovation and creativity. The group presentations provided a platform for peer and collaborative learning along-with the exchange of innovative ideas amongst the participants. The Diverse aspects of science education covered in the programme on the whole are expected to promote professional development of teachers.

The training program successfully concluded on August 17, 2016 with the administration of a post-test and the valedictory function. The Valedictory function, chaired by Prof. A.K. Wazalwar, Head, DESM, NCERT and the entire team of NCERT involved in the activity attended the function. A Scarf Ceremony, Awarding of Certificates, reflections on the program by every participant, an overall view of the program and vote of thanks by Mrs. Passang Chokpa ji, Education officer, Science, DoE, CTA were the highlights of the Valedictory function. In his concluding remarks, Prof. A.K. Wazalwar, Head, DESM impressed upon the importance of the applications of the concepts and strategies learnt from the programme participants in classroom situations. He further expressed his willingness to extend every kind of support and urged the teachers to have a very free interaction with the resource persons of NCERT for all sorts of relevant issues. The organisation of this programme has all been possible due to the collective efforts of the Department and Education, CTA, the entire team of NCERT and most importantly with the generous funding by DFTAD, Canada.

In-Service Training Programme for Secondary Science Teachers Belonging to Tibetan Schools
Content, Pedagogy and Emerging Trends
Department of Education in Science and Mathematics
August 8 – 17, 2016; Seminar Room above SBI

PROGRAMME SCHEDULE

Date/Period	9:30 AM	I 9:45 AM – 11:00 AM	II 11:30 AM – 12:45 PM	III 2:00 PM – 3:15 PM	IV 3:45 PM – 5:00 PM	
August 8 Monday		Inauguration/Pre-Test	Teaching of Science (GG)	Life Processes (SF)	National Curriculum Framework (GG)	
August 9 Tuesday	Report and Feedback by participants	CTES (RKB)	Atomic Structure (AK)	Heredity and Evolution – 1 (DK)	Science Park (AKS and GG)	
August 10 Wednesday		Non-Metals and Metalloids (PT)	Activities on Non-Metals and Metalloids (PT)	Heredity and Evolution – 2 (DK)	Science Exhibitions (GG)	
August 11 Thursday		Herbal Park (SF)	Discussion on Science Park Exhibits (GG)	Motion 1 (RG)	Sound 1 (AKS)	
August 12 Friday		Sound 2 (AKS)	Motion 2 (RG)	Science Kits (RKP)	Mole Concept and Molar Mass (AM)	
August 13 Saturday		Light -1 (GG)	Electricity (SP)	Sense Organs (SF)	Disaster Management (RV)	
August 14 Sunday		Light -2 (GG)	Teaching Science through English Medium (RM)	Carbon Compounds (RKP)		
August 15 Monday		Local Visit National Science Centre				
August 16 Tuesday		Learning Science through Games and Art Forms (RV)	Activities in Life Sciences (CVS)	Magnetism (SP)	Nutrition (BKT)	Human Brain (PLV)
August 17 Wednesday		Participants' Presentation 1 (AKS/GG)	Adolescence Education (SY)	Participants' Presentation 2 (GG)	Magnetism (SP)	Post-Test Valedictory

11:00 AM – 11:30 AM: Morning tea

12:45 PM – 2:00 PM: Lunch

3:15 PM – 3:45 PM: Evening Tea

AK: Anjni Koul;

AKS: AK Srivastav;

AM: Alka Mehrotra;

BKT: B.K. Tripathi

CVS: C.V. Shimray;

DK: Dinesh Kumar;

GG: Gagan Gupta;

PLV: Pushplata Verma; PT: Pramila Tanwar;

RG: Rachna Garg;

RKB: Rejaul Karim Barbhuia;

RKP: R.K. Parashar;

RM: Rama Meganathan; RRR: R.R. Koireng;

RV: Ruchi Verma;

SF: Sunita Farkya;

SP: Shashi Prabha

SY: Saroj Yadav

Materials Distributed amongst the participants during the Training Programme:

1. Science -Textbook for Class X
2. Science – Textbook for Class IX
3. Science - Laboratory Manual for Class X
4. Science - Laboratory Manual for Class IX
5. Science – Exemplar Problems for Class X
6. Science – Exemplar Problems for Class IX
7. In-Service Teacher Professional Development (ITPD) Package (Generic Issues and Teaching of Science)
8. Notes on Establishing an English-rich Environment in English-medium Schools, The Funeral of I can't; Once upon an ordinary school day; and Being a Teacher.
9. SLSMEE and JNNSMEE Guidelines; List of Exhibits; Structure and Working of Models; Publicity Brochures
10. DVD containing JNNSMEE Videos
11. Science park brochures
12. Pre- and Post-Tests

Content, Pedagogy and Emerging Trends
In-Service Training Programme for Secondary Science Teachers
Belonging to Tibetan Schools

Department of Education in Science and Mathematics, NCERT
in collaboration with the
Department of Education, Central Tibetan Administration, Dharamsala
August 8 – 17, 2016

Training Needs

Fundamentals of Framing Science Curriculum; Scope of Science

Motivating Skills on Learning of Science; Art of Teaching Science

Effective Questioning Skills

Critical, Creative Thinking, Problem Solving Skills

Effective Time Management between theory and Practical Work

Use of Science in Daily Life as well as Future Problems

Upgrade in New Scientific Findings

Information and Communication Technology Update

Assessment Skills

Interpersonal Skills

Teaching Techniques to upgrade Children who are weak in English Language

Motion – Graphical Representation; Conservation of Momentum

Sound

Light – reflection and refraction in lenses and Mirrors; Snell's Law

Verification of Ohm's Law (combination maker V , I , and R)

Magnetic Effect of Current; Fleming's Rule; Electric Motor and Generator

Alternative sources of Energy

Heredity and Evaluation; Human Brain; Sense Organs

Non-Metals, Metalloid, Carbon Compound (Functional Group), Nomenclature

Activity Based Teaching in Mole Concept, Molar Mass

Atomic Concepts in Classes VII and VIII

Use of Science Kits

In-Service Training Programme for Secondary Science Teachers

CONTENT, PEDAGOGY AND EMERGING TRENDS

August 8 – 17, 2016

**Department of Education in Science and Mathematics
National Council of Educational Research and Training, New Delhi**

DAY-WISE REPORTS

Day: 01: August 8, 2016

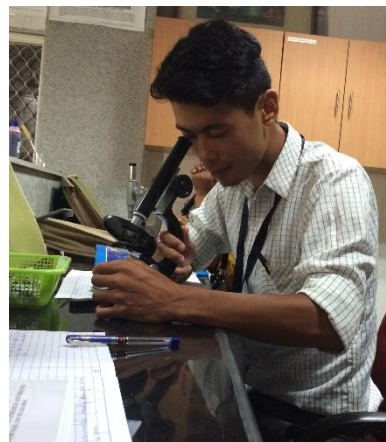
Topics: Inauguration and Pre-Test, Teaching of Science, Life Processes, National Curriculum Framework.

Resource Persons: Dr. Gagan Gupta and Prof. Sunita Farkya

The In-Service Training Programme started with the welcome address by the Coordinator of the Programme, Dr. Gagan Gupta, DESM. Mrs. Paasang Chokpa, EO-Science, DoE, CTA also welcomed all the participants and introduced them with the background of the programme. Prof. Sunita Farkaya, the Head In-Charge, DESM also welcomed all the participants who have come to NCERT from all parts of India and also from neighbouring country, Nepal. All who attended the inaugural session introduced themselves and spoke about their expectations from this programme. Dr. Gagan Gupta mentioned that though the schedule of this training programme has been prepared keeping in view of the training needs already forwarded to the NCERT by the DoE, CTA, the participating teachers may further suggest more topics to be included in the training programme. The training workshop was opened with the administration of a Pre-Test to identify the participants' prior knowledge and their understanding of different concepts in science at the secondary stage. He shared words about teaching of science in terms of its nature and purpose. He also introduced the various factors that validate the formation of a science syllabus. The first session of the programme was on Teaching of Science. In this session, Dr. Gagan Gupta discussed the nature of science, aims and objectives of science education and relating the content with the daily life experiences to make science teaching more interesting and motivating.

In the evening session, Prof. Sunita Farkya gave participants a hands-on experience on development of psychomotor skills among children using

preparation of slides; while discussing about Life Processes and related activities in plants. This was followed by the presentation about the National Curriculum Framework 2005 by Dr. Gagan Gupta, after which the training workshop was closed for the day.



The participants have gained substantial amount of knowledge in terms of (i) the factors that affect the validation of science syllabus; (ii) importance of the enhancement of inquisitiveness among the students; (iii) responsibility of a teacher as a facilitator to explore all the possibilities to enhance learning rather making a child to cram the final answers; and (iv) attainment of some new skills and information that could be exercised in the effective teaching-learning process.

Y.D. Sharma and Malathy V.N.

Day 2: August 09, 2016

Topics: CTES, Atomic Structure, Hereditary and Evolution, Science Park

Resource Persons: Dr. Anjni Koul, Dr. Rejaul Karim Barbhuiya, Dr. Dinesh Kumar, Dr. A.K. Srivastav and Dr. Gagan Gupta

The first session of the day started with the introduction to the use of the ICT in teaching-learning process and also with the NCERT's online learning programme called Certificate Course for Teaching in Science at the Elementary Stage (CTES). Two sessions on this were jointly taken by Dr. Anjni Koul and Dr. R.K. Barbhuiya. In these interactive sessions, the participants were first asked to create their accounts in this On-Line Course. A pre-test and a post-test on "atomic structure" were administered. Dr. Koul acquainted the participants with the modules of science learning designed by the NCERT. The modules have specific characteristic features as follows: The questions in the modules emphasize the different levels of learning; Stimulates interactive learning; Every assertion was supported with specific reasoning; The modules also contain very illustrative videos and pictures as well; and the modules offer wide range of applications in terms of an assessment tool, independent learning, teaching resource. Such modules help in learning at one's own pace; foster creativity and develops interest through effective contextualization of subject matters; deliver rich information to boost self confidence in children; helps in proper fabrications of answers emphasizing the key concepts; enable self-assessment to promote independent learning etc. A caution about the fake and illegal web-portals was also suggested by Dr. Barbhuiya. He also provided some reliable websites edx.org; courslrc.org; udaaity.com etc.



The second session on Heredity and Evolution was taken by Prof. Dinesh Kumar. He started with the identification of the problems normally faced during teaching-learning of the topic. A few identified were related to different crosses, genetic drift, speciation, inheritance and stages of evolution. These issues were then discussed in detail. Prof. Kumar explained that the evolution is a gradual change that occurs in a population rather than on an individual organism over a long time. The principle of Darwinism was also explained with the example of pepper moth. The ideas behind the basic principles of inheritance were also discussed. The last session of the day was to visit Science Park, where Dr. Gagan Gupta and Dr. A.K Srivastav could explain some exhibits before it started raining heavily which compelled us to close the day.

Dechen Tsomo and Sonam Bhuti

Day 3: August 10, 2016

Topics: Metals and non-metal and Activities based on them, Hereditary and Evolution, and Science Exhibitions

Resource Persons: Dr. Pramila Tanwar, Dr. Dinesh Kumar, Dr. Gagan Gupta

The day 3 started with a general discussion on the various problems faced by the teachers in their school atmosphere as far as teaching of science is concerned. Dr. Pramila Tanwar introduced the concept of metals and non-metals with thought provoking questions which was felt as an interesting way to start a lesson. She then dealt with the comparison of physical and chemical properties of metals with non-metals and elaborated the reasons behind why metals are lustrous, malleable etc. Various activities regarding the chemical behaviours of metals were then performed in small groups.



In next session on day 3, Prof. Dinesh Kumar interactively explained various theories of evolution. The evidences in favour of such theories were also discussed in brief. The last session pertained to the Jawaharlal Nehru national Science, Mathematics and Environment Exhibition for Children, organized by the NCERT every year in a state/UT on rotation basis. The concerns about the nurturing children for such events were also discussed. Information on CTA participation in this national event was also discussed.

Outcomes: Interactive teaching and learning process; Student-centered learning; Innovative ideas towards teaching of science; Participation of children' and teachers' innovative ideas in science exhibitions.

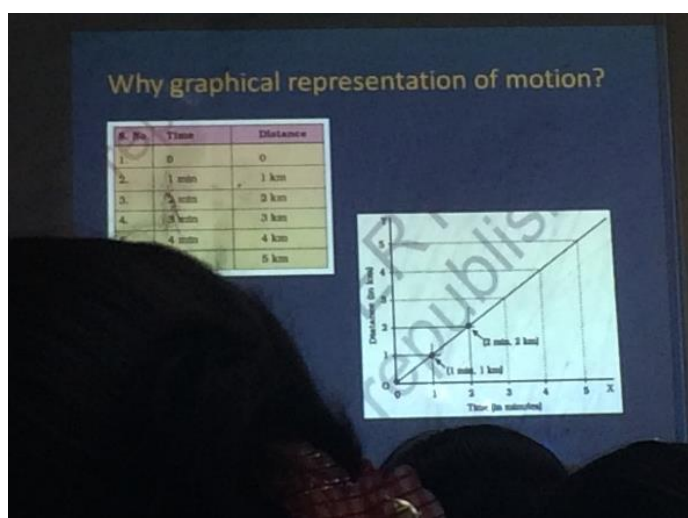
Tenzin Choeden and Tenzin Phuntsok

Day 4: August 11, 2016

Topic: Visit to science Park; Motion and Sound

Resource Persons: Dr. Gagan Gupta, Dr. Rachna Garg, and Dr. A.K. Srivastav

The morning session began with a visit to the Science Park of NCERT with Dr. Gagan Gupta. He explained many of the exhibits such as Newton's colour disc, rotating chair, parabolic dishes, sympathetic pendulum, pulley etc. Soon after the visit to Science Park, Dr. Gagan Gupta discussed the concepts and the principles behind the exhibits. The group also had the opportunity to meet with the Honorable Education Minister from DOE, Dharamsala along with his executive members. He had enlightened us by reminding that we teachers could play an important role in shaping the future of the Tibetan children and the society in general. It has now become a great necessity to upgrade our teaching methodology and techniques according to the changing time and situations throughout the world. And the workshop like such could immensely benefit the teachers and hence in turn to their students.



The afternoon session began with the topic on Motion by Dr. Rachna Garg. She explained the importance of using graphs and graphical representations while teaching topics on motion. She had also covered and discussed the various methods on drawing line graphs, steps for making graphs and the interpretation of graphs.

The last session of day 4, concluded with the topic on Sound by Dr. A.K. Srivastav. He discussed some of the important tips and provided guidance to introduce topic on sound through different demonstrations and examples. Demonstration on longitudinal and transverse pulses, through a slinky and a rope,

respectively, were also made. He also answered queries of the participants regarding the time period, frequency, and elasticity of the medium.

The visits to Science Park could bring the sense of inquiry, curiosity and creativity among the visitors. This could also offer interactive and activity based learning among the children and also adults. The use of graphical method in teaching learning process can enable and uplift the analytical skills among the children. Some of the working models seen in the science park like sympathetic pendulum, periscope, parabolic dishes, Archimedes screw etc. can also be improvised with low cost materials.

Hari Prasad Bhandari and Tsultrim Chomphel

Day 5: August 12, 2016

Topics: Sound, Motion, Mole Concept and Educational Kits

Resource Persons: Dr. A.K Srivastav, Dr. Rachna Garg, Prof. R.K. Parashar and Prof. Alka Mehrotra, and Dr. Anjni Koul

Morning session was addressed by Dr. A.K.Srivastav. Various concepts related to sound like characteristics of sound, propagation of sound waves, difference between noise, music etc. were explained. He clarified queries of the participants by giving lot of examples from daily life situations and also advised that we should respect the opinion of each and every child in the class-room. This can motivate the students to express themselves.

The second session was taken by Dr. Rachna Garg on graphical representation of motion and conservation of momentum. She demonstrated activities to introduce the distance-time, velocity-time graphs as most of the teachers felt that students find it difficult and confusing. Difficulty areas were discussed and ways to solvedifficulties in a simple way were also explained.

Post-lunch session started with a short visit to the Department of Educational Kits. Participants got a chance to observe different kits like Integrated Science Kit, Physics, Biology and Chemistry Kits. These kits are very simple, portable and easy to use.



Next session on mole concept and molar mass was taken by Dr. Alka Mehrotra in the Chemistry Lab. Work-sheets were provided to the participants to discover a method of counting things that can't be seen, e.g. Octave and relating it to the mole concept. In another activity Dr. Mehrotra asked the participants to take various types of 8 seeds and weigh them. Next taking seeds randomly,

weighing them and counting their numbers. Thus complex topic of mole concept and molar mass was explained in very easy way.

Dr. Anjni Koul demonstrated an experiment to show the correct way of preparing iron sulphide by heating sulphur powder and iron fillings.

All the sessions throughout the day were very fruitful as the resource persons gave tips and tricks to teach the topics in an interesting and effective way. These pedagogical methods will be very useful for us during teaching-learning process in the class-room situations.

Mrs. Bhawna Verma and Mrs. Manju Kaushal

Day 6: August 13, 2016

Topics: Herbal Garden, Light, Electricity, Sense Organs, Disaster Management

Resource Persons: Prof. Sunita Farkya, Dr. Gagan Gupta, Dr. Shashi Prabha and Dr. Ruchi Verma

The day started little early for a visit to the Herbal Gardens of the NCERT. Prof. Sunita Farkya explained different kinds of flowers with medical benefits. The tour to the garden was followed by a session on Light by Dr. Gagan Gupta who elaborately and interestingly introduced the concept of reflection of light from a plane. The third session was on Electricity and Magnetism by Dr. Shashi Prabha. She discussed the concepts of current, charge, potential difference etc. She also focused on the importance of teaching through various activities and practical methods.



The next session was a total pleasant surprise when Prof. H.K. Senapaty, Director, NCERT interacted with the participants. He spoke primarily about child centric approach which is an extremely essential component of any educational system. He was of the opinion that teacher must practice “Learner-Centred Approach” instead of a monotonous way and should minimize exam-oriented teaching. He further emphasized on the necessity of innovative and creative teaching approaches. He also spoke on the importance of critical thinking and embracing doubts and questions of students.

Session on Sense Organs was addressed by Prof. Sunita Farkya. She explained the importance of explaining scientific terms. She also reaffirmed the

needs to ask creative and interesting questions to the students before starting any new chapter. She also discussed tissue systems. The last session of day 6 was on disaster management mechanisms that was taken by Dr. Ruchi Verma. She explained about developing a disaster management culture. She also talked about various prevention and preparedness methods. She also showed us the clips of a few disastrous events that took place all over the world. She concluded her lecture throwing light on the importance of individual reflections and thus to develop a culture towards the management of disasters along with the teaching-learning processes.

Tenzin Legmon and Tenzin Chodak

Day 7: August 14, 2016

Topics: Light, Teaching Science through English Medium, Carbon Compounds

Resource Persons: Dr. Gagan Gupta, Dr. R. Meghanathan, Prof. R.K. Parashar

First session of the day was in continuation with the discussions on Light. The points regarding the reflection of light, laws of reflection, and image formation by a plane mirror, spherical mirrors; refraction of light, laws of refraction, refractive index, scattering of light were explained and demonstrated through candle and using simple low-cost lasers. Sign convention, magnification, real and virtual images, defects of vision such as myopia, hypermetropia and their corrections, were also discussed in detail. Natural phenomenon like reddish appearance of Sun at sunrise and sunset, bluish colour of the sky were also explained.

The second session began with the topic on teaching science through English medium by using ICT. Dr. R. Meghanathan told how to familiarize the words used in the concerned lesson/topics, words web/family by activity method. He emphasized to use modern latest method/technology for effective teaching-learning process. He emphasized that a teacher should always be language conscious.



The afternoon sessions were on carbon compounds was addressed by Prof. R.K. Parashar. He explained the versatile nature of carbon, saturated and unsaturated compounds, their bonding, homologous series, electronic configuration, nomenclature of carbon compounds as per the IUPAC system. Functional groups, chemical properties of carbon compounds (i.e, combustion, oxidation, reduction, addition, substitution etc.), ethanol, ethanoic acid, esterification, saponification and cleansing action of soaps and detergent were also discussed explained.

R.P. Singh and B.M. Chaware

Day 08: August 15, 2016

Topic: A visit to National Science Centre, New Delhi

Escorts: Mr. Ravi Sharma and Mr. Jai Kumar

Mr. Gurmeet Singh, Educational Trainee, briefed the team about the activities and exhibits displayed at the National Science Centre, New Delhi. The following eight galleries at the Centre were visited by the team: Fun Science gallery, Emerging technology gallery, Science and technology heritage gallery, Digital adventure gallery, Information Revolution gallery, Pre-historic life gallery, Human biology gallery, and Water gallery. Participants had a mixed kind of experiences having fun and information at the same time. Information about water and its importance is very explicit and resourceful. We have had a great fun at the fun science gallery. Participants were also enlightened with the concepts like Doppler effect, electromagnetic induction, conservation of momentum, reflection of light and sound etc. The gallery of emerging technology illustrated various aspects of nuclear energy, including both power and non-power applications in the service to mankind. The group also witnessed a free show on nuclear energy. One of the most interesting galleries was the science and technology heritage gallery that explains how science was very much familiar in the ancient Indian civilization like the Harappa culture. We also had a rich interaction at the biology gallery in terms of human physiology, reproduction, evolution and genetic field. All the valuable information's were either displayed through illustrative pictures, dummy models, working models, videos etc.



Such visits and interactions broaden our learning outside classroom activities. Teachers may get more visualizations and examples to be taken in the classroom teaching while dealing with different topics.

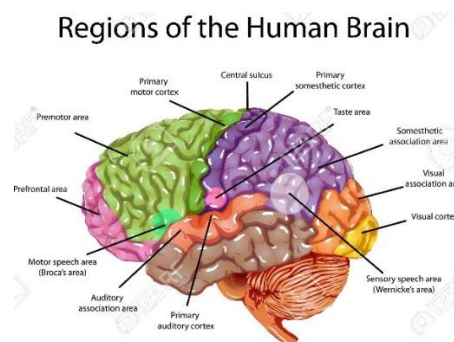
Lhundup Namgyal and Tenzin Namgyal

Day 9: August 16, 2016

Topics: Learning Science through Games and Art Forms, Activities in Life Sciences, Magnetism, Nutrition, Human Brain

Resource Persons: Dr. Ruchi Verma, Dr. C.V. Shimray, Prof. B.K. Tripathi, Dr. Shashi Prabha, and Dr. Pushplata Verma

The first session on Learning Science through Games and Art Forms was addressed by Dr. Ruchi Verma, where she presented several activities through which learning of science can be made more interactive and joyful. She also suggested some indoor as well as outdoor activities for the purpose. These may include tambola, toys, rangolis etc. She also presented a poem “कक्षा में हलचल”. The poem highlights the importance of learning by doing and cooperative learning. She emphasized on blending the content judiciously with pedagogies to be undertaken.



The second session on activities in life sciences was addressed by Dr. C.V. Shimray. She suggested several activities that can be performed in classrooms to make content more understandable and interactive. She also prompted all present to have a group discussion on Food Production, and on Global Warming. She also suggested to imbibe moral values in classroom teaching. In continuation with the learning of electricity activities and experiments, Dr. Shashi Prabha demonstrated activities on magnetic effect of electricity in a brief session after the lunch. She explained how a current carrying solenoid works as a bar magnet. In his discussion with the practising teachers, Prof. B.K. Tripathi emphasized on the role of teachers in the overall development of children. Prof. Tripathi also discussed about the spiral arrangement of content knowledge in different classes. He also discussed about the concerns related to the social and emotional quotients of children. During the last session of the day 9, Dr. Pushplata Verma discussed human brain systems in general. Participants were suggested to make children understand the left and right brain connections through a game activity.

Jamphel Tsering and Tsering Lhakpa

Day 10: August 17, 2016

Topics: Participants' Presentations, Understanding Adolescent Learners, Magnetism, Post-Test and Valedictory

Resource Persons: Dr. Gagan Gupta, Prof. Saroj Yadav, Dr. Shashi Prabha and the whole group of DESM during Valedictory

The day began with the group presentation on Chemical Reactions. The group comprised of Mr. B.M. Chaware, Mr. R.P. Singh, Mrs. Bhawana Verma, Mrs. Manju Kaushal, Mrs. Malathy V.N., and Mr. Y.D Sharma. The group explained with the help of demonstrations various kinds of chemical reactions. Another group comprising of Mr. Lhundup Namgyal, Mrs. Ngawang Tenzin, Mr. Tenzin Namgyal, Mr. Tenzin Phuntsok and Mr. Sherab Gyatso explained Archimedes' Principle of buoyancy. They narrated a story about Archimedes to arouse curiosities among the participants for the need of law on buoyancy.

The second session was taken by Prof. Saroj Yadav on the concerns related to adolescent children. She presented a few related case studies to the participants in groups for their reflections. Prof. Yadav discussed on the issues of dealing with children with adolescence age in a very effective manner.

The participants' presentations continued after the deliberation of Prof. Saroj Yadav. Third group of participants comprising of Mr. Jamphel, Mr. Hari Prasad Bhandari, Mr. Tsultrim Chopel, Mr. Tsering Lhakpa and Mr. Lobsang Tsering played a video clip exhibiting a student-teacher relationship to explain that how teachers can make a difference in their pupil's life. The fourth group of participants comprising of Mrs. Sonam Bhutti, Mrs. Dechen Tsomo, Mr. Tenzin Choeden, Mr. Tenzin Chodak and Mr. Tenzin Legmon performed activities to demonstrate solubility of different substances in water. All the presentations were discussed and participants put forward their suggestions and comments. The afternoon session was in continuation with the activities and experiments on magnetism, where Dr. Shashi Prabha cleared the doubts of teachers.

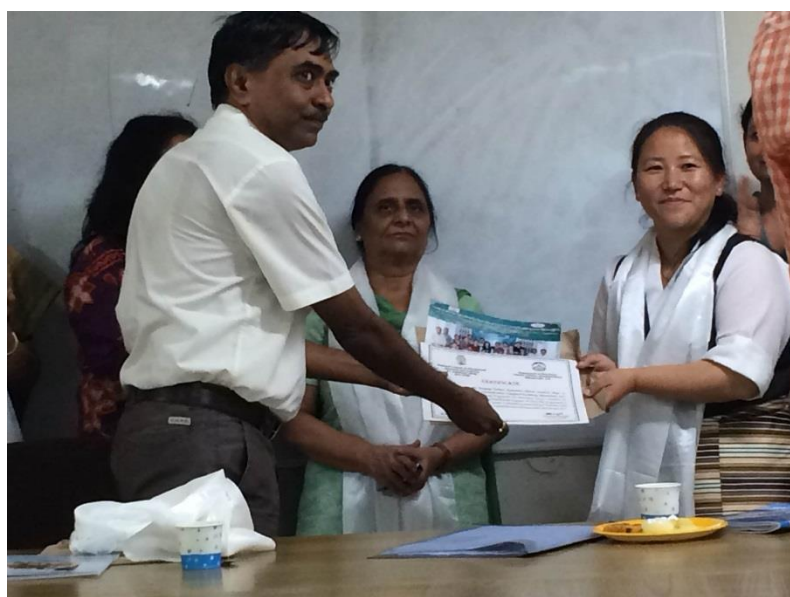
The last session was to have a post-test on the topics dealt during the Training Programme. There were twenty questions. To measure the immediate

outcome of the programme, the comparison of findings with the Pre-Test and Post-Test are given in a separate annexure.



During the Valedictory Session, a scarf ceremony was held to grace all the resource persons and NCERT team by the DoE, CTA as a mark of their gratitude for participating in this In-Service Training. All participants were awarded Certificates. The function was attended by Prof. A.K. Wazalwar, Head, DESM and all resource persons from DESM. Prof. Wazalwar congratulated the participants on completing the programme successfully and thanked CTA for giving DESM, NCERT this opportunity to interact with their teachers. Mrs. Passang Chokpa presented the vote of thanks.

Passang Chokpa



**In-Service Training Programme for Secondary Science Teachers
Belonging to Tibetan Schools**

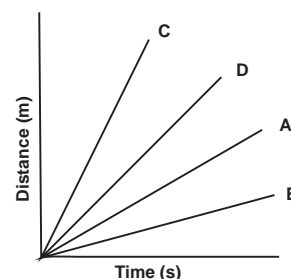
Content, Pedagogy and Emerging Trends

August 8 - 17, 2016

PRE-TEST

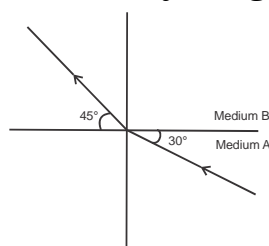
Please attempt all questions.

1. Four cars A, B, C and D are moving on a levelled road. Their distance versus time graphs are shown in the figure below.



- Which one of the following is the correct statement?
- (a) Car A is faster than car D.
(b) Car B is slowest.
(c) Car D is faster than car C.
(d) Car C is the slowest.
2. In relation with the rocket propulsions, which one of the following is the correct statement?
- (a) Rocket works on the principle of conservation of mass.
(b) Rocket works on the principle of conservation of energy.
(c) Rocket works on the principle of conservation of momentum.
(d) Rocket works on the principle of conservation of velocity.
3. Which one of the following variables associated with a feeble sound need to be increased if we were to change it to a loud sound?
- (a) Its frequency
(b) Its amplitude
(c) Its velocity
(d) Its wavelength
4. A current of 1 A is drawn by a filament of an electric bulb. What would be the number of electrons passing through a cross-section of the filament in 16 seconds?
- (a) Nearly 10^{20}
(b) Nearly 10^{16}
(c) Nearly 10^{18}
(d) Nearly 10^{23}

5. The figure below shows a ray of light as it travels.

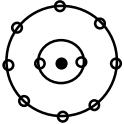


What is the refractive index of the medium B relative to medium A?

- (a) $\sqrt{3}/\sqrt{2}$ (b) $\sqrt{2}/\sqrt{3}$
(c) $1/\sqrt{2}$ (d) $\sqrt{2}$
6. On treating metal X with cold water, it gives a basic compound Y, with the molecular formula XOY having molecular mass 40. A gas Z is also liberated which catches fire easily. Identify X, Y and Z. Also write the reaction involved.
7. Mg^{2+} has completely filled K and L shells. Explain it with the help of a diagram.
8. Why metalloids do not form ions? Give two examples of metalloids.

9. What is the name of the compound $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CHO}$?
(a) Butanal (b) Butanone
(c) Propanol (d) Propanone
10. Masses of electron, proton and neutron are 9.10908×10^{-28} g; 1.67252×10^{-24} g; and $1.6749286 \times 10^{-24}$ g respectively. Calculate the mass of one mole of oxygen atoms in grams.
11. How can we make our food production sustainable?
12. According to you, what are the causes of the ever-increasing environmental issues that we are facing today?
13. Where do you find stomata in the leaves of a dicotyledonous plant?
14. Which of the following is the substance triggers the fall of matured leaves and fruits from plants?
(a) Auxin (b) Gibberellin
(c) Abscisic Acid (d) Cytokinin
15. If a round, green seeded pea plant (RR yy) is crossed with wrinkled, yellow seeded pea plant (rr YY), the seeds produced in F_1 generation will be:
(a) round and yellow (b) round and green
(c) wrinkled and green (d) wrinkled and yellow

Pre-Test: Key

Q.No.	Key
1	b
2	c
3	b
4	a
5	a
6	$\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$ X: Na; Y: H; and Z: H_2
7	<p>Mg^{2+} has only 10 electrons so K and l shells are fully filled.</p> 
8	Metalloids have high ionization enthalpy and low electron affinity. Therefore they do not lose or gain electron easily. Hence they tend to form covalent bonds. (Examples: Silicon, Germanium, Arsenic etc.)
9	a
10	1.61316 g (8 x mass of electron + 8 x mass of proton + 8 x mass of neutron)
11	Hybridization, Gene Mutation, Crop Rotation; Without using harmful chemicals; minimum exploitation of natural resources
12	Deforestation, Industrialization, anthropogenic activities etc.
13	Lower epidermis
14	c
15	All options 9:3:3:1

In-Service Training Programme for Secondary Science Teachers
Content, Pedagogy and Emerging Trends

August 8 – 17, 2016

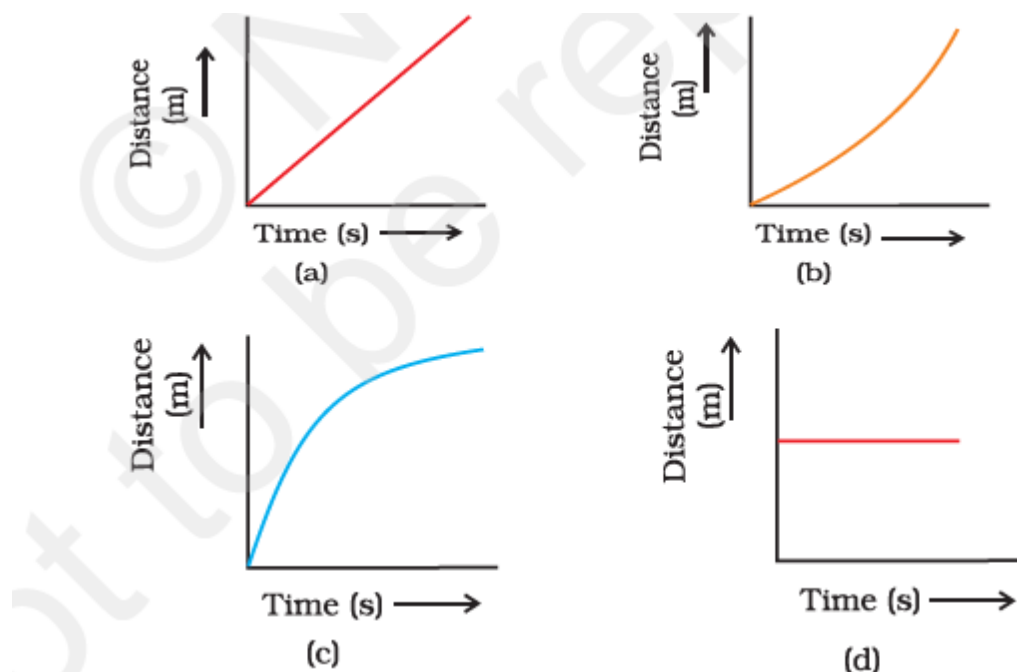
Department of Education in Science and Mathematics, NCERT

Post-Test

Please attempt all questions. Give the best option.

1. In relation to the learning of content through a language, which of the following refers to LAC?
(a) Language Across Curriculum (b) Language Associated Curriculum
(c) Language Affiliated Cognition (d) Language as Curriculum
2. JNNSMEE is
(a) Jawaharlal Nehru National Scientific and Mathematical Environment Exhibition for Children.
(b) organised every year by the National Council of Educational Research and Training, New Delhi.
(c) organised every year by the Central Tibetan Administration, Dharmasala.
(d) Jawaharlal Nehru National Science, Mathematics and Environmental Education Exhibition for Children.
3. When a wave travels from one medium to another, which of the following quantities associated with it necessarily change?
(a) Amplitude, frequency and speed (b) Amplitude, wavelength and speed
(c) Both frequency and speed (d) Both amplitude and frequency
4. Which of the following phenomena contributes significantly to the reddish appearance of the Sun at sunrise?
(a) Dispersion of light
(b) Reflection of light from the surface of the earth
(c) Scattering of light
(d) Refraction of light in the earth's atmosphere
5. The laws of reflection hold good for
(a) plane mirror only (b) concave mirror only
(c) convex mirror only (d) all mirrors irrespective of their shape
6. The strength of magnetic field inside a long current carrying straight solenoid is
(a) more at ends than at the centre
(b) minimum in the middle
(c) same at all points
(d) found to increase from one end to the other

7. What should be the minimum distance (approximately) between the source of sound and the reflector for hearing distinct echoes?
- (a) 34.4 m (b) 17.2 m (c) 7.2 m (d) 68.8 m
8. Which of the following figures represents uniform motion of a moving object?



9. As a Science teacher, which one of the following could be the best practice to contribute for the management of disasters?
- (a) Giving lectures to the students
 (b) Making efforts for developing culture of disaster management
 (c) Attending workshops and seminars on related topics
 (d) Involving students in project work related with the management of disasters.
10. Two resistors of resistance $2\ \Omega$ and $4\ \Omega$ when connected to a battery will have
- (a) same current flowing through them when connected in parallel.
 (b) same current flowing through them when connected in series.
 (c) same potential difference across them when connected in series.
 (d) different potential difference across them when connected in parallel.
11. Which of the following represents saponification reaction?
- (a) $\text{CH}_3\text{COONa} + \text{NaOH} \xrightarrow{\text{CaO}} \text{CH}_4 + \text{Na}_2\text{CO}_3$
 (b) $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{H}_2\text{SO}_4} \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$
 (c) $2\text{CH}_3\text{COOH} + 2\text{Na} \longrightarrow 2\text{CH}_3\text{COONa} + \text{H}_2$
 (d) $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \longrightarrow \text{CH}_3\text{COONa} + \text{C}_2\text{H}_5\text{OH}$
12. Compute the total number of ions present in 5.85 g of sodium chloride solution.
- (a) 6.022×10^{23} (b) 5.58×10^{23}
 (c) 1.2044×10^{23} (d) 58.5×10^{23}

13. Which of the following metals form an amphoteric oxide
(a) Na (b) Ca (c) Al (d) Cu
14. The ion of an element has 3 positive charges. Mass number of the atom is 27 and the number of neutrons is 14. What is the number of electrons in the ion?
(a) 10 (b) 13 (c) 14 (d) 16
15. Which of the following should be avoided during our efforts to enhance crop production?
(a) Apply biopesticides and manures to crops
(b) Use unlimited amount of chemical fertilizers
(c) Grow High Yielding Varieties
(d) Improve irrigation system
16. Which of the following is not a factor that contributes in the process of speciation?
(a) Acquired character (b) Genetic drift
(c) Isolation (d) Mutation
17. Which one of the following hormones is important for the root initiation?
(a) Auxin (b) Cytokinin
(c) Gibberline (d) Abscisic Acid
18. Rehan collected leaves of *Rhoeo* sps from the plant growing under the bright sunlight during day time and observed the peel of its upper and lower epidermis under the microscope. He could observe that the stomata were
(a) present only on the lower epidermis
(b) present only on upper epidermis
(c) present on both upper and lower epidermis
(d) absent on both lower and upper epidermis
19. Posture and balance of the body is controlled by
(a) cerebrum (b) cerebellum
(c) medulla (d) pons
20. Provide key learning points which you adopt in your teaching learning process.

Post-Test: Key

Q. No.	Key
1	a
2	b
3	b
4	c
5	d
6	c
7	b
8	a
9	b
10	b
11	d
12	c
13	c
14	a
15	b
16	a
17	a
18	a
19	b
20	