



HEM *harmonize*

SCIENCE

Grade X

Integration of Values

Teacher's Manual



Teacher Manual for Integration of Values in Teaching Academic subjects

By

HEMA Foundation, Mumbai

Teacher Manual for Integration of Values in Academic subjects

SCIENCE

Grade X

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Preface



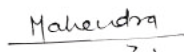
It gives immense pleasure to all of us at HEMA Foundation in presenting the “Teacher Manual for Value Integration” from Grade I to Grade X to our beloved teaching fraternity in school education. Teachers are the corner stones in building the huge edifice for the student community and they are the driving force and guiding spirit to the society. Little will change in the society, if the teachers do



not make any efforts. We are all living in a scenario where value systems need to be integrated and enhanced through essential school subjects so that the students assimilate values into their regular habits effortlessly. There may have been innumerable reasons why values from the society are disappearing, but there cannot be two opinions about the significance of educational institutions in restoring the culture and values of the society. When they say, ‘values are to be caught’, it is leaving a high degree of moral responsibility on the part of our teachers and this manual is our humble effort to lessen that burden for them. This manual is not a substitute to the academic teaching lesson plan, but is a supplementary assistance to the academic text. Nevertheless, the teachers are at perfect liberty to choose and aptly use the learning materials/activities wherever they find it relevant. This manual would be of great use to the teachers as they are written by practicing teachers in the school system and after thorough research and therefore, the general difficulties of teachers such as completion of portions in the given time to teach the subjects etc are taken care of. In fact, some of the lessons have been written after seeing their practical applications in actual classrooms.

We all have a responsibility of creating a society that is driven by values and our younger generation is the key change makers in the society. They all must be inspired by our educational institutions and their teachers so that their intellectual development is supported and augmented by the value systems and culture. HEMA Foundation takes it as a commitment to the society in participating in this huge endeavor. Inviting all the stakeholders to this venture of spreading and integrating values into the learning environment of schools, with all humility, we remain always your well wishers

Thank You,



Mahendra Kabra
Managing Trustee



Anita Maheshwari
Trustee & Creative Director

Acknowledgement

Welcome to HEMA Foundation's "Teacher Manual for Value Integration". I take this opportunity to thank each one of those who participated in it. At the outset I thank the Management of HEMA Foundation, its Managing Trustee Shri Mahendra Kabra and the Trustee and Creative Director, Smt. Anita Maheshwari, for their unstinted support and cooperation in making this happen. Our humble pranams to the Senior most Member of HEMA Foundation Padmashree Shri Rameshwarlal ji Kabra, for his abundant blessings. The Associate Director Hetal Desai, the IT department Head, Shri Arvind Pandey, Shri Akash Shah and all other team mates from HEMA Foundation have contributed immensely toward realizing this manual.

There are several people outside the system who have supported this cause by giving their valuable comments and suggestions and my thanks are due to them as well. My sincere appreciations to the authors of this book who have been esteemed Principals, Section heads and Department heads and educators from reputed institutes of the country and they deserve the highest appreciation in envisaging the concept so well. My sincere appreciation to Dr. Shobana Nandakumar Nair, Mrs. Shobha Rajkumar, Mrs. Priya Cibi, Mrs. Sopna T. R and Rashmi Menon, for authoring the manual for Math, EVS, English and Science respectively. It was their untiring work and willingness to modify the documents as and when changes were required or further researches were needed, that this book was made possible.

As the Academic Director of HEMA Foundation and the person who has conceived this idea of value integration, I have gone through this document several times before presenting it to you and am fully aware of the significance of each word used in this document. I am sure the faculty who uses this manual would strictly adhere to the norms of the school Boards and the suggestions given over here. The Central staff of HEMA Foundation is more than willing to take your valuable suggestions and I promise that we shall be able to incorporate them if found suitable in our next publications.

I thank you for all your incredible commitment. All the credits if you find this document useful, would go invariably to all those who wrote the book and those who helped in the realization of the book and all those demerits if any, are purely due to my oversight. Believing that you would find it very useful in reaching out to the students and become inspiring teachers for our younger generations

I remain your sincere



Vijayam Ravi, PhD

Introduction

(must read before the teacher proceeds)

Its 'a Friday evening'. Everyone looks forward to a joyful weekend with family. After a weeklong work, it is a much-needed break. The school campus that was brimming with noises and screams of children, is silent and calm- The evening twilight has set in on the tall buildings, creating beautiful silhouettes. All have shut their tables; cupboards and the office of the school is closed. Principal and staff were slowly proceeding to the gate. They all wished each other a happy weekend. The peon is stepping out. Suddenly it happened. None expected the normal events that take place every day would take a turn so unexpectedly. School watchman came rushing to them to announce that there has been a riot in the city and he said he could see few students along with some other miscreants sabotaging public and private properties and hurting people on streets, hooting and howling. He added that it is not safe now to walk out. That the rioting group included their students as well. The miscreants included some of their old students too. And they were all those 'good' students when they were inside the school campus.

That left the teaching staff and the leaders stunned for a while. For a moment many of them looked at the school building just like that, which is their Almamater, and it stood so tall and elevated with a pride of creating thousands of glorious citizens in the past. Each one had a question mark in their eyes. None spoke. There was a dumb silence. Each one silently started replaying what they have been doing in the classrooms all along. There was an unbelief, inexplicable feeling reflected in their eyes. Did we make any difference to our students today? Did we teach our children to live or did we teach only Math, Science and language?

This is a serious question that all teaching faculty must ask themselves-

Did we teach subjects? Or did we teach children?

Professional standards for teaching academic subjects and transferring the right knowledge to the students have been the main objective of teaching all along, across the universe. All the latest teaching and learning revolutions that are happening in the classrooms and the students are evaluated for their skill development. Education is the vehicle for development of human being. Situations turned out to be grim when the pandemic engulfed the world with its outstretched arms. Every nook and corner of the world reeled under pressure with the pain and uncertainty that was caused by this pandemic. The ambiguity around, the uncertainty, complexity and insecurity around the schools was huge that none could fathom a way to come out of it. Teachers started looking toward blended learning in a hybrid classroom situation as a solution to reach students. All the more a reason for us, to do introspection about what we were doing till yesterday in the classrooms.

Yes, we taught our students Math, English, Languages, Social sciences, Sports, Music, Art and Craft and everything else-but values. We boasted ourselves as the top schools

with more students falling into the distinction list in terms of marks. Every year we sent out to the world, thousands of students with less skills and values but more of academics and marks. We were happy. Schools were happy. But we realize today that only some of those schools have been teaching students and not teaching subjects alone. Teaching subjects has a goal post and that is the academic credentials in terms of marks, but teaching students per say has another purpose altogether and that is -Touching their lives. We were confused and placing our balls in the wrong goal' posts. Result? The riots on the street, misbehavior, calamities, destruction, suicide and a valueless society in the making! Yes, certainly we imparted knowledge of academic subjects, however while this intellectual development is transmitted, there was room for us -the teachers for integration of values into these subjects. Few schools include moral science or value education in the curriculum and the teachers do teach the kids values like an academic subject and most of the schools assess the moral science in a written examination. It is very doubtful whether the students have really gained anything out of this process. Chances are bright that they end up considering the value education as just another subject. Teaching values through books was not a mistake, but assessing the children on marks was the issue. So, students when they completed their moral science examination, and received their 'pass marks', they quietly 'passed on' the values to the dustbins.

They say that the society's growth and degradation depend to a large extent the way the students are produced by the schools. The economic prosperity of a Nation depends to a large extent on living style and value systems of the society and there is every reason to believe that when the crime rate in a country goes high, the economic prosperity has declined in the society. The thinking, the culture of coexistence, working as teams and maintaining the art of tolerance, if these are removed from the society, it is very difficult to revive the Nation. India has been such a rich country with its values and it is a very painful scenario to watch how our younger generation is missing out on values. To a large extent the responsibilities can be passed on to the Macaulay's education system, parents and schools. If the schools make deliberate attempts to impart academic subjects and create excellence in that, the student's generation that gets molded out of the schools would certainly prove to be an asset in creating wealth and prosperity for the nation. However, if the schools do not impart values to the students, the nation will end up in a huge disaster after some time in terms of its moral fibre.. Wealth and success alone do not bring happiness to the society or an individual. Yes, it may bring some kind of satisfaction and one can always get a pleasure out of it. But very soon, this feeling becomes very transient and the mind would look for something else. This is human nature and it happens because the purpose of human life is not imparted to the students in schools. And when the assessment is done, that subject is also done.

Is this the purpose of education? Swami Vivekananda conceives education as the process where the innate potential of the human being is revealed. The innate nature of a human being is peace and joy. The riots on the street shows totally opposite virtues. Then where did the schools go wrong?

The riot on the street by students is not the debate here. It may be right or it may be wrong. The question is of larger dimension. It is of citizenry, safety, security and morality of a Nation, of the Globe! But why does such a behavior happen? Why do our students or our citizens behave in such an unruly manner that is a pain to others? When did our children or our citizens who passed out of the portals of our school, become so very intolerant? What is the fundamental cause for such an unrest in the minds of students, or generally speaking mankind as a whole? The intellectual quotient is very much in place. But when the spiritual quotient and emotional quotient are misplaced, the human beings sometimes behave weirdly. They lose cool, the power to think and act. Most often human beings react.

Did we, at schools, teach our students to act, or react?

Did we, at schools, teach the students values? Or imbue values in them?

Did we teach the students only subjects? Or did we touch their lives?

The Context to Value Integration with subjects:

It is in this context of these questions, that the thought of integrating values with academic subject teaching dawned. Education and values are no two different subjects. They are mutually interwoven. As a teacher, the biggest role is to prepare their students behave like human beings with all values intact. All academic subjects may give them an opportunity to excel in life, but the values learnt help them to live as human being. Since the teacher is an integral part of education and the inspiration in the life of the children, they have to turn toward integrating values while they teach subjects. Value Integration does not mean quoting a value and discussing it, rather it is an effort to lead the students to see a personal meaning in whatever the teacher teaches in all subjects. It depends to a large extent on the creativity of the teacher to highlight the value that is hidden in all subjects, including the languages. Value means a person's personal principles or standards of behavior the judgement of how important that value is to him in his life. In nut shell we can say, "Value is a preferential behavior". What the teacher needs to do in class is to help the kids choose 'his/her preferential behaviour'

The fundamental shift that needs to happen here is this.

At the centre, is the value and all subjects are contributing to the stabilization of the value. Therefore, the teaching has to be intertwined with those values from the subjects and the teachers reach to the students in a very subtle way. Each Subject-be it Science, Math Or languages, or social science, or Non-academic subjects, have got something very fundamental to convey to the people who spend time to learn those subjects. And if we look at those subjects from a very objective perspective, we can clearly see what they are all dying to convey to the children. Math talks about precision, value of time, sharing caring, multiplying happiness and joy and several likes. Science talks about hard work and resilience and the will power to fail and still work hard to achieve. Languages give the

feelings of expression, love, compassion and what not. So, when a student goes out of the school portals, he would have assimilated within him values like precision, punctuality, rationality, truth, compassion, love, caring, sharing, determination, courage to fail, spirit of enquiry et etc. Along with similar such values, the content gets learnt by the kids.

What benefits do Value Integration bring to the students?

1. The students acquire several time honoured personal and collective values for life
2. Along with the cognitive development assured by modern education, integrating values in academic subjects prepares the children to develop their social and emotional lives
3. The approach of integration of values in teaching subjects, help the students enrich students' intellectually, physically, socially, morally, spiritually and artistically.
4. Schools can witness more of academic diligence with students showing increased attentiveness in the classroom and show capacity to do independent work
5. The school ambience also will see less of conflicting situations as the students start demonstrating greater empathy and responsibility
6. The student teacher relationships drastically improve and it becomes more trusting
7. Students feel a sense connectivity with others and belongingness

The argument

Teachers are the crucial ingredients in getting the values incorporated into the system and there is no two way about it. At present teachers are focused on completing their lessons on time amid all challenges and they do not have the extra time for doing any research for incorporating the lessons with values. Education and imparting values are no two different subjects. They are one. Additionally, thrusting a subject of value addition always attracts criticisms, primarily from the teaching community since they believe that it is an additional work and have to prepare more.

This argument is in place and cannot be ruled out and that is why HEMA Foundation pitches in for help.

What does HEMA Foundation offer to teachers?

This particular attempt from HEMA Foundation is to address this conflicting issue in education. HF is striving to reach out to teachers with ways and means to incorporate or integrate values while they teach academic subjects so that additional burden is not on them, while they address a major concern of education.

Values can never be taught, values can only be caught

Every subject has material knowledge that is needed for existence. What goes unnoticed more often is the subtle knowledge that the subjects try to convey. Any subject-Language, Math or science-all stand there for spreading virtues and values alongside the material knowledge. It is an integral part of learning the subject.

How and why are the Values Integrated by HF?

There is a very sound reason for HF to adopt the project of Value Integration into academic subjects and it is justified when any one reads the deliberations made in the NEP-2020 -NEP talks passionately about the integration of values, skills, and essential subjects to make the learning holistic. Let us refer to the clause 4.28, and it reads as follows: “Students will be taught at a young age the importance of “doing what's right” and will be given a logical framework for making ethical decisions. In later years, this would then be expanded along themes of cheating, violence, plagiarism, littering, tolerance, equality, empathy, etc., with a view to enabling children to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. As consequences of such basic ethical reasoning, traditional Indian values and all basic human and Constitutional values (such as seva, ahimsa, swachchhata, satya, nishkam karma, shanti, sacrifice, tolerance, diversity, pluralism, righteous conduct, gender sensitivity, respect for elders, respect for all people and their inherent capabilities regardless of background, respect for environment, helpfulness, courtesy, patience, forgiveness, empathy, compassion, patriotism, democratic outlook, integrity, responsibility, justice, liberty, equality, and fraternity) will be developed in all students.”

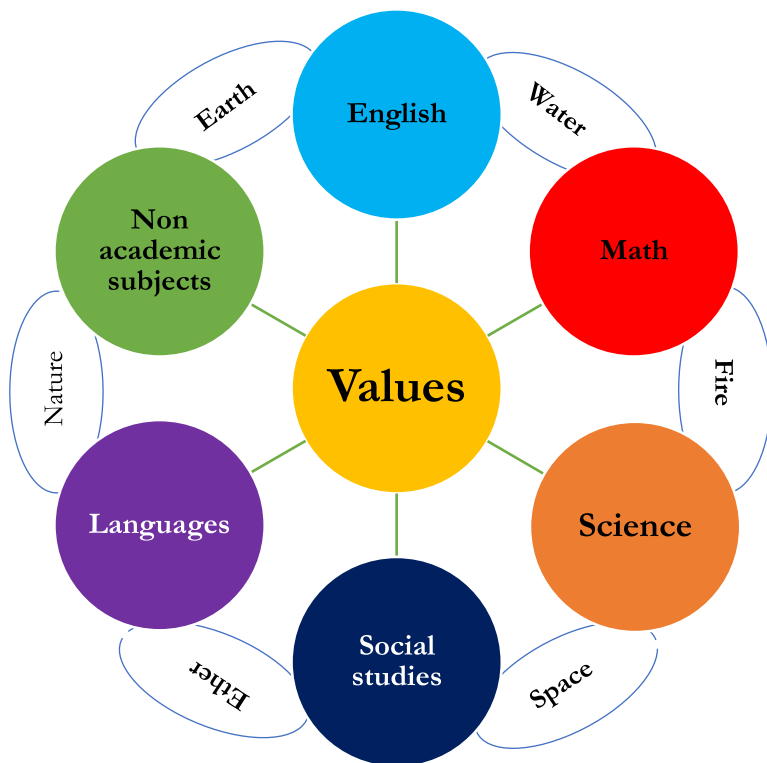
The new NEP and therein the NCERT insist on integration of values with essential subjects. Nature is the mother of all knowledge- Every learning that takes place with human beings is connected through the mind and intellect. While giving food for thought at the intellectual level, teachers have to supplement the emotional aspect through developing the mind. Mind develops by seeing, observations and hearing from sources that make sense to it. Human brain and human mind need to go hand in hand to make rational decisions and emotional attachments. If there are no emotions to any material knowledge learnt, it will remain a subject only. The love for the subject comes, when one extrapolates it to the application of it both at the material and emotional level. The emotional intelligence that gets originated while an academic subject is being taught is as powerful as the academic learning. Because it signals imagination and creativity and these are faculties associated with the mind. The rational brain which is provided with intellectual information about the academic subjects processes the knowledge with the help of the emotional brain-which is the mind. When no food is given to the emotional brain, it gets impoverished. Therefore, a balancing act needs to be done by teachers while imparting knowledge on academic subjects to incorporate the value or virtue that the subject is trying to convey to the reader or learner.

While the teacher teaches a topic ‘Patterns’ in Math, remember that the teacher has to touch the value of precision, discipline and punctuality. The whole universe gives us innumerable patterns and they all follow a certain order. That order brings discipline and it helps you see things in the right perspective. Similarly, the teacher, while discussing about geography, and earth in particular, what can be brought out is the virtue of evolution and the stability given by the earth. Earth is an evolved planet. The innate stability, the order, the growth and silence involved in this process are all virtues that can

be imparted to the students. On similar lines, the ecosystem, the biology, atmosphere, the plants, animals, air, water, aesthetics, and beauty-all talk about values and virtues of truth, tolerance and love, coexistence, interdependence, compassion and honesty.

Integration of values with academic subject teaching is an effort of HEMA Foundation to reach to the teachers with the varied ways of dealing with academic subjects and making it very interesting for the students to learn.

Whom does this manual serve?



The next thing that HF is trying to incorporate is Skills along with values. Skills are also considered to be an integral part of learning and hence while a value is highlighted the skills are also touched upon.

The additional advantage that teachers who use this manual of HF is that, the chart of the flow of lessons can be as such adopted in real teaching sessions without the need for doing a lesson plan again. The pattern of a school lesson plan used for imparting academic session is given incorporating the values integrated in it.

The perfect way of starting an academic lesson in a normal classroom situation so that the students get glued to the teacher's skills of teaching, is assured in the manual

through a context text—either by way of a story or an activity or discussion that rouses the interest of children

The description of the lesson ends with assignments for doing individually, at home or in class and this comes as a huge relief for the teachers

There is also a descriptive summary in the beginning of the text manual where in the topic, the core values, the skills and the activities that can be done and also the materials required for the same are all given so that the teacher gets a quick idea about how to go about the same.

HF, thus, is trying to travel that path of imbibing values to children along with the teachers!

Organization of the manual - How to read the manual?

The teacher will have to read and understand the manual as follows:

This teacher manual follows a certain structure that is not replacing the academic journal of the teacher. On the contrary, serves as an additional support as to how the teacher can link those values that are very relevant for a human life with the teaching of the subjects.

It has two parts:

A descriptive summary: this is a sheet in the beginning of each manual, showing what are the core values, sub values and skills that are linked with the topics and describes what activities can be undertaken to teach the values through subject integration and also shows what all education materials are required. Teacher has to glance through this to get a fair idea about how many values are integrated in total and understand this part first

The second part is the actual manual where the method of integration is dealt with the main academic concept.

The structure of the manual goes as follows: Start reading from introduction

1. **Introduction:** This gives what the lesson is about and what values, skills can be integrated here and the significance of it
2. **Learning objectives:** This plan talks about what are the academic and value driven objectives of learning the lesson
3. **Process and Action:** Here the way how the lesson has to be undertaken and it is shown in the form of a flow chart for quick understanding mentioning the activities at each stage. It starts with the context which actually serves as the introduction of the class to the new topic.
4. **Activities and related discussion:** Here the activities are dealt with in detail with discussion questions that lead to both academic and value driven integration. It is through these the teacher is able to deliver the total lesson effortlessly.
5. **Assignments:** Gives assignments that can be done individually, at home, or as group in the class.

The activities given can be chosen by the teacher as and when needed or as per the time available. It is not mandatory that the teacher does all activities.

Conclusion:

It is a proven fact that any particular value learnt becomes a habit when one practices it consistently. The purpose of integration of values with academic subjects is to learn the values along with the academic concepts and so whenever the academic concepts are tested, the value learnt is reiterated. The creativity and imagination of teacher make the lessons interesting to the students and HEMA Foundation presents this Value Integration Teacher Manual for the benefit of the teaching and student community.

Jai Hind

Conceived and presented by

Vijayam Ravi, PhD

Academic Director

HEMA Foundation

"वसुधैव कुटुंबकम्"

Vasudhaiva Kutumbakam ("vasudha", the earth; "iva", is ; and "kutumbakam", family). This Sanskrit phrase literally translates to mean that the whole world is one single family. The Sages have said that the entire world is truly just one family connected with thoughts, emotions, humanity and humility.



सर्वे भवन्तु सुखिनः सर्वे सन्तु निरामया ।
सर्वे भद्राणि पश्यन्तु मा कश्चित् दुःखभाग् भवेत् ॥

May all be prosperous and happy. May all be free from illness.
May all see what is spiritually uplifting. May no one suffer in anyway.
Om peace, peace, peace.



Vision

We aim to cultivate a conscious understanding of human values in individuals in order to help them coexist peacefully and harmoniously.



Mission

Our mission is to awaken the spirit of value based living in all individuals at school, organizational and community levels through well researched and structured programs resulting in a responsible, effective and harmonious existence for all



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Chemical Reactions and Equations

Topic	Values / Life skills integrated & imbibed	Activities
Chemical Reactions and Equations	<p>Core Values Adaptability, Teamwork and Self-control</p> <p>Other Sub Values: Discipline and Positivity</p> <p>Life Skills: Creative and Imaginative skills and Rational thinking skills.</p>	<ol style="list-style-type: none"> 1. This is an experimental demonstration which helps to understand the importance of Adaptability, and teamwork in life. Refer B.1. 2. This is a demonstration activity which helps the children to relate to values like .self-control and discipline. Refer B.2.. 3. A paragraph writing assignment that helps to improve the creative and imaginative skills and also rational thinking skills of children . Refer.C.1

Materials / Resources needed

- 1) Iron nails, test tubes oil and calcium chloride.
- 2) NCERT text books of Class X

Description (of the points of discussion)

This chapter gives an overview of the different types of reactions and how to represent them as balanced equations.

The points of discussion are

- the observations and outcomes of chemical reactions.
- the rules of writing balanced chemical equations.
- the various types of chemical reactions and their characteristics, with examples.
- In some situations you may have to work as a team to have better outcomes as in combination reactions and sometimes separate out to work individually as in decomposition reactions.
- Realise that in interpersonal interactions, one can have constructive or destructive reactions and one has to adapt to the changes to survive. Like in displacement reactions, sometimes one may have to break old bonds and make new ones.
- Some situations demand self-control and discipline and it may be ideal not to react in certain situations or avoid reacting by keeping yourself insulated.

Unit 1**Chemical Reactions and Equations
Adaptability, Teamwork and Self-control****I. Introduction**

Chemical reactions can be considered as one of the most significant event impacting our universe. Formation of solar system, our mother earth are all their outcomes, when considered on a macro scale. It's through chemical reactions that plants grow, produce fruit, and become compost for new plants .It's because of chemical reactions that human beings (and all other animals) reproduce, digest, grow, heal, and think .This chapter gives an overview of the different types of reactions and how to represent them as balanced equations.

This chapter gives the teacher an opportunity to explain values like adaptability, teamwork, self-control and discipline, along with the importance of good interpersonal relationships. While explaining combination reactions and displacement reactions, teacher can relate it to interpersonal interactions. In interpersonal relationships one can react constructively or destructively in certain situations. Sometimes you may have to work as a team to have better outcomes, as in combination reactions. Sometimes it is better not to react to situations, displaying self-control. One may have to break old bonds, sometimes, like in displacement reactions, and make new ones which makes adaptability an important virtue in life.

The core values focused upon are Adaptability, Teamwork and Self-control along with sub values such as Discipline and Positivity.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Comprehend the observations and outcomes of chemical reactions.
- Know the rules of writing balanced chemical equations.
- Learn about the various types of chemical reactions and their characteristics, with examples.

- Understand that in some situations you may have to work as a team to have better outcomes as in combination reactions and sometimes separate out to work individually as in decomposition reactions.
- Realise that in interpersonal interactions, one can have constructive or destructive reactions and one has to adapt to the changes to survive. Like in displacement reactions, sometimes one may have to break old bonds and make new ones.
- Learn that some situations demand self-control and discipline and it may be ideal not to react in certain situations or avoid reacting by keeping yourself insulated.

III. Process & Action Plan

Teacher can throw light upon values like adaptability and self-control while teaching the nature of reactions and their outcomes. It can be highlighted that every element is unique and has its own way to react with others, which is also influenced by external factors. Likewise, there may be situations in life which may trigger a reaction in you, that may have positive or negative impact in your relationships.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Adaptability and Teamwork

This is an experimental demonstration which helps to understand the importance of Adaptability, and teamwork in life.
Refer B.1.

2. Self-control and Discipline

This is a demonstration activity which helps the children to relate to values like .self-control and discipline. Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1. A paragraph writing assignment that helps to improve the creative and imaginative skills and also rational thinking skills of children. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** - Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Adaptability, Teamwork and Self-control* along with sub values such as *Discipline and Positivity*.

The unit also provides the scope to develop the following skills in the students *like creative and imaginative skills and also rational thinking skills*.

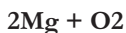
IV. Activities & Related Discussion

A. The teacher can introduce chemical reactions by describing several different changes in matter and asking students whether they are chemical or physical changes. Be sure to include examples of each type of change (e.g., ice melting and salt dissolving for physical changes; leaves changing colour and wood burning for chemical changes). Discuss with the class how chemical changes differ from physical changes.

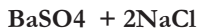
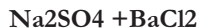
B. Activities:

B.1. The lesson can proceed with a simple activity. While teaching about the different types of chemical reactions, teacher can demonstrate some reactions in the class.

- For combination reactions, teacher can demonstrate burning of magnesium ribbon in air (activity 1.1) or reaction between zinc and hydrochloric acid (activity 1.3) and make the students write a balanced equation for the same.



- For double displacement reactions, teacher can demonstrate activity 1.10 in the class.

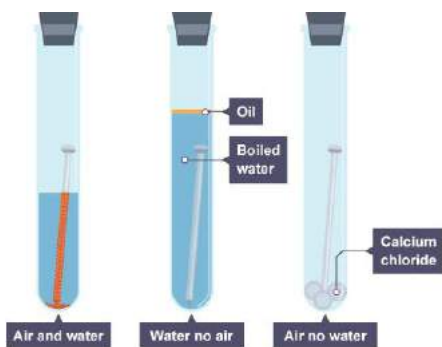


While explaining these reactions teacher can highlight upon values like team work and adaptability. In this context teacher can compare the above reactions to situations in life when you interact with others. In human relationships you can have a constructive or destructive approach. In certain situations, joining hands with someone and acting as a team yields better results, as demonstrated by magnesium and oxygen in the combination reaction. Whereas in some cases one may have to break bonds and form new ones, as done by sodium and barium in the displacement reaction. Adaptability to changing environment and redefining relationships is very much needed in many situations of life. Children can be urged to respond to situations according to what they think, to yield positive outcomes.

Things needed: As per the activity chosen.

Note : Teacher can refer the activities described in the NCERT textbook for Class X.

B.2. This is another activity which helps to understand how rusting of iron happens and the factors contributing to it .Take 3 test tubes and set up each as shown in the picture below. In the first one the iron nail is kept dipped in water and air is also there. In the second one no air is available as it is boiled water and the oil layer prevents air from dissolving in the water, In the third one air is available , but no water is there as calcium chloride absorbs moisture from the air. After some days, it can be observed that only the nail in the first test tube rusts while those in the others remain intact. Thus it is understood that oxygen and moisture are essential for rusting.



During the discussion on this activity, teacher can point out that the presence of oxygen triggers oxidation process which causes two undesirable phenomena like rusting of iron and rancidity in oils. This is because oxygen is a highly reactive gas. Here, teacher can bring to the attention of the children, that sometimes in some situations, it is better to control yourself and avoid reacting unnecessarily. We may have to learn to ignore and insulate ourselves from negativity just like, an iron

nail can be prevented from rusting by coating it with oil or paint .It is always better to keep away from unnecessary arguments and conflicts, for maintaining peace and harmony in relationships. To achieve this one has to practice self-control and discipline and improve one's level of maturity.

Things needed: Iron nails, test tubes oil and calcium chloride.

V. Assignments

C.1. Class Assignment.

An interesting assignment can be given to children to write a small paragraph about how they will respond to a particular situation in life. The teacher is free to give any situation similar to some sample situations given here.

- During the class, the person sitting behind you, punches you in the back. You try to tell the teacher, but he only says to be quiet during the class. What would you do?

- You're excited about a friend's upcoming birthday party, but then she says you aren't invited. Her parents said she can only invite four people, and you aren't one of them. What would you do?
- You're playing a video game when your mom gets home from work. She turns off the power and tells you to get going on homework—even though you don't have any. All your progress in the game is lost. What would you do?

This activity would help children to understand how and when one should respond to certain situations. It would also provide them some inputs on how to react positively to such situations. This activity also enhances the creative and imaginative skills, and also would contribute to rational thinking of the children.

Resources

References:

- NCERT Class X Science Textbook.
- Picture courtesy : <https://www.bbc.co.uk>

Unit 2

Acids, Bases and Salts

Topic	Values / Life skills integrated & imbibed	Activities
Acids ,Bases and Salts	<p>Core Values Optimism, Determination and Self-discipline</p> <p>Other Sub Values: Self-control and Positivity.</p> <p>Life Skills: Critical thinking and Logical reasoning.</p>	<ol style="list-style-type: none"> 1. This is an experimental demonstration activity which helps the children to realise the importance of developing positivity Refer B.1. 2. This is an experimental demonstration activity which helps the children to relate to values like Self-discipline and Determination. Refer B.2. 3. Home Assignment that helps to improve the critical thinking and logical reasoning abilities of the students.. Refer.C.1.

Materials / Resources needed

- 1) Dil. Sodium hydroxide solution, Dil. Hydrochloric acid, Phenolphthalein as indicator. test tubes, sodium chloride, conc. sulphuric acid, litmus papers, calcium chloride and drying tube.
- 2) NCERT text books of Class X

Description (of the points of discussion)

This chapter elaborates on the reactions between acids and bases ,how they cancel out each other's effects and their day to day uses.

The points of discussion are

- the properties of acids , bases .and salts
- the reactions between acids and bases and also their reactions with metals, non-metals, metallic and non-metallic oxides, carbonates etc.
- the formation of various salts and uses of different salts in our daily life.
- neutralisation reaction between an acid and a base which results in the formation of neutral products including water. This can be shown as an example of how negativity can be neutralised by positive thoughts which in turn brings peace and calmness to one's mind.
- Realise that acidic properties of acids are due to the presence of hydrogen ions which is liberated only in the presence of water. This can be related to going into a bad company which brings out the negative traits in a person. This can be avoided by self-discipline and self-control.

Unit 2**Acids, Bases and Salts**
Optimism, Determination and Self-discipline**I. Introduction**

The concepts of acid, base, and salt are very old ones that have undergone several major refinements as chemical science has evolved. We know that acids and bases differ in their taste and nature and they have different interactions with indicators. This chapter elaborates on the reactions between acids and bases ,how they cancel out each other's effects and their day to day uses.

While explaining the neutralization reactions between acids and bases to form neutral products, teacher can touch upon how to gain positivity by neutralizing negative thoughts. Teacher can point out the fact that bad company influences a person and makes him bad, just like acids, that show acidic behaviour only in the presence of water. One has to develop self-discipline and determination not to go into bad company.

The core values focused upon are *Optimism, Determination and Self-discipline* and sub values like *Self-control and Positivity*.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Learn about the properties of acids ,bases .and salts
- Comprehend the reactions between acids and bases and also their reactions with metals, non-metals, metallic and non-metallic oxides, carbonates etc.
- Understand the formation of various salts and uses of different salts in our daily life.
- Learn about neutralisation reaction between an acid and a base which results in the formation of neutral products including water. This can be shown as an example of how negativity can be neutralised by positive thoughts which in turn brings peace and calmness to one's mind.
- Realise that acidic properties of acids are due to the presence of hydrogen ions which is liberated only in the presence of water. This can be related to going into a bad

company which brings out the negative traits in a person. This can be avoided by self-discipline and self-control.

III. Process & Action Plan

A good teacher can guide the children in the right path by inculcating good values in them. This chapter provides teachers with opportunity to urge children to not get into bad company . They can be advised to always choose good friends who brings out the goodness in them .It can also be assured that your positive thinking can remove all the negativity in your mind and bring peace and calmness just like what happens in neutralization reaction.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Positivity and Optimism

This is an experimental demonstration activity which helps the children to realise the importance of developing positivity Refer B.1.

2. Self-discipline and Determination

This is an experimental demonstration activity which helps the children to relate to values like Self-discipline and Determination. Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Home Assignment that helps to improve the critical thinking and logical reasoning abilities of the students..
Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** - Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Optimism, Determination and Self-discipline and sub values like Self-control and Positivity*.

The unit also provides the scope to develop the following skills in the students like *critical thinking and logical reasoning*.

IV. Activities & Related Discussion

A. The teacher can discuss the home remedies for some of the common ailments like acidity, a bee sting etc. which are actually acid -base neutralisation reactions in daily use. The characteristic physical properties of acids and bases can be discussed before discussing the chemical properties and reactions.

B. Activities:

B.1. The teacher can demonstrate a neutralization reaction in the class as given in activity 2.6 (from NCERT textbook). Children can be asked to write the balanced equation for the reaction.



It can be noted that during the experiment on pouring dil. hydrochloric acid into sodium hydroxide solution the colour of the indicator changes which indicates that the solution became neutral i.e. neither acidic nor alkaline.

This demonstration clearly shows that however powerful an acid may be, it can be neutralized by a base. Similarly, you may have so many negative thoughts in your mind, but if you fill your mind with positivity the negativity will get neutralized and you can attain calmness and inner peace. Children can be urged to think about positive things and the brighter side of life. Be optimistic in whatever you do and try to see the positive side of things.

Things needed: Dil. Sodium hydroxide solution, Dil. Hydrochloric acid, a test tube, Phenolphthalein as indicator.

B.2. Teacher can demonstrate activity 2.9 (from NCERT textbook) in the laboratory. This is a demonstration of how acids show their acidic character in the presence of moisture. The acidic nature of acid is shown when hydrogen ions are formed and this happens only in the presence of water.

This can be related to the fact that self-control comes from within, yet many of our actions depend just as much on our friends and family as ourselves. This is not simply peer pressure, in which you deliberately act in a certain way to fit in with the group. Instead, it is largely unconscious. So if you are with a bad group your negative traits will be pampered and they are manifested. But if you consciously select a good company then you will evolve as a better person. For this to happen you should be self-disciplined and should have self-control and determination. In this demonstration water is like a bad company that makes the acid show its acidic nature which behaved otherwise as non-acidic.

Things needed: Test tubes, Sodium chloride, Conc. Sulphuric acid, litmus papers, Calcium chloride and drying tube.

V. Assignments

C.1. Home Assignment.

Children can be asked to write about any incident in their life, where they were forced to act in a socially unacceptable manner, due to peer pressure. They can also be asked to explain why they acted in that way and whether they regretted for their bad behaviour. This activity helps the children to understand how their friendships influences their actions. This also helps them to develop critical thinking and logical reasoning for their actions.

Resources

References:

- NCERT Class X Science Textbook.

Topic	Values / Life skills integrated & imbibed	Activities
Metals and Non-Metals	<p>Core Values Generosity, Integrity and Self-control</p> <p>Other Sub Values: Kindness and Care and Share.</p> <p>Life Skills: Social responsibility.</p>	<ol style="list-style-type: none"> 1. This is an experimental demonstration which helps to understand the behaviour of metals which can be related to self-control and preserving integrity .Refer B.1. 2. This is a discussion on how metals are generous in giving their electrons to the needy elements thus highlighting the importance of gratitude and kindness. Refer B.2. 3. Kindness journal keeping assignment that helps to inculcate social responsibility in the minds of the children. Refer.C.1.

Materials / Resources needed

1)Some metals as described in the table and cold water, indicators etc.

2)NCERT text books of Class X

Description (of the points of discussion)

This lesson deals with basic properties of metals and non-metals, their reactivity to other elements and the formation of some compounds.

The points of discussion are

- the physical characteristics of metals and non-metals.
- how metals donate their electrons and form strong bonds with other non-metals
Here teacher can highlight the importance of generosity and kindness which helps one to develop strong relations.
- how metals and nonmetals react to form various compounds like oxides, carbonates etc.
- the reactivity series and how different metals have different levels of reactivity which can be related to the fact that it is better not to react to every situation. Integrity and self-control are two important values which one should inculcate.
- the various processes involved in the extraction of metals.
- how corrosion happens and various methods to prevent it.

Unit 3**Metals and Non-Metals
Generosity, Integrity and Self-control****I. Introduction**

In our day to day life we use many well-known materials like iron, aluminum, copper, gold, silver and many more. We are also familiar with the elements like oxygen, carbon, sulphur as well. This lesson deals with basic properties of metals and non-metals, their reactivity to other elements and the formation of some compounds.

Through this chapter the teacher can educate the children about the important values like generosity, integrity and self-control. While explaining how metals react with non-metals teacher can urge the children to be like metals, which are ready to give away their excess electrons to other non-metals who are in need of electrons to attain stability. This results in a strong ionic bond between them like a true friendship. Teacher can highlight that generosity, kindness and caring and sharing helps to build strong interpersonal relations. Teacher can point out that it is better that we do not react to every situation like gold and silver which are non-reactive. If we overreact to every situation then we will be like sodium and potassium which loses their integrity and form some other compounds. Values like self-control and integrity should be inculcated in every child's mind.

The core values focused upon are Generosity, Integrity and Self-control along with sub values such as Kindness and Care and Share.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Explain the physical characteristics of metals and non-metals.
- Learn how metals donate their electrons and form strong bonds with other non-metals Here teacher can highlight the importance of generosity and kindness which helps one to develop strong relations.
- Learn about how metals and nonmetals react to form various compounds like oxides, carbonates etc.
- Understand the reactivity series and how different metals have different levels of

reactivity which can be related to the fact that it is better not to react to every situation. Integrity and self-control are two important values which one should inculcate.

- Comprehend the various processes involved in the extraction of metals.
- Learn about how corrosion happens and various methods to prevent it.

III. Process & Action Plan

Teacher gets an opportunity to inculcate values like unity and simplicity through this topic. An awareness on how important it is to protect the environment can also be inculcated in the minds of children .

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Self-control and Integrity

This is an experimental demonstration which helps to understand the behaviour of metals which can be related to self-control and preserving integrity. Refer B.1.

2. Kindness and Generosity

This is a discussion on how metals are generous in giving their electrons to the needy elements thus highlighting the importance of gratitude and kindness. Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Kindness journal keeping assignment that helps to inculcate social responsibility in the minds of the children. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** - Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Generosity, Integrity and Self-control* along with sub values such as *Kindness and Care and Share*.

The unit also provides the scope to develop the following skills in the students like *social responsibility*.

IV. Activities & Related Discussion

A. The teacher can initiate a discussion on the various physical properties and characteristics of metals and non-metals.. Children can be asked to name some objects at home that are made by metals and non-metals and can give a reason why they have classified them under respective groups.

B. Activities:

B.1. The lesson can proceed with a simple activity that will show how different metals react with non-metals and other compounds and the significance of reactivity series. Teacher can refer to the activity 3.10 (NCERT Text Book) and demonstrate them with proper precautions in laboratory. Children can be asked to see table as given below to record the observations of the above activity.

Metal	Possible observations
Aluminum turnings	no change - no reaction
Calcium granules	Slow reaction, effervescence, colourless gas evolved. The universal indicator turns blue-purple - alkaline solution (pH ~13)
Copper strip	no change - no reaction
Iron filings	no change - no reaction
Lead strip	no change - no reaction
Lithium - pea sized lump!	Moderately fast reaction - effervescence, colourless gas formed (Teacher can demonstrate in a large trough of water) The universal indicator turns blue-purple - alkaline solution (pH ~13

Magnesium ribbon	Very slow reaction, bubbles slowly form on the surface of the magnesium ribbon. Around the magnesium ribbon the universal indicator turns pale blue - weakly alkaline solution (pH ~11)
Potassium pea sized lump!	Very fast reaction - effervescence, colourless gas (Teacher can demonstrate in a large trough of water) . The universal indicator turns blue-purple - alkaline solution (pH ~13)
Sodium - pea sized lump!	Fast reaction - effervescence, colourless gas formed, may ignite with a larger lump (Teacher can demonstrate in a large trough of water) .The universal indicator turns blue-purple - alkaline solution (pH ~13)
Tin strip	no change - no reaction
Zinc granules	no change - no reaction

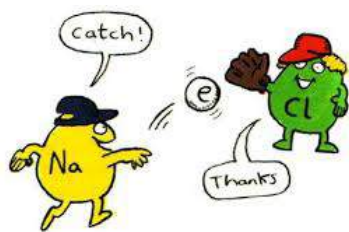
For metals reacting with cold water

It can be noted that sodium and potassium gives vigorous and explosive reactions with even cold water as they are highly reactive. This can also be observed when these metals react with acids. Whereas metals like silver, gold ,platinum etc. does not show any reaction with water or acids. It can be pointed out that sodium and potassium are stored, dipped in kerosene oil so that they would not react with oxygen. Whereas gold ornaments sustain their property even after being exposed to water and oxygen for a long time.

Teacher can urge the children to be like gold and silver .They should not over react to situations maintaining their integrity and calmness. If we overreact to every situation then we will be like sodium and potassium which loses their integrity and form some other compounds. Values like self-control and integrity should be inculcated in every child's mind while explaining this activity. You should be reacting to any situation after proper and wise thinking.

Things needed: Some metals as described in the table and cold water, indicators etc.

B.2. This is a discussion on how metals react with some non-metals and form strong ionic compounds Teacher can explain the formation of bonds between sodium and chlorine atoms. Here chlorine is in need of one more electron to attain its stability whereas sodium has one excess electron. Metals generally give away their electrons to others and become positive ions . This results in a strong ionic bond between the metal and the non-metal.



Metal atoms give electrons to non-metal atoms.

This can be displayed as an act of sharing and caring. Children can be advised to be generous and kind to others and try to donate whatever they have in excess to others who are in need. This makes your mind feel a positive energy and also helps you to gain the good will of others. Only people who are ready to help others can nurture true friendships just like the strong bonding between sodium and chlorine. Teacher can try to make the children understand the importance of generosity

and kindness which helps in your journey to success.

V. Assignments

C.1. Home Assignment.

Children can be asked to record in a kindness journal any kind activity they have done like donating their unused notebooks, textbooks, pencils and other stationary or some good clothes, to any poor and needy children in their locality. This will give a sense of happiness, positivity and accomplishment in the minds of the children. This activity also helps them to understand their social responsibility and helps them to become responsible citizens.

Resources

References:

- NCERT Class X Science Textbook.
- Picture courtesy : <https://chemistryklipz.files.wordpress.com>

Topic	Values / Life skills integrated & imbibed	Activities
Carbon and Its Compounds	<p>Core Values Generosity, Teamwork and Adaptability</p> <p>Other Sub Values: as Flexibility and Love.</p> <p>Life Skills: Creative and Imaginative skills and Analytical and Critical thinking skills.</p>	<ol style="list-style-type: none"> 1. This is a game activity which helps to understand the importance of generosity and teamwork in life. Refer B.1. 2. This is a discussion which helps the children to relate to values like adaptability and flexibility. Refer B.2. 3. Home Assignment that helps to improve the analytical and critical thinking skills. Refer.C.1.

Materials / Resources needed

- 1) Thermocol balls of different colours and sizes and matchsticks.
- 2) NCERT text books of Class X

Description (of the points of discussion)

This chapter gives an overview of characteristics of carbon and its bond formation, classification of carbon compounds and the various types of reactions exhibited by carbon compounds.

The points of discussion are

- the characteristic properties of carbon that makes it unique and helps it to form so many compounds.
- how carbon forms covalent bonds and double and triple bonds.
- the homologous series and the different functional groups.
- why most hydrocarbons are very good fuels and how soaps and detergents work.
- while learning about the nature of carbon, that bonding with others is important in life as we are all social beings and virtues like love and generosity can help us to do s.
- adaptability and flexibility to changing situations are important as seen in addition and substitution reactions.

Unit 4**Carbon and Its Compounds**
Generosity, Teamwork and Adaptability**I. Introduction**

Carbon compounds are everywhere i.e. in the food we eat, the clothes we wear and even in the pencil lead with which we write. Carbon is a major component of living beings. Carbon is one of the basic building blocks for organic life along with nitrogen and oxygen. Carbon constitutes about 18% of the human body. Due to its unique ability to form four separate bonds with other elements, Carbon has huge significance. This chapter gives an overview of characteristics of carbon and its bond formation, classification of carbon compounds and the various types of reactions exhibited by carbon compounds.

Through this chapter children can learn about love, generosity, adaptability and flexibility. The flexible nature of carbon and its tendency to form strong bonds with other elements by sharing its electrons with others are typical examples of generosity and love towards others. Carbon compounds teach us the importance of networking and collaborating with others. Another interesting life lesson one can learn from organic chemistry is from addition and substitution reactions. In this type of reaction, an element may be readily added or one element may be substituted by another. Teacher can advise the children to be always ready to accommodate changes and always try to be adaptable to any change.

The core values focused upon are Generosity, Teamwork and Adaptability along with sub values such as Flexibility and Love.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Learn about the characteristic properties of carbon that makes it unique and helps it to form so many compounds.
- Understand how carbon forms covalent bonds and double and triple bonds.
- Learn about the homologous series and the different functional groups.

- Realise why most hydrocarbons are very good fuels and how soaps and detergents work.
- Understand while learning about the nature of carbon, that bonding with others is important in life as we are all social beings and virtues like love and generosity can help us to do so.
- Learn that adaptability and flexibility to changing situations are important as seen in addition and substitution reactions.

III. Process & Action Plan

A teacher can take the role of a mentor and guide his/ her students in the right direction by inculcating essential values. Here in this chapter carbon can be taken as a good example of a person who can build a large group of friends by being generous. It forms all types of bonds by sharing its electrons with others and can form long chains including branched ones using its networking skills.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Generosity, Love and Teamwork

This is a game activity which helps to understand the importance of generosity and teamwork in life. Refer B.1.

2. Flexibility and Adaptability

This is a discussion which helps the children to relate to values like adaptability and flexibility. Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Home Assignment that helps to improve the analytical and critical thinking skills. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** - Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Generosity, Teamwork and Adaptability* along with sub values such as *Flexibility and Love*.

The unit also provides the scope to develop the following skills in the students *like creative and imaginative skills and analytical and critical thinking skills*.

IV. Activities & Related Discussion

A. The teacher can discuss about a large number of organic compounds which we use daily and thus enlighten the children about the diversity and versatility of these compounds. He/ she can also highlight the characteristics of carbon that makes it unique.

B. Activities:

B.1. The lesson can proceed with an interesting game activity. Teacher can divide the class into four or five teams each having three to four members each. Now each team can be given equal number of coloured thermocol balls and some match sticks. Teacher can ask each team to build molecular models of organic compounds using the balls and matchsticks within a given time say one minute. An example of a model is shown in the figure. Matchsticks can be used for showing bonds. They can choose different coloured balls for each element. for e.g. say red balls for carbon, white for hydrogen, blue for oxygen etc. The team that makes maximum number of compounds will be the winner.



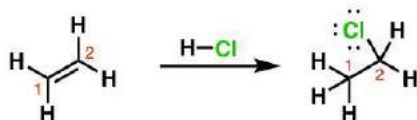
This activity not only helps students to improve their understanding of organic compounds but also encourage their creativity and imagination. It also helps them to understand the flexible nature of carbon and its tendency to form strong bonds with other elements by sharing its electrons with others. This is a typical example of generosity and love towards others. Carbon compounds teach us the importance of networking and

collaborating with others and also highlight the effectiveness of team work. This is an opportunity for teacher to inculcate values like generosity and love in the minds of the children and help them to understand the essential elements of good teamwork.

Things needed: Thermocol balls of different colours and sizes and matchsticks.

B.2. This is discussion activity. The teacher can elaborate on the various types of reactions exhibited by organic compounds like substitution and addition reactions. It can be highlighted that in this type of reaction an element may be readily added or one element may be substituted by another as shown here. Children can be made to draw these reaction mechanisms to understand how substitution and addition takes place.

A typical addition reaction:



Bonds broken



Bonds formed



A typical substitution reaction

In this context teacher can advise the children to be always ready to accommodate changes and always try to be adaptable to any change. Adaptability and flexibility are two values very much needed in life. It also teaches how to make or break bonds when the situation demands. You should be able to walk out of toxic friendships and add good friends to your friends list whenever possible, just like carbon in these reactions.

V. Assignments

C.1. Home Assignment.

A home assignment can be given to children to write about a strong bonding they have outside their immediate family members and the factors that contribute to such strong bonding. It can be a friend, a cousin or a teacher whom they trust and consider as someone who contributes to their success. This activity not only helps to understand interpersonal relations but also enhance the analytical and critical thinking skills of children.

Resources

References:

- NCERT Class X Science Textbook.
- Picture courtesy : www.masterorganicchemistry.com

Periodic Classification Of Elements

Topic	Values / Life skills integrated & imbibed	Activities
Periodic Classification Of Elements	<p>Core Values Self-discipline, Integrity and Teamwork</p> <p>Other Sub Values: as Cooperation and Self-respect.</p> <p>Life Skills: Organizing skills, Analytical thinking skills and Scientific aptitude.</p>	<ol style="list-style-type: none"> 1. This is a guessing game which helps to understand the importance of self-respect and integrity. Refer B.1. 2. This is an activity which helps the children to relate to values like teamwork and cooperation Refer B.2. 3. Home Assignment that helps to improve the organizing skills and , analytical thinking skills Refer.C.1.

Materials / Resources needed

1)NCERT text books of Class X

Description (of the points of discussion)

This chapter explains why it is important to classify elements, the different types of classification and how elements are classified in the modern periodic table.

The points of discussion are

- the various attempts to classify elements with their merits and demerits.
- how elements are classified in the Mendeleev periodic table and its drawbacks.
- the modern periodic table, its structural peculiarities and the periodicity of properties shown by the elements.
- just like it is important to classify elements, it is important to be self-disciplined. One should learn to be organised and systematic in dealing with one's thoughts and actions.
- every atom of elements in the periodic table is made up of same constituents - protons, neutrons and electrons. Still they have their own identity and integrity.
- how teamwork is important from the fact that elements network, collaborate, form alliances to form compounds that are very useful and increase their value.

Unit 5**Periodic Classification Of Elements
Self-discipline, Integrity and Teamwork****I. Introduction**

The periodic table lists all the elements, with information about their atomic weights, chemical symbols, and atomic numbers. The arrangement of the periodic table leads us to visualize certain trends among the atoms. This chapter explains why it is important to classify elements, the different types of classification and how elements are classified in the modern periodic table.

Through this chapter the teacher can correlate the importance of values like Discipline, integrity and teamwork in life. While explaining the importance of classification of elements and how it helps us to study the behaviour of elements with ease, teacher can highlight the importance of organizing and classifying things and thoughts. This is termed as self-discipline. Another interesting observation is like the elements in the periodic table, each one of us is unique. It is important to understand own qualities and capabilities and always keep one's integrity. However, there is more to be done in the area of bonding with others to form "compounds". The Periodic table of elements encourages us to network, collaborate, build community, form alliances, which, overall can be termed as teamwork.

The core values focused upon are Self-discipline, Integrity and Teamwork along with sub values such as Cooperation and Self-respect.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Comprehend the various attempts to classify elements with their merits and demerits.
- Understand how elements are classified in the Mendeleev periodic table and its drawbacks.
- Learn about the modern periodic table, its structural peculiarities and the periodicity of properties shown by the elements.
- Realise that just like it is important to classify elements, it is important to be self-disciplined. One should learn to be organised and systematic in dealing with one's thoughts and actions.

- Know that every atom of elements in the periodic table is made up of same constituents -protons, neutrons and electrons. Still they have their own identity and integrity.
- Learn about how teamwork is important from the fact that elements network, collaborate, form alliances to form compounds that are very useful and increase their value.

III. Process & Action Plan

Teacher gets an opportunity to highlight the importance of discipline and teamwork while teaching the different aspects of periodic table. Relating life values to the scientific aspect will help children to register and correlate these values deeply in their minds.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity: Self-discipline
Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Self-respect and Integrity

This is a guessing game which helps to understand the importance of self-respect and integrity. Refer B.1.

2. Teamwork and Cooperation

This is an activity which helps the children to relate to values like teamwork and cooperation. Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1.Home Assignment that helps to improve the organizing skills and , analytical thinking skills. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** - Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Self-discipline, Integrity and Teamwork* along with sub values such as *Cooperation and Self-respect*.

The unit also provides the scope to develop the following skills in the students like *organizing skills, analytical thinking skills and scientific aptitude*.

IV. Activities & Related Discussion

A. The teacher can start the lesson with a discussion with the students on how organised they are in their life and how many of them classify things like stationery, bags, uniform etc. and keep everything properly organised. Teacher can explain the importance of self-discipline which is a very important virtue in life. Just like it is important to classify elements as in a periodic table to make their study easier, it is important to be organised and systematic in dealing with one's things as well as thoughts to make our life easier. Children can be told that if they organise and keep their things properly they will not be late in getting ready to school. It will give them more time to relax and start the day in a pleasant manner. Similarly if one study in an organised manner with proper planning and a time table, it will help them to improve in their studies.

B. Activities:

B.1. The lesson can proceed with a guessing game where each student will ask the whole class to guess the element in his/ her mind. He/ She can give clues like the number of protons, neutrons, electrons or atomic mass or atomic number of that element. Others have to guess the name of that element, its valency, the group and period to which it belongs.

While playing this game children will be able to realize that every element in the periodic table is made up of the same constituents namely protons, neutrons and electrons. Still each element is different and has dissimilar characteristics which makes each of them unique. Similar to the elements in the periodic table, each one of us have qualities that are in no doubt adorable. Though all human beings are very much similar to one another and has the same biological structure, each one is unique. We should be proud of our qualities and capabilities and should have self-respect. It is also important that we should maintain our integrity instead of trying to imitate others. In this context, teacher should try to highlight the importance of integrity and self-respect to the children.

B.2. This is an activity to identify the different elements present in a compound. Teacher can give a list of ten compounds. For e.g. Water, Carbon dioxide, Sodium chloride etc. Students can be asked to write the elements present in each compound. This activity will help to enhance the scientific aptitude of the children. It also helps the teacher to point out that elements network, collaborate, form alliances to form compounds that are very useful and increase their value.

This activity helps the students to understand the importance of teamwork and cooperation which are very important in life. Children can be told that we may have to work as a team instead of working alone, to achieve our goals in life. They should be able to cooperate and collaborate and form bonds with others to be successful in life. If hydrogen and oxygen had not agreed to share their valence electrons and decided to stay as elements, we would probably not have had water today.

V. Assignments

C.1. Home Assignment.

Children can be asked to prepare a study time table at home. They should be advised to make a time table that is practical and with enough leisure time. Ask them to follow it diligently at least for one month and give a feed back to the teacher on whether it has helped them to improve in their studies or not. This activity not only helps the children to appreciate the importance of self-discipline but also help them to improve their organizing skills and analytical thinking skills.

Resources

References:

- NCERT Class X Science Textbook.

Topic	Values / Life skills integrated & imbibed	Activities
Life Processes	<p>Core Values considered: Gratitude and Simplicity</p> <p>Other Sub Values: Positivity</p> <p>Life Skills: Networking</p>	<ol style="list-style-type: none"> 1. Every child will prepare an ideal meal plan. 2. Make a memory list explaining how your parents have stood by you in good times and in difficult times. 3. Children to create help groups to help weak students. 4. Creation of a positivity journal.

Materials / Resources needed

Pen, Pencil, Eraser, Scale, Chart papers, printouts, multimedia and internet wherever required.

NCERT text books of Class X

Description (of the points of discussion)

In this chapter we learn about the different life processes and the values associated with it. The topics covered are:

1. To understand and learn the topic of Nutrition in plants
2. To understand and learn the topic of Nutrition in animals.
3. To learn the various pathways in breakdown of glucose.
4. To learn about the working of the human respiratory system.
5. To learn the working of the human circulatory system.
6. To learn and understand transportation in plants.
7. To learn the working of the human excretory system.
8. To associate values like Gratitude Self Discipline, Simplicity, Networking and Empathy, Positive thinking, while learning the above-mentioned life processes.

Unit 6**Life Processes****Gratitude, Self-Discipline, Simplicity, Networking, Positive thinking****I. Introduction**

The functioning of every living organism is an amalgamation of its various organ systems functioning in perfect harmony and carrying out different life processes. The life processes included in this chapter are Nutrition, Respiration, Transportation and Excretion in both plants and animals.

The topic of Nutrition can be used to inculcate the value of Self Discipline for healthy eating habits. The topic of Respiration can be used to make children understand how simply breathing supplies some of the essential nutrients like Oxygen, in our life, and helps to sustain life just by being there.

The next topic of transportation, both in plants and animals, helps us to study the transfer of water, minerals and food to the various parts of the organisms. Networking helps to build relationships and make the task easier to achieve. The last topic of Excretion, wherein children learn how the basic unit of kidney -the nephron, filters all the useful substances back into the body and eliminates only the waste material with extreme hard work of filtering about 5 litres of blood, nearly 400 times, a day.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value-based goals:

1. To understand and learn the topic of Nutrition in plants and animals
2. To learn the various pathways in breakdown of glucose.
3. To learn about the working of the human respiratory system.
4. To learn the working of the human circulatory system.
5. To learn and understand transportation in plants.
6. To learn the working of the human excretory system.
7. To associate values like Gratitude Self Discipline, Simplicity, Networking and Empathy, Positive thinking, while learning the above-mentioned life processes.

III. Process & Action Plan

Maintenance of life requires processes like Nutrition, Respiration. Transport of Materials within the body and excretion of waste products. These maintenance functions of living organisms must go on even when they are not doing anything in particular. These functions continue to go on even when we are asleep.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

To create a gratitude journal by writing down various quotes on gratitude.



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Nutrition : Self Discipline

Every child will prepare an ideal meal plan for long term benefits.

Ref B1

2. Respiration : Simplicity

Make a memory list explaining on how simply your parents have stood by you in good times and in difficult times.

Ref B2

3. Circulation : Networking and Empathy

Children to create help groups to help weak students thus developing empathy.

Ref B3

4 Excretion :

Elimination of negative thoughts of (Positive Thinking). to record negative thoughts and ways to overcome it.

Ref B4



C. Aid generalization of the concepts learnt, through assignments (given below)



1. Harmony

To take part in organising an event to understand harmony.

Ref C1

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach - Working in Harmony**, the values embedded in the topic.

The core values being considered are **Gratitude and Simplicity** along with other sub-values like **Positivity**.

The unit also provides the scope to develop the life skills in the students like the ability to develop the skill of Networking.

IV. Activities & Related Discussion

A. Create a Gratitude journal.

As children learn the different life processes in this chapter, let them reflect upon how their various systems like digestive system, circulatory system, excretory system etc., function in a smooth harmony to sustain life.

To make them feel thankful for the various life processes that run within them, they can be asked to create a Self-gratitude journal, where they can jot down their own thoughts and gratitude or have quotes on gratitude like:

**Gratitude unlocks the
fullness of life. It turns what we
have into enough and more. It
turns denial into acceptance, chaos
to order, confusion to clarity. It can
turn a meal into a feast, a house
into a home, a stranger into a
friend. Gratitude makes sense of
our past, brings peace for today
and creates a vision for tomorrow.**

- Melody Beattie

“Be grateful for what comes

next in your journey.

Be grateful for the experience

Be grateful that you are

equipped to handle it.

Be grateful for what life reveals to you

Be grateful that you are becoming

who are meant to be.

Be grateful for your strength

your perseverance, and your courage”

- Craig Crippen

B1. Activity : Creating an ideal meal plan

It has been observed that, today, due to the lack of understanding of the food habits, watching television and mobile during eating, many people are falling more and more sick by the time they reach middle age. Therefore, to lead a healthy life let us encourage children to follow the circadian rhythm for healthy digestion, drink enough glasses of water, not to watch television or mobile during eating and follow a healthy meal plan leading to a healthier life style.

Every child can prepare a daily, healthy meal plan which he or she would like to follow. A few tips are given here:

07:30 hrs.	A protein based supplement
08:00 hrs.	Breakfast consisting of a balance of carbohydrates, fats, minerals and vitamins.
12:30 hrs.	A large banana (for fiber)
13:00 hrs.	Lunch
19:30 hrs.	Raw shredded salad of cabbage and carrot with salt, as per availability.
20:00 hrs.	Light 5

A slight alteration in the timings can be done to suit the local circumstances.

Inculcating this kind of Self-discipline in their eating habits will definitely help them to maintain long term good health. Children should be grateful for the food

on their table three times a day, they should thank the farmers who grow this food which gives them the energy to function, to their mother for cooking it with nutrition and taste and above all to God for the smooth functioning of the body in a harmonious manner.

B2 : Activity : Make a memory list explaining how your parents have stood by you in good times and in difficult times, correlating their presence in life to the function of existence of breath in our life. In the process of understanding the minute ways, in which our breathing system works , the teacher can emphasize that ‘ Breath is life’. The simplicity with which our respiratory system works, in the background, for all other functions to take place, itself teaches us, the value of Simplicity.

It can be emphasized, that as our breathing helps us, just by being there in the background, similarly, we in our life can aid many things, by just being there in the background and doing just the right things at the right time.

We can help our parents by just being there and doing the right things for them, at the right time. We can help our friends and relatives by being there, whenever they need us. We can contribute to the development of our Nation and to the development of our work place by doing our work, to the best of our ability.

Thus, respiration teaches us the value of Simplicity by simply being there at the right time doing the right thing.

B3 : Activity : Creating help groups - In the topic of circulation we observe that blood supplies various nutrients and life-giving oxygen to all cells in the body and therefore by the same analogy, by creating help groups in class, it can be ensured that any child who does not understand any topic has help from other children. This will help to develop the value of empathy and networking amongst students. **This topic can be used to make children understand the value of Networking in life. Connecting with people at all levels is an important part of personality development. It is very important for the child's career development also.**

Children can be asked to prepare notes and share it with others and also help by explaining the topics they have understood nicely to those who have not understood.

B4 : Activity: Create a Positive Thoughts Journal : Note down your negative thoughts or habits which you would like to change, over a period of time.

We have studied that the function of kidney is to eliminate waste and therefore similarly

we can develop positive thinking and positive habits by eliminating negative thoughts and negative habits from our life. This can be aided by keeping a record of the negative habits or thoughts and record ways to improve them and convert them to positive habits.

Similar to the function of a nephron which retains all the essential nutrients required by the body and eliminates the waste material, every child should understand that lot of hard-work goes into eliminating bad influences from our life.

V. Assignments

C1. Participate in organising any event in your school or your society in order to understand how several elements have to come together and work in harmony, for any event to be successful.

Resources

References:

Resources for Teachers:

Book: NCERT Class X Science text book

Topic	Values / Life skills integrated & imbibed	Activities
Control and Coordination	<p>Core Values considered: Love for the Country</p> <p>Other Sub Values: Self Control and Flexibility</p> <p>Life Skills: Discipline and flexibility</p>	<ol style="list-style-type: none"> Through the topic of reflex action teacher will explain how self-control can help in avoiding altercations. Children to make a list of such situations where self control help them Read the preamble of the constitution of India loudly in the class, analyze and discuss its importance for national integration. Corelate the integration of glands and their working to integration of Nation by different states working together. A project on National integration. Every child takes one topic from the lesson, studies it thoroughly, and makes notes on it. Different children can pick up different topics and prepare notes. Teacher can ask them to share their knowledge and notes with other children in the class leading to understand the value of networking, caring and sharing. Children can be asked to make a chart of various plant hormones and their functions, in a tabular format., explaining to them how these hormones in such small proportions help the various functions of plants like growth, wilting etc., thus acting correctly when the situation arises. Similarly, children should also develop the correct amount of discipline and flexibility to develop correctly in various environment.

Materials / Resources needed

Pen, Pencil, Eraser, Scale, Chart papers, printouts, multimedia and internet wherever required

NCERT text books of Class X

Description (of the points of discussion)

In this chapter we learn about Control and Coordination along with academic objectives and life skills enumerated below:

1. To understand the topic of nervous system.
2. To learn about the various parts of brain and its function.
3. To study the importance of the spinal cord and the nerves arising out of it.
4. To study the reflex arc.
5. To study about neurons and its types.
6. To learn about action of hormones.
7. To learn about chemical coordination.
8. To develop the value of networking , care and share.
9. To understand the value of self- control.
10. To develop integrity and love for one's country.

Unit 7**Control and Coordination****Love for the Country, Integrity, Networking, Discipline and Flexibility****I. Introduction**

Control and Coordination are the functions of the nervous system and hormones in our bodies. The responses of the nervous system are basically classified into reflex action, voluntary action and involuntary action. The nervous system uses electrical impulses to communicate messages. The nervous system gets information from our sense organs and acts through our muscles. Hormones produced in one part of the organism moves to another part to achieve the desired result. Thus, a feedback mechanism regulates the action of the hormones in the body.

Similarly, in life too, we need a feedback mechanism to develop certain values and skills, to enhance our overall development. We need to develop discipline, and at the same time have the flexibility while approaching various problems in our life. A controlled and coordinated effort can help in achieving success for any activity undertaken.

The way in which various endocrine glands work together to make the whole-body function properly can be correlated to how the people of different states of the country should work together for the success of the nation.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value-based goals:

1. To understand the topic of nervous system.
2. To learn about the various parts of brain and its function.
3. To study the importance of the spinal cord and the nerves arising out of it.
4. To study the reflex arc.
5. To study about neurons and its types.
6. To learn about action of hormones.
7. To learn about chemical coordination.
8. To develop the value of networking , care and share.

9. To understand the value of self- control.
10. To develop integrity and love for one's country.

III. Process & Action Plan

In animals, control and coordination are provided by nervous and muscular tissues. Children try to get fun out of swinging, buffaloes chew cud to help tough food to digest better, when bright light is focused on our eyes or when we touch a hot object, we detect the change and respond to it with movement in order to protect ourselves. All of this shows how control and coordination is at work at all times in our body.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Teacher introduces the value of **Self control** through the topic of Control and coordination. Prepare a list of instances where a controlled and balanced emotional response could have saved an altercation.



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Love for the country

Discussion on the preamble of the Indian constitution. Ref. B1

2. National Integrity

A project on National Integration can be undertaken by the class. Ref. B2



B. Carry out the varied activities in class (given below) in the sequence specified.



Networking

1. Every child prepares notes on one topic in the chapter and shares it with others. Ref C1

Self- Discipline and Flexibility

2. To prepare a chart of different types of tropism and plant hormone functions thus understanding the value of discipline and flexibility Ref C2

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** - of **Integrity and Networking** to inculcate the values embedded in the topic.

The core values being considered are **Love for our country** along with other sub-values like **Self control**.

The unit also provides the scope to develop the following life skills like **Discipline** and **Flexibility** in the students.

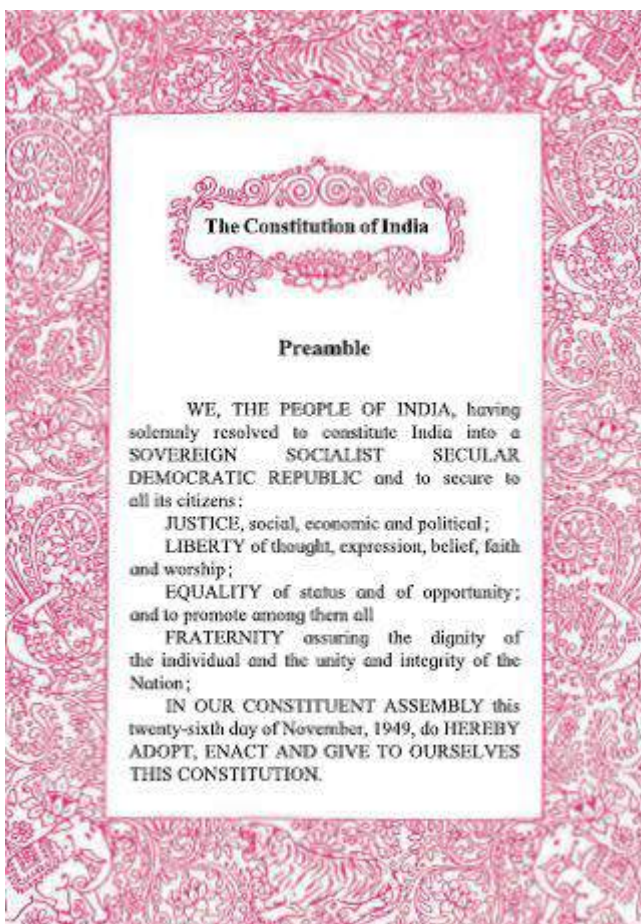
IV. Activities & Related Discussion

A. Self Control as a value can be introduced by the teacher while starting with the topic of control and coordination. We see that most people in most situations react without thinking things out. If children are taught to evaluate and respond to a situation, many fights and loss of life due to anger etc happening in teenage years and later life can be avoided.

For this purpose, teacher can, while taking the topic of reflex action, explain that reactions can happen at two levels- physical and emotional. In case of reflex action, our immediate response to a dangerous situation saves our life but when people say something bad to us or try to make us angry, a more self-controlled and thought out emotional and verbal response can stop a fight etc.

Therefore the activity of making a list where they have either been in such situations or where they have seen such situations can help them understand how self-control can help avoid unnecessary altercations or fights

B1. Activity : Read the preamble of the constitution of India loudly in the class, analyze and discuss its importance for national integration. Correlate the integration of glands and their working to integration of Nation by different states working together.



The discussion can help make children understand how people coming from different states of our country should encapsulate all the values mentioned in the preamble and contribute towards national integration and develop a **love for the country**.

B2. Like the different endocrine glands function together and make the body work in perfection, similarly children can be asked to represent the various states of India, studying the various differences and similarities and contribution of each state to the development of the country. People from all states should show high level of **integrity** for the development of the nation.

A project on national integration can be arranged by the students of the class to promote the values of **interconnectedness, integrity** and **love for the country**.

V. Assignments

C1. The chapter of Control and Coordination deals with a network of Nerve fibers or Neurons sending signals all across the body. This topic can be used to emphasize the value of Networking.

The development of a wholesome personality depends upon many factors like decision making ability, human skills, communication skills, interpersonal skills, conceptual skills, diagnostic skills and administrative skills. Thus, the ability to develop and maintain different relationships, the ability to assess and decide the solutions to a particular problem, negotiate and relate to others, to systematically put a point of view and the ability to follow policy and procedures etc., are important parts of people networking.

Every child takes one topic from the lesson, studies it thoroughly, and makes notes on it. Different children can pick up different topics and prepare notes. Teacher can ask them to share their knowledge and notes with other children in the class leading to understand the value of networking, caring and sharing.

C2. Children need to prepare a chart on various kinds of tropism, as mentioned below, with its meaning.

1. Phototropism.
2. Hydrotropism
3. Geotropism
4. Chemotropism
5. Seismonastic movements.

While this topic is being taught, teacher can talk about the value of **flexibility**, like in phototropism the plant develops towards the stimuli of light, in gravitropism it develops towards the earth having gravity as stimuli. Similarly in life we too should develop, as we keep getting different educational and environmental stimulus to grow. The value of flexibility in development can thus be emphasised.

Children can be asked to make a chart of various plant hormones and their functions, in a tabular format, explaining to them how these hormones in such small proportions help the various functions of plants like growth, wilting etc, thus acting correctly when the situation arises. **Similarly, children should also develop the correct amount of discipline and flexibility to develop correctly in various environment.**

Resources

References:

Resources for Teachers:

Book: NCERT Class X Science text book

Topic	Values / Life skills integrated & imbibed	Activities
How do Organisms reproduce.	<p>Core Values considered: Self Respect, Mutual Respect and Respect for Women</p> <p>Other Sub Values: Determination and Will power</p> <p>Life Skills: Analytical skills</p>	<ol style="list-style-type: none"> 1. The development of a zygote into a complete organism can be correlated into a personal growth activity for children. 2. The story of parable of long spoons can be used to make children understand self respect and mutual respect. 3. Pledge for protection of woman. 4. An essay on the topic of “The impact of increasing population of the world” with focus on natural resources, inequitable distribution of income, standard of living and climate change. This study will create an awareness in the minds of the children on the need of population control and responsible behavior.

Materials / Resources needed

Pen, Pencil, Eraser, Scale, Chart papers, Note book, printouts, multimedia and internet wherever required
NCERT text books of Class X

Description (of the points of discussion)

In this chapter we learn the various aspects of reproduction and its associated values, through the following topics.

1. To understand asexual reproduction by binary fission, fragmentation, regenerating, budding, spore formation and vegetative propagation. This various in types of reproduction can be correlated with acceptance of various human behavior emphasizing on mutual and self-respect.
2. To study sexual reproduction in flowering plants.
3. To study the male reproductive system.
4. To study the female reproductive system.
5. To understand fertilization, formation of a zygote which leads to the growth of an individual organism. This can be correlated to a personal growth plan with Will power and determination.
6. To understand reproductive health and the importance of respecting women as life givers in all stages of life.

Unit 8

How do organisms reproduce
Determination, Willpower, Self Respect,
Mutual Respect, Respect for Women

I. Introduction

Reproduction is a biological process by which new individual organisms or off springs are produced by their parents. Reproduction is a fundamental feature of all known life and each individual organism exists as a result of reproduction. There are 2 forms of reproduction namely Asexual and Sexual reproduction.

In asexual reproduction an organism can reproduce without the involvement of another organism. By asexual reproduction, an organism creates a genetically identical copy of itself. Sexual reproduction typically requires, interaction between the two genders of the species. Every species has a fixed set of chromosomes which help to pass on the characteristics to the next generation. In sexual reproduction the reproductive cells or gametes contain half the set of chromosomes, which when combined by fertilisation produces a new progeny which varies in its genetic constitution.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value-based goals:

1. To understand asexual reproduction by binary fission, fragmentation, regenerating, budding, spore formation and vegetative propagation. This various in types of reproduction can be correlated with acceptance of various human behavior emphasizing on mutual and self-respect.
2. To study sexual reproduction in flowering plants.
3. To study the male reproductive system.
4. To study the female reproductive system
5. To understand fertilization, formation of a zygote which leads to the growth of an individual organism. This can be correlated to a personal growth plan with Will power and determination.
6. To understand reproductive health and the importance of respecting women as life givers in all stages of life

III. Process & Action Plan

Reproduction is a natural process which leads to growth. As children study this topic, let us guide them, towards developing Self-respect, Mutual respect, coupled with Determination and Will power in achieving success, in whatever they undertake in their lives by giving them the steps to achieve this.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Teacher to introduce the concept of Willpower and Determination through the concept of Fertilization.



B. Teacher will give the following points in the class and ask the children to make their personal growth plan, emphasizing how a single sperm competes with other and wins the race to start life.



1. Determination and Willpower

The development of a zygote into an organism can be correlated to a personal growth plan activity. Ref. B1

1. Self-respect and Mutual respect

The story of Parable of Long Spoons. Teacher can co-relate different type of asexual reproduction methods to different types of behaviour of people highlighting how every individual must be respected irrespective of the differences. Ref. B2

3. Respect for women

Taking a pledge to respect women at all times. Ref. B3



Aid generalization of the concepts learnt, through assignments (given below).



1. Write an essay on the topic of “The impact of increasing population of the world” Ref C1

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** of achieving goals for personal growth and developing the value of **Respect**.

The core values being considered are **Self Respect, Mutual respect, Respect for Women** along with other sub-values like **Determination** and **Willpower**.

The unit also provides the scope to develop the **analytical** life skills in the students.

IV. Activities & Related Discussion

A. As every human being grows, he or she naturally expects to be purposeful and successful. Commitment is a natural outcome of this recognition. Commitment naturally leads to perfection and perfection naturally results in success. Our wisdom is the true source for realizing these expectations of personal growth.

The first step for personal growth will be **Planning**. When we talk about planning, it does not mean, it is a magic formula for solving all the problems of life. It means coming to grips with what a person wants to be. It means daring to dream and then learning how to make these dreams come true.

- It gives you a sense of direction.
- It develops self-confidence.
- It gives you a sense of accomplishment.
- It helps you to strengthen your commitments.
- It helps you to be flexible.

The teacher will give the following worksheet for the students to self-analyse the following points.

Q1. Every child has a certain potential.

Agree

Disagree

Q2. Preparation and Planning helps in achieving success.

Agree

Disagree

Q3. We need to unlearn old attitudes and beliefs to learn new things.

Agree

Disagree

Q4. Doing right things at the right time can lead to success.

Agree

Disagree

Q5. Staying informed and absorbing new ideas can lead to success.

Agree

Disagree

Q6. Confidence and Communication is important to achieve goals.

Agree

Disagree

Q7. Staying positive is an important part of achieving a goal.

Agree

Disagree

Q8. Persevering in all situations is important for success.

Agree

Disagree

Q9. Trying new methods of learning is important for success.

Agree

Disagree

B1. As children learn the topic of fertilization where they learn how a single sperm, with will and determination, competes with all other sperms to win the race, similarly with Determination and Willpower children can set goals, learn to manage time effectively and thus move from opportunity to accomplishment. The determination could be exemplified by children by setting up a roadmap for the future with the following guidelines.

1. **Aim at a goal that you wish to achieve** - Take a paper and write down your short-term goals (e.g. I wish to complete my biology notes for the give chapter with understanding and learning) and long-term goals (e.g. Currently I get 70% but I wish to achieve above 90% in my final examination)
2. **Be Specific** - A time schedule for both your short term and long-term goals will take you closer to success.
3. **Brainstorming** - For every goal you establish there are many routes by which this can be achieved. You choose what suits you the best.
4. **Gather Information** - It is an important step to understand how to achieve the goal you have set. Without requisite information you cannot learn.
5. **Prioritise** - After gathering the information make a list of first things to be done as per priority.
6. **Develop & Plan** - Goal: _____
 Target _____
 How are you going to do it? _____
 When I achieve it what are the benefits? _____
 I need help from: _____
 I am pursuing this goal because: _____
7. **Commit yourself** - Talk help from your someone like your parents / siblings for sticking to your commitment
8. **Reinforce your commitment** - Every morning when you wake up review your goals and mentally reaffirm them.
9. **Learn from your failure** - Just because you have committed yourself to a goal it does not mean that that you will never succumb to indecisiveness. It happens from time to time to all of us, but it is important that a small failure does not cause you to abandon your goal altogether.
10. **Reward yourself** - Remember to concentrate on the positive reward you will receive, every time you are tempted by a momentary that slows down your progress towards your ultimate goal.

B2. As we learn the topic of types of reproduction, like fission, fragmentation, regeneration, vegetative propagation, sexual reproduction etc., we realize that there so much variation and differences in the process. Similarly, even though every human being is basically made up of the same stuff, but a lot of variation exists in their nature which we need to accept and respect. **Self Respect and Mutual Respect** are very important for a healthy and civilized society. Let us understand with a story of what is Heaven and Hell.

The parable of the Long Spoons explains very well what heaven and hell truly are.

One day a man said to God, “God, I would like to know what Heaven and Hell are like.”

God showed the man two doors. Inside the first one, in the middle of the room, was a large round table with a large pot of vegetable stew. It smelled delicious and made the man’s mouth water, but the people sitting around the table were thin and sickly. They appeared to be famished. They were holding spoons with very long handles and each found it possible to reach into the pot of stew and take a spoonful, but because the handle was longer than their arms, they could not get the spoons back into their mouths.

The man shuddered at the sight of their misery and suffering. God said, “You have seen Hell.”

Behind the second door, the room appeared exactly the same. There was the large round table with the large pot of wonderful vegetable stew that made the man’s mouth water. The people had the same long-handled spoons, but they were well nourished and plump, laughing and talking.

The man said, “I don’t understand.”

God smiled. It is simple, he said, here we can see that in Heaven people believe in helping each other and thus are able to solve beautifully survive in a difficult situation also.

From the above see it is clear that everybody needed food to survive but as we see in hell, since they are not able to think about others, they themselves also cannot survive. This story tells us how Mutual help and Respect can make a beautiful base for a healthy society. But many a times we see that not everything is right with the society. Let us think that if we can solve happenings in the society with our positive attitude of self-respect and mutual respect, analyze the following points and note down and discuss your responses in the class.

- Q1.** Are teenage boys guided towards wrong things by the Society? Does following wrong things affect your self-respect?
- Q2.** What kind of problems are faced by teenage girls?
- Q3.** Due to thing respecting women should come naturally to people?
- Q4.** What will you do if you see a woman being disrespected.?
- Q5.** What do you think of the statement that protection of a women should be everyone’s responsibility as she is a life giver and nurturer?

B3. Pledge for Protection of Women

In the process of teaching the topic of female reproductive system and reproductive health teacher can emphasis on how respecting women is one of the most important values that each and every child should imbibe. Women have been endowed with the ability to produce and nurture children and it is they who give birth to men and women and therefore let us take a pledge to protect them by respecting them in all walks of life.

THE PLEDGE

"I (name) solemnly pledge that I shall always extend due regard and respect to women and desist from violent behaviour of any kind against them. I shall respect and protect the dignity of women in school and society at large. I solemnly affirm to oppose any kind of gender bias against women."

V. Assignments

C1. Write an essay on the topic of "The impact of increasing population of the world" with focus on natural resources, inequitable distribution of income, standard of living and climate change.

This study will create an awareness in the minds of the children on the need of population control and responsible behaviour.

Resources

References: "You can make your dreams come true" by Dale Hanson Bourke.

Resources for Teachers:

Book: NCERT Class X Science text book

Topic	Values / Life skills integrated & imbibed	Activities
Heredity and Evolution	<p>Core Values considered: Appreciation, Compassion and Gratitude and Environmental awareness</p> <p>Other Sub Values: Self Realization Self acceptance and Self Development</p> <p>Life Skills: Interpersonal, Communication and Problem solving skills</p>	<p>To evolve into a better individual by acquiring various skills and imbibing important values.</p> <ol style="list-style-type: none"> 1. Fun ways to become People Smart - interpersonal skills. 2. Fun ways to become Word smart - Communication skills. 3. Fun ways to become Life smart - Curiosity and Compassion. 4. Fun ways to become logic smart - Problem solving. 5. Fun ways to become music smart - Self realization and Will power. 6. Fun ways to become self smart - Self acceptance and gratitude. 7. Fun ways to become picture smart - Appreciation and innovation. 8. Fun ways to become nature smart - Environmental awareness. 9. Fun ways to become body smart - Self Discipline and hard work. 10. Create your own family tree chart.

Materials / Resources needed

Pen, Pencil, Eraser, Scale, Chart papers, printouts, multimedia and internet wherever required

NCERT text books of Class X

Description (of the points of discussion)

In this chapter we learn about inherited and acquired traits and aim to evolve into better individuals: The topics covered are as follows:

1. To understand variation.
2. To study rules of inheritance of traits through Mendel's Punnett square experiment on peas.
3. To learn about genetic sex determination.
4. To study the process of evolution and classification, through fossils
5. To understand speciation.
6. To understand human evolution.
7. To evolve into smarter individuals by acquiring various values like Gratitude, Compassion, Appreciation and Environmental Awareness.

Unit 9**Heredity and Evolution****Gratitude, Compassion, Appreciation, Environmental Awareness****I. Introduction**

Evolution is the slow change in the heritable characteristics of biological populations over successive generations. The theory of evolution is based on the idea that all species are related and gradually change over time. It relies on the process of natural selection. All characteristics are the expression of genes that are passed on parents to offspring during reproduction. Different characteristics tend to exist within any given population as a result of mutation and genetic recombination leading to genetic variation.

The scientific theory of evolution by natural selection has been mentioned in detail in Darwin's book on the 'Origin of Species'. It is the process of evolution that gives rise to biodiversity, leading to formation of different species in this world.

As we go through chapter of Heredity and Evolution we can look at how children can evolve into smarter individuals by acquiring various values of Gratitude, Compassion, Appreciation and Environmental awareness, through different activities.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals:

1. To understand variation.
2. To study rules of inheritance of traits through Mendel's Punnett square experiment on peas.
3. To learn about genetic sex determination.
4. To study the process of evolution and classification, through fossils
5. To understand speciation.
6. To understand human evolution.
7. To evolve into smarter individuals by acquiring various values like Gratitude, Compassion, Appreciation and Environmental Awareness.

III. Process & Action Plan

In the chapter of Heredity and Evolution we see variation in species confers certain survival benefits, similarly we can see variation in the different types of intelligences that different children possess, which can help them to have varied choices in their career development.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Teacher can introduce various kinds of intelligence which exist in children which can evolve as they grow.



B. Carry out the varied activities in class (given below) in the sequence specified.



To evolve into a better individual by developing various skills – Ref B1	Body Smart People Smart Word Smart Life Smart Logic Smart Music Smart Self Smart Picture smart Nature Smart	Self Discipline and Hard work Interpersonal Skills Communication Skill Curiosity and Compassion Problem Solving Self-realization and Will power Self-acceptance and gratitude Appreciation and innovation Environment awareness
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C. Aid generalization of the concepts learnt, through assignments (given below).



1. Prepare a family tree chart with the help of your parents
Ref C1

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach - Evolving and Acquiring newer intelligence** through the values embedded in the topic.

The **core values** being considered are **Appreciation, Compassion, Gratitude** and **Environmental awareness** along with other sub-values like **Self-realization, Self-acceptance** and **Self-development**.

The unit also provides the scope to develop the following life skills in the students like **Interpersonal, Communication** and **Problem-solving** skills.

IV. Activities & Related Discussion

A. As we deal with the topic of heredity and evolution in the chapter, let us, as teachers, look at making children aware of all the varied multiple nine types of intelligence.

1) Linguistic intelligence 2) Musical intelligence 3) Logical- Mathematical intelligence 4) Spatial intelligence 5) Bodily- kinesthetics Intelligence 6) Interpersonal Intelligence 7) Intrapersonal Intelligence 8) Naturalist intelligence 9) Existential Intelligence

B1. The teacher while teaching the topic of acquired and inherited traits can ask the children to analyse and write down some of the inherited intelligences that they are born with and further jot down some of the intelligences which they would like to develop

Activity : To evolve into better individuals by developing various kinds of intelligence. Children can perform any of the following activities to evolve into a better personality.

I. Being **People smart** means, you genuinely care about people and enjoy finding ways to help them. A big part of being people smart is the ability to read and understand other people.

Fun ways to become **People smart: - Inter Personal skill**

1. Make friends.
2. Play team sports
3. Volunteer to help people.

4. Tutor classmates or siblings.
5. To study in groups or work in group projects.
6. Resolve conflicts.
7. Sell things for school or become organisation fund raisers.
8. Organise activities for you and your friends
9. Debating, writing or making presentations in your class.

II. Being **Word smart** is about good communication skills. The simplest way to communicate is by speaking and listening. Why do people speak? They speak to communicate, inspire, persuade, lead, teach and entertain. When you talk to your family, read the sports page or a favorite comic or write emails or letters to your friends you're being word smart.

Fun ways to become **Word Smart: - Communication skill**

1. Write down your ideas as you get them.
2. Read about what interests you. e.g.: Comics, Sports magazine etc..
3. Start a journal. Write at least words a day on any subject you like.
4. Join or create a book club where you can discuss books with others.
5. Keep a writer's journal, where you record you own poems or plays. You can even add favourite quotes, passages from books that you read.
6. Attend a play.
7. Have regular story telling time with your family.
8. Look up words that you do not know in a dictionary.
9. Play with scrabble / newspaper crosswords etc..

III. Being **Life smart** means living your life to the fullest and becoming as aware as you can about the world around you. It also means sharing your knowledge and understanding with others, so that they can too deeply appreciate this miracle called Life

Fun ways to become **Life Smart: - Curiosity and Compassion**

1. Read science books to discover the universe and evolution.
2. Read literature that touches religious, spiritual or philosophical matters.
3. Find a special place in nature where you feel relaxed and comfortable and can observe the surroundings, undisturbed. You might feel a sense of awe at the diversity of living things, an awareness of how living things in nature are connected or a feeling of wonder at the mystery of life itself.

4. Volunteer to help those in need. By helping a fellow human being one can develop compassion.
5. Work on a special hobby.
6. Play a sport intensively.
7. Develop a sense of honour or respect for all living things.

IV. Think of **logic** as a tool that helps you solve problems. When you apply logic to a problem, you might break down the problem into smaller problems that you can solve bit by bit. You are also putting together patterns and creating rules when you use logic to solve a problem or answer a question. Logic can help you do Maths, crack a code, solve a brain teaser or answer a science question.

Fun ways to become **Logic Smart: - Problem solving**

1. Play games that use strategy and logic like Chess or Checkers or Monopoly
2. Watch television programs that teach science and maths like National Geography, Discovery channel etc.
3. Practice calculating simple math problems in your head. Don't use calculator or paper/pencil. Keep practicing with harder problems.
4. Estimate things. For example, no of raisins in a bowl or tooth picks in a box.
5. Teach someone else the Maths and Science ideas you have learnt. The more you have to explain an idea the better you will understand yourself.

V. Playing **music** as well as listening to it, can help you to focus your thoughts. Music can help you create art and inventions, brain storm ideas and solve problems. Many scientists, writers and artists have used music to help them learn, think through problems and get inspired.

Fun ways to become **Music Smart: - Self-realization and Will Power**

1. Listen to as many different music as you can.
2. Listen to music from different parts of the world.
3. Sing with you family or friends.
4. Play musical games with family or friends. For e.g. Identify the tune etc.
5. Go to live musical concerts whenever you get a chance.
6. Learn to play a musical instrument.
7. Create a music club in your school / startup band with a group of like minded friends.

VI. When you are **Self-smart** you know yourself. You have got a good idea of who you are and what you can do. You are able to set personal goals, understand your strength and weakness, work through the problems in life, create a plan for the future etc.

Fun ways to become **Self Smart: - Self-acceptance and Gratitude**

1. Make a list of all things that you do well.
2. Set goals for yourself. Make sure that the goals are realistic and challenging.
3. Create a collage of your interests.
4. Start something important to you. You might invent something that fixes a common problem and get a patent for it, or you might start a business based on your ideas or inventions or you might find an issue to care about a lot- stray animals, helping homeless people, teaching people to read etc.
5. Think about your day. At the end of each day, reflect on the good things that happened, on what did not go so well, on what you learnt and how you can improve things in future.
6. Write down 3 things that you thankful for or that made you happy. (Develops gratitude)

VII. Picture smart is mainly about special intelligence. With spatial intelligence you have the ability to imagine things in 3 dimensions. One of the most important things about this intelligence is the ability to understand space. You may have a good memory for faces or places, or you may notice little details that other people usually overlook. In general, you probably remember, many of the things you have learnt in the form of images, instead of words.

Fun ways to become **Picture Smart: - Appreciation and Innovation**

1. Create a “Design Studio” in your home. Keep materials around to draw a built mock up model of your inventions, ideas or projects.
2. Keep a visual journal. Visual journals are great for sketching things you see during the day that interests you, ideas you have or problems that you are trying to solve.
3. Create a picture library. It can be fun to take pictures of interesting things that you see during the day or you could practice your photo journalism skills and record the events of your life over the course of several days.
4. You can collect fallen leaves, feathers, seeds, pods or other things from nature to create your own natural art.
5. Being creative and thinking in 3D can be used to solve problems and therefore picture smart is also one of the intelligences of the inventors, artists and designers. Where artists see ideas for their art, inventors often see problems that need solutions.

Here are few problems that you can set your imagination to work on – Think of them as possible inventions of the future:

- New methods or recycling
- Creating fuel out of garbage
- New kinds of cars that do not pollute the air or crowd the highways.
- A cheap method of taking salt out of sea water.
- Better ways to grow food and feed the hungry people of the world.

VIII. Being Nature smart means that you are curious about the environment you live in. You notice what is around enjoy identifying and classifying things like plants and animals. You are interested in trees, plants, animals, birds, insects, clouds, stars and mountains. When you are nature smart you are very interested in your surroundings, wherever you happen to be.

Fun ways to become **Nature Smart: - Environment awareness**

1. Plant something and watch it grow.
2. Start a garden.
3. Look at on a clear night.
4. Learn how to cook. Cooking can be more fun if you are using herbs and vegetables that you have grown yourself.
5. Volunteer for a “Green school” or community project.
6. Take care of a pet or a stray animal

IX. One of the many ways to be body smart is by expressing skills physically. Body smartness improves your balance, coordination, flexibility, dexterity, strength and endurance. Physical sports help in developing body smartness.

Fun ways to become **Body Smart: Self-discipline and hard work**

1. Get fit and make your lungs strong and improve your endurance being doing aerobics activities like dancing, running, jogging, biking etc.
2. Join a sports team in your school or in your neighbourhood.
3. Focus on learning one solo sport like swimming, running, archery etc.
4. Take martial arts lessons.
5. Play dumb charades with your family and friends.

Every child already has all nine kinds of smartness, but in different degrees. By doing these activities we take the child towards, overall development. When each of these intelligences are used in their unique way by every child, you might discover that they might develop into a topnotch speaker, a terrific writer, a great swimmer, a computer programmer or a person who passionately looks after stray animals. Therefore, with the chapter on evolution we can teach the evolving of these 9 intelligences in the child.

V. Assignments

C1. Create your family history tree to the extent possible. You may also visit your Maternal and Paternal homes and trace the history. This exercise will help to establish the extent of growth that the family lineage has managed. Inspiration can also be drawn from the struggles and successes of the forefathers, helping the child to adopt and adapt.

Resources

References: “You are smarter than you think” by Thomas Armstrong and published by Jaico publishing house.

Resources for Teachers:

Book: NCERT Class X Science text book

Light-Reflection and Refraction

Topic	Values / Life skills integrated & imbibed	Activities
Light-Reflection and Refraction	<p>Core Values Integrity, Flexibility and Positivity</p> <p>Other Sub Values: Self-control and Hope</p> <p>Life Skills: Descriptive writing skills and Analytical thinking skills.</p>	<ol style="list-style-type: none"> 1. This is an activity which helps to correlate the importance of Flexibility, Self-control and Integrity in life. Refer B.1. 2. This is text book activity which helps the children to relate to values like Hope and Positivity. 3. Refer B.2. 4. Home Assignment that helps to improve the descriptive writing skills and analytical thinking skills of students. Refer.C.1.

Materials / Resources needed

- 1) Glass beaker, water and pencil, A convex or concave lens, an object like a burning candle, a lens stand.
- 2) NCERT text books of Class X.

Description (of the points of discussion)

This chapter explains the phenomena of reflection and refraction and the applications of mirrors and lenses in real life.

The points of discussion are

- the nature of light and how reflection and refraction happen.
- the laws of reflection and refraction and the mathematical expressions for lens formula and refractive index.
- the image formation by spherical mirrors and lenses and the practical applications of these.
- light is very flexible and it changes its direction when moving from one transparent medium to another, which results in refraction.
- just like you see a pencil to be bent, though it is actually not, you will be considered as bad if you surround yourself with bad company. One should have self-control and should keep one's integrity on top even when among bad people.
- the nature of images formed by a lens is dependent on many factors and this can be compared to the way in which we approach life. If we see the world through a positive angle it gives you hope.

Unit 10**Light-Reflection and Refraction**
Integrity, Flexibility and Positivity**I. Introduction**

Light is a kind of electromagnetic radiation that travels in straight line. Light rays change direction when they reflect off a surface, move from one transparent medium to another or travel through a medium whose composition is continuously changing. This chapter explains the phenomena of reflection and refraction and the applications of mirrors and lenses in real life.

While teaching this chapter teacher can highlight the behaviour of light, its ability to change its direction while entering another medium that results in refraction of light. This is a perfect example of flexibility. A practical effect of refraction can be demonstrated by immersing a pencil in water partially, which can be related to social perception, self-discipline and integrity. The nature of images formed by lenses can be compared to the way in which we see the world and can be related to positivity and hope.

The core values focused upon are *Integrity, Flexibility and Positivity* along with sub values such as *Self-control and Hope*.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Know about the nature of light and how reflection and refraction happen.
- Learn the laws of reflection and refraction and the mathematical expressions for lens formula and refractive index.
- Learn about the image formation by spherical mirrors and lenses and the practical applications of these.
- Realise the fact that light is very flexible and it changes its direction when moving from one transparent medium to another, which results in refraction.
- Appreciate the fact that just like you see a pencil to be bent, though it is actually not, you will be considered as bad if you surround yourself with bad company. One should have self-control and should keep one's integrity on top even when among bad people.

- Understand that the nature of images formed by a lens is dependent on many factors and this can be compared to the way in which we approach life. If we see the world through a positive angle it gives you hope.

III. Process & Action Plan

A good teacher can fill the minds of students with positivity and hope and help them to come up in life. This chapter gives a perfect opportunity to talk about integrity and flexibility. While explaining the images formed by lenses and the factors affecting the formation of the images, teacher can inculcate positivity and hope in the children.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:

Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Flexibility ,Self-control and Integrity

This is an activity which helps to correlate the importance of Flexibility, Self-control and Integrity in life. Refer B.1.

2. Hope and Positivity

This is text book activity which helps the children to relate to values like Hope and Positivity. Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1.Home Assignment that helps to improve the descriptive writing skills and analytical thinking skills of students.
Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Integrity, Flexibility and Positivity* along with sub values such as *Self-control and Hope*.

The unit also provides the scope to develop the following skills in the students like *descriptive writing skills and analytical thinking skills*.

IV. Activities & Related Discussion

A. The teacher can start the lesson explaining the nature of light and how shadows are formed. He/ She can relate this to the straight line propagation of light. Teacher can demonstrate the formation of shadows and reflection which has already been covered in the previous grades.

B. Activities:

B.1. This is a simple demonstration which shows a daily life example of the phenomena of refraction. Take a glass beaker and fill it partially with water. Now immerse a pencil into it. Ask the children to write their observation about the shape of the pencil. It will be seen as bent. Now take the pencil out of the water. It can be seen that it is still straight. Repeat it again to demonstrate that the pencil is not bent but appears to be bent from outside when it is immersed in water. This is due to the refraction of light when it enters from air to water. The light rays change their direction when they enter water from air.



In addition to refraction one can learn many life lessons and values from this simple demonstration. The way light changes its direction to adapt to the new medium teaches you the importance of flexibility in life. When situations change or become hostile one should be able to adapt and adjust to the new situation. One should not hesitate to change if the change is inevitable for survival.

Another important value one can learn from the above demo is keeping your integrity. The pencil inside the

water can be compared to a good person among bad friends. Although you are good the society will be judging you based on your company. If you are with a bad group of people the social perception about you will be bad. So it is better to avoid such company, for which you should have lot of self-control and discipline. It can also be observed that when the pencil is taken out of the water it is still straight. This gives an example of how you should try not to lose your integrity even if you happen to be with bad people. You should stick to your principles and values and should not compromise on them.

Things needed: Glass beaker, water and pencil.

B.2. For this activity teacher can keep a convex or concave lens on a stand and do as said in activity 10.12 in the text book. Students can be asked to write their observations regarding the position, size and nature of the images formed .It can be noted that the same object may give different images based on the type of lens and the position of the screen or the object. Some times the image may be diminished and sometimes it may be enlarged. This can be compared to the way in which we perceive life. There is a saying ,

“If you want to see a better world, change the lens through which you see it and do the work to make it better.”

We can see the world with different types of lenses and at different angles and positions. The images we get may be positive or negative depending upon our outlook .If we try see the world through a positive angle it gives you hope and happiness. But if we start looking at a negative angle, everything appears to be hostile in this world. Children can be urged to always have positive outlook towards the world around and thus inculcate hope and positivity, which eventually leads to success. Streamline your efforts and work hard and make it focus on the goal through the lens of positivity.

Things needed: A convex or concave lens, an object like a burning candle, a lens stand.

V. Assignments

C.1. Home Assignment.

A home assignment can be given to children to write about an incident in their life, which they initially thought as negative, but later turned out to be good for them. For e.g. getting low marks in a class test which made them sad initially but later encouraged them to work harder and get good marks in the next term exam. Children can be told that

sometimes a fall will help you to succeed in life. This activity will improve the descriptive writing skills and analytical thinking skills of the students.

Resources

References:

- NCERT Class X Science Textbook.

Topic	Values / Life skills integrated & imbibed	Activities
Human Eye and the Colourful World	<p>Core Values Empathy, Adaptability, and Respect</p> <p>Other Sub Values: Responsibility and Gratitude.</p> <p>Life Skills: Analytical and critical thinking skills..</p>	<ol style="list-style-type: none"> 1. This is an demo activity which helps to understand the importance of adaptability in life. Refer B.1. 2. This is a demo activity to inculcate values like respect and responsibility. Refer B.2. 3. Home Assignment that helps to improve the analytical and critical thinking skills in addition to sowing the seeds of responsibility. Refer.C.1.

Materials / Resources needed

- 1) Any book to read, A thick sheet of cardboard, a glass prism and a screen.
- 2) NCERT text books of Class X.

Description (of the points of discussion)

This chapter describes the structure of human eye, how to take care of them and why it is important to take care of our eyes. This chapter also explains the phenomena of diffraction of white light into its constituent colours and some of the daily applications of diffraction.

The points of discussion are

- the structure of human eye and the power of accommodation. Learn the importance of adaptability in life from this phenomena of accommodation of eye.
- the various defects of eye and their remedial methods.
- the phenomenon of dispersion of light to its component colours including the daily applications of dispersion.
- scattering of light and its role in many daily life phenomena.
- the importance of eyes and the necessary care to be given to keep them healthy. Learn to be grateful for the blessing of vision and to be empathetic to those who do not have it.
- the importance of eye donation and consider it as your social responsibility.
- the phenomenon of diffraction can be compared to bringing out the talent and capabilities of a person by giving him/her respect, opportunity and encouragement.

Unit 11**Human Eye and the Colourful World
Empathy, Adaptability, and Respect****I. Introduction**

The eye is one of the most remarkable achievements of evolution. In humans, vision is the most important sense, and a large part of the brain is allocated for the processing of visual information. Eye is a specialized sense organ that helps us to see the world around us. This chapter describes the structure of human eye, how to take care of them and why it is important to take care of our eyes. This chapter also explains the phenomena of diffraction of white light into its constituent colours and some of the daily applications of diffraction.

Through this chapter teacher can explain the importance of values like gratitude, empathy, adaptability and respect for others. While describing the importance of eyes in our life, teacher can urge the children to be grateful to god for giving us such a wonderful organ that makes your life colourful. At the same time children should be asked to take good care of their precious eyes by following healthy habits. It can also be highlighted that there are millions of people in this world, who do not have vision. Eye donation is one of the greatest things one can do to show empathy to such visually challenged people and it can be considered as our social responsibility. While explaining about the power of accommodation of our eyes the importance of adaptability can be pointed out to children. The dispersion of white light into its component colours while passing through a prism tells us about how the hidden talents of a person can be discovered by giving him / her respect, opportunity and encouragement.

The core values focused upon are Empathy, Adaptability, and Respect along with sub values such as Responsibility and Gratitude.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Learn about the structure of human eye and the power of accommodation. Learn the importance of adaptability in life from this phenomena of accommodation of eye.
- Comprehend the various defects of eye and their remedial methods.

- Understand the phenomenon of dispersion of light to its component colours including the daily applications of dispersion.
- Learn about scattering of light and its role in many daily life phenomena.
- Understand the importance of eyes and the necessary care to be given to keep them healthy. Learn to be grateful for the blessing of vision and to be empathetic to those who do not have it.
- Realise the importance of eye donation and consider it as your social responsibility.
- Realise that the phenomenon of diffraction can be compared to bringing out the talent and capabilities of a person by giving him/her respect, opportunity and encouragement.

III. Process & Action Plan

A good teacher can inculcate many important life values in his/ her students. This chapter gives the teacher an opportunity to make the children aware of the importance of eye donation and also to appreciate the preciousness of vision. Children can be asked to avoid unhealthy habits that lead to vision impairment.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:
Empathy and Gratitude Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Adaptability

This is an demo activity which helps to understand the importance of adaptability in life. Refer B.1.

2. Respect and Responsibility

This is a demo activity to inculcate values like respect and responsibility.
Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Home Assignment that helps to improve the analytical and critical thinking skills in addition to sowing the seeds of responsibility. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** - Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Empathy, Adaptability, and Respect* along with sub values such as *Responsibility and Gratitude*..

The unit also provides the scope to develop the following skills in the students like *analytical and critical thinking skills*.

IV. Activities & Related Discussion

A. The lesson can be introduced with a discussion of the unhealthy habits that can impair vision. Children can be warned against the long hours they spent on watching mobile and television, which are harmful to their eyes. They should be told, how precious vision is and how to take care of their eyes. Teacher can also urge the children to be grateful to god for giving them proper vision. He/ She can discuss about millions of visually challenged people and make the children understand the importance of eye donation. Children should be told that they should be empathetic towards those who are blind. If possible teacher can show a suitable video promoting eye donation after death. This will encourage children to show their social responsibility by pledging their eyes for donation and also convey the message to all others in their family.

B. Activities:

B.1. This is an activity that help students to understand the power of accommodation of human eye.

- Ask students to look out through an open window (preferably not through a pane of glass) and decide whether they can see things that are far away very sharply. If they can, they can say that their eyes see things as far as 'infinity'.
- Students with spectacles may wish to take them off. If they find they cannot see things very far away, they should find the farthest distance at which they can see an object comfortably and clearly by looking at objects at various distances.
- Now each student should look at a book held at arm's length, and bring it closer and closer to the head until the print can no longer be seen comfortably and clearly. With young eyes the range of accommodation is very large, and many students will be able to focus sharply on objects only a few centimetres from their eyes. This will involve uncomfortable squinting, which can be avoided by holding a hand over one eye.

- Ask students to look at a book, read a few words, and then to look quickly at a far wall and then back at the book. It may be possible to feel the eye lens being squeezed and let go.

Through this activity children can understand how human eye is capable of adjusting its focal length rapidly which is known as power of accommodation of eyes. Children can learn another important value from this namely adaptability. One should be capable of adapting to new situations in life very fast. It is very important to be successful in life. Our eyes are the best example for adaptability to changing environment.

Things needed: Any book to read.

B.2. Teacher can demonstrate the dispersion of white light into its component colours with the help of the following activity by following the steps given below. (This is given as activity 11.2 in the NCERT textbook).

- Take a thick sheet of cardboard and make a small hole or narrow slit in its middle.
- Allow sunlight to fall on the narrow slit. This gives a narrow beam of white light.
- Now, take a glass prism and allow the light from the slit to fall on one of its faces.
- Turn the prism slowly until the light that comes out of it appears on a nearby screen.
- You will find a beautiful band of colours.

What is observed is due to the dispersion of light. This shows that white light is composed of many colours which manifests itself only when it passes through a prism. This can be compared to the different talents and capabilities hidden in an individual. Only when you give opportunity and encouragement, these will be visible to others. Children can be urged to be like a prism for others, respecting the capabilities and virtues of others and giving them encouragement and opportunity to show their inherent talents and capabilities. You may also require a person who will be a prism for you and help you to develop your potential, leading you to success.

Things needed: A thick sheet of cardboard, a glass prism and a screen.

V. Assignments

C.1. Home Assignment.

Children can be asked to write down five things that they will do for the better health of their eyes and five things that they will stop doing for protecting the health of their eyes. This will make them aware of the preciousness of vision and also make them feel responsible for their health. This also will help to improve their analytical and critical thinking skills.

Resources

References:

- NCERT Class X Science Textbook.
- Activity B.1. courtesy: <https://spark.iop.org/range-accommodation-eye>

Topic	Values / Life skills integrated & imbibed	Activities
Electricity	<p>Core Values Positivity, Sensibility and Self-Confidence</p> <p>Other Sub Values: Happiness ,Humility and Hard work.</p> <p>Life Skills: Analytical thinking and Self-realization skills.</p>	<ol style="list-style-type: none"> 1. This is a discussion activity which helps to understand the importance of Humility and Happiness in life. Refer B.1. 2. This is discussion activity which helps the children to relate to values like consistency and hard work. Refer B.2. 3. This activity using combination of resistances helps the children to relate to the value, sensibility. Refer B.3. 4. Home Assignment that helps to improve the analytical thinking and self-realization skills. Refer.C.1.

Materials / Resources needed

- 1) Cells, Resistors and the necessary elements of a circuit..
- 2) NCERT' text books of Class X.

Description (of the points of discussion)

This chapter gives an overview of the components of an electric circuit, Ohm's law, definition of electric power and its heating effect and combination of resistances.

The points of discussion are

- what electric current is and how electricity flows through a circuit.
- the importance of each and every component in a circuit; and learn to draw a circuit diagram.
- Ohm's Law and resistances and the combination of resistances.
- the heating effect of electric current and the relation between power, current and voltage.
- the importance of values like positivity and humility while learning about positive and negative charges and the fact that electricity will flow from high to low potential.
- happiness charges your body and mind and keep you active just like battery cells can be recharged by electricity.
- god has given us the same power to succeed .But we have to choose from high voltage or high current as power is a product of these two. Voltage can be compared to confidence and hard work. Current can be compared to ego, selfishness and pride.
- the importance of sensibility in life, while learning about the combination of resistances.

Unit 12**Electricity****Positivity, Sensibility and Self-Confidence****I. Introduction**

Consumption of Electricity is present all around us - powering our daily technologies like our cell phones, computers, lights, fans, soldering irons, air conditioners, heaters, refrigerators etc. It is tough to escape it in our modern world. Even when you try to escape electricity, it's still at work throughout nature, from the lightning in a thunderstorm to the synapses inside our body. Electricity can be concisely defined as the flow of electric charge. This chapter gives an overview of the components of an electric circuit, Ohm's law, definition of electric power and its heating effect and combination of resistances.

Through this chapter teacher can explain the importance of values like positivity and humility while explaining positive and negative charges. The fact that electricity will flow from high to low potential shows that humility as an important virtue. Another interesting observation is that happiness is similar to electricity which charges your body and mind and keep you active. God has given us the same power to succeed. But we have to choose from high voltage or high current as power is a product of these two. Voltage can be compared to confidence and hard work. Current can be compared to ego, selfishness and pride. While explaining the combination of resistances teacher can touch upon the importance of sensibility in life.

The core values focused upon are Positivity, Sensibility and Self-Confidence along with sub values such as Happiness, Humility and Hard work.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Learn what electric current is and how electricity flows through a circuit.
- Understand the importance of each and every component in a circuit; and learn to draw a circuit diagram.
- Know about Ohm's Law and resistances and the combination of resistances.

- Learn about the heating effect of electric current and the relation between power, current and voltage.
- Correlate the importance of values like positivity and humility while learning about positive and negative charges and the fact that electricity will flow from high to low potential.
- Realise that happiness charges your body and mind and keep you active just like battery cells can be recharged by electricity.
- Realise that god has given us the same power to succeed .But we have to choose from high voltage or high current as power is a product of these two. Voltage can be compared to confidence and hard work. Current can be compared to ego, selfishness and pride.
- Realise the importance of sensibility in life, while learning about the combination of resistances.

III. Process & Action Plan

Children should be made to understand how to stay positive in life and how staying happy can lead to a healthy and long life. This chapter gives the teacher an opportunity to explain these, by comparing these with electricity and its nature.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:
Positivity Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Humility and Happiness

This is a discussion activity which helps to understand the importance of Humility and Happiness in life.
Refer B.1.

2. Self-Confidence and Hardwork

This is discussion activity which helps the children to relate to values like consistency and hardwork. Refer B.2.

3. Sensibility

This activity using combination of resistances helps the children to relate to the value, sensibility.
Refer B.3.



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Home Assignment that helps to improve the analytical thinking and self-realization skills. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** - Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Positivity, Sensibility and Self-Confidence* along with sub values such as *Happiness, Humility and Hard work*.

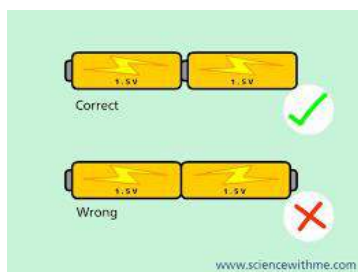
The unit also provides the scope to develop the following skills in the students like *analytical thinking and self-realization skills*.

IV. Activities & Related Discussion

A. The teacher can discuss on the positive and negative charges and how current electricity is produced. While discussing this topic it can be related to positivity in life. Every person has positivity and negativity in them. But one should always keep the positivity on the upper side, in order to be successful in life. Just like how an atom becomes positive when the number of positive charges becomes greater than that of negative charges, one should accumulate more positivity in life.

B. Activities:

B.1. The lesson can proceed with a simple activity. Keep two cells with positive terminal touching the positive terminal of the other cell. If such a combination is connected in a circuit no current will flow.



This can be related to the fact that current always like to flow only if there is a potential difference. It flows from higher potential to lower potential just like water flows only from a higher to lower point. This teaches us that humility is important in life for success to happen. Ups and Downs are part of life that gives a driving force towards success. If there are no ups and downs there will be no driving force towards success. It is always better to be humble to make success flow smoothly. It can also be pointed

out that rechargeable cells have to be recharged with electricity and non-rechargeable ones have to be replaced. This is like recharging your body and mind with happiness. It is essential that you need to have a driving force inside you, for success and that can be obtained only by being happy and staying positive.

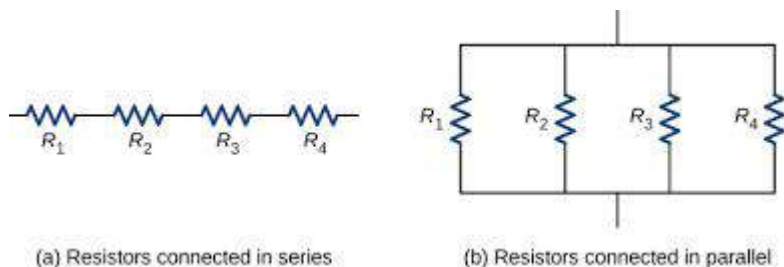
Things needed: Cells.

B.2. This is discussion on how power is calculated. Teacher can explain that

$$\text{Power} = \text{Voltage} \times \text{Current}$$

Power is the product of voltage and current. It can be highlighted that God has given same potential (power) to all of us. Despite that, not everyone gets to the same level of success in life. Because along with same potential, God has given us the power to choose the balance between voltage and current. Higher voltage essentially leads to lower current and vice-versa because at the end the power has to be maintained constant. Voltage can be compared to confidence and hard work. Current can be compared to ego, selfishness and pride. So if we choose more voltage, then naturally there is less current. But a lot of people choose current over voltage. That is what makes only a selected few successful. We should flush out all the negative traits like ego and pride and do hard work with self-confidence. This is the secret to success in life.

B.3. This is a demonstration that shows the outcome of combination of resistances. Teacher can demonstrate this in the class if possible.



This is the case of 4 resistors connected in series and connected in parallel. It can be seen that when they are connected in series you get maximum effective resistance which is the sum of the resistances. But when they are connected in parallel they result in minimum effective resistance which is smaller than the smallest of the four individual resistances.(given by the reciprocal of the sum of their reciprocals).

This teaches us an important life lesson. We all may have the same resources at hand. But the outcome depends on how we utilize them. We can get the best out of them or the worst. It depends on how we use it. We have to use our resources sensibly and judiciously .Sensibility is one important virtue teacher can try to inculcate in the minds of children during this demonstration.

Things needed: Resistors and the necessary elements of a circuit.

V. Assignments

C.1. Home Assignment.

A home assignment can be given to children to analyze themselves and make a chart

listing their positive and negative traits. Children can be asked to balance their positive and negative characteristics and try to increase the number of positive traits in them and at the same time reduce the negative ones; and review the chart every month. This helps children to improve their analytical thinking skills and self-realization skills.

Resources

References:

- NCERT Class X Science Textbook.
- Picture courtesy: www.sciencewithme.com, www.opentextbc.ca

Topic	Values / Life skills integrated & imbibed	Activities
Magnetic Effects of Electric Current	<p>Core Values Self-Realisation, Focus and Determination</p> <p>Other Sub Values: Hard work</p> <p>Life Skills: Observation, analytical thinking and written communication skills.</p>	<ol style="list-style-type: none"> 1. This is an activity which helps to understand the importance grabbing opportunities to bring out one's hidden talents. Refer B.1. 2. Home Assignment that helps to improve the observation, analytical thinking and written communication skills. Refer.C.1.

Materials / Resources needed

- 1) A needle made of steel or iron, A bar magnet, a round faced button and all the components of a circuit as shown in activity 13.1 of text book.
- 2) NCERT text books of Class X.

Description (of the points of discussion)

This chapter also explains electromagnetic induction and how this principle is implemented in electric motors and generators.

The points of discussion are

- Realise that electric current has got magnetic effect and a current carrying conductor generates a magnetic field around it.
- Describe the poles of a magnet and how a magnet always orients itself in the north south direction.
- Learn about the magnetic lines of flux and the general rules associated with them.
- Understand electromagnetic induction and its applications.
- Describe how an electric motor and generator works.
- Realise that talent is like electricity which is hidden inside but can manifest if an opportunity arises. For this to happen self-realisation is important.
- Correlate the behaviour of a magnetic compass to focus and determination in life.

Unit 13**Magnetic Effects of Electric Current
Self-Realization, Focus and Determination****I. Introduction**

Magnets are part of our everyday lives. They come in different forms and have different uses. Many devices we use have magnets present in them. This chapter gives an idea about how electricity and magnetism are closely related, what magnetic flux lines are and how they are oriented. This chapter also explains electromagnetic induction and how this principle is implemented in electric motors and generators.

Through this chapter teacher can explain the importance of values like focus, determination and self-realization. An interesting observation about electricity is that it is not visible but its effects are felt, whether it is heating effect or magnetic effect. There are many talents hidden in each one of us which are not visible from outside. But given an opportunity it will manifest itself. This shows the importance of self-realization. One should know his/ her potential and grab any opportunity to display it. While explaining magnetic flux lines and how a magnet always orients itself in the north south direction, teacher can relate it to focus and determination in life.

The core values focused upon are Self-realization, Focus and Determination and sub values like Hard work.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Realise that electric current has got magnetic effect and a current carrying conductor generates a magnetic field around it.
- Describe the poles of a magnet and how a magnet always orients itself in the north south direction.
- Learn about the magnetic lines of flux and the general rules associated with them.
- Understand electromagnetic induction and its applications.
- Describe how an electric motor and generator works.
- Realise that talent is like electricity which is hidden inside but can manifest if an

opportunity arises. For this to happen self-realisation is important.

- Correlate the behaviour of a magnetic compass to focus and determination in life.

III. Process & Action Plan

A child may have many inherent talents in him/her. . Like the unseen electricity that causes effects like heat, light and magnetism, if given an opportunity the hidden talents of a person will manifest. The role of a good teacher is to encourage children to realize their hidden potential and bring out the best in them by giving them opportunities.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:
Focus and Determination Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Self-Realisation

This is an activity which helps to understand the importance grabbing opportunities to bring out one's hidden talents. Refer B.1.



C. Aid generalization of the concepts learnt, through assignments (given below).



1. Home Assignment that helps to improve the observation, analytical thinking and written communication skills.
Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** - Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Self-Realisation, Focus and Determination and sub values like Hard work.*

The unit also provides the scope to develop the following skills in the students *like observation, analytical thinking and written communication skills.*

IV. Activities & Related Discussion

A. The teacher can demonstrate how to make a button compass by following the steps described below.

- Magnetise a needle (can be made of iron or steel) by stroking end to end with one end of a magnet.
- Place a round faced button on a smooth surface so that it can move freely overcoming the friction on the surface.
- Keep the needle on the button and allow it to orient in the north south direction.
- This set up can now act as a compass.

It should be noted that the round faced button should be so smooth that the needle can make it move according to its direction.

Teacher can explain that magnetic compass needles always orient themselves in the north south direction. This can be taken as an example of focus and determination. Children should be advised to be like a compass needle and always orient themselves towards their goal. They have to set their goals and work towards it with focus and determination. Distraction that happens on the way to success, should be ignored. They should try to move forward only in the direction of their goal. Another interesting observation one can make is that a magnet can magnetise an iron or steel needle. This can be compared to good and bad company. If you are with good people you will imbibe all the good traits. But if you are in bad company, you will eventually become a bad person. Children can be asked to select their peer group keeping this universal truth in mind.

Things needed: A needle made of steel or iron, A bar magnet, a round faced button.

B. Activities:

B.1. The teacher can start the demonstration by discussing about the various effects of electric current like heating effect, lighting effect etc.

- Take a straight thick copper wire and place it as part of an electric circuit as shown in activity 13.1 of the NCERT textbook.
- Now we can place a small compass near to this copper wire.
- After placing the needle note the position of its needle.
- Now insert the key into the plug to close the circuit and pass the current through the circuit. Since the current is flowing in the circuit now, observe the change in the position of the compass needle.

It can be observed that the compass needle is deflected when it is placed near a current carrying wire showing the presence of a magnetic field around the conductor. The interesting takeaway from this experiment is that we are not able to see the presence of electricity but can only feel its effects. This is like hidden talents in a person. Talent is like electricity which is hidden inside but can manifest only if an opportunity comes. There are many talents hidden in us which is not visible from outside. But given an opportunity they will manifest themselves. This shows the importance of self-realisation. One should know his/ her potential and grab any opportunity available, to display it.

V. Assignments

C.1. Home Assignment.

You've probably heard of a person having a magnetic personality. If something or someone is magnetic, the object or person has an extraordinary power or ability to attract. We tend to get attracted to people because of their positive personality traits. Children can be asked to write about a magnetic personality they have met in their real life and explain what attracted them to him/her.

They can list down the traits in a person that makes his/ her personality magnetic. This activity helps the children to improve their observation, analytical thinking and written communication skills.

Resources

References:

- NCERT Class X Science Textbook.

Topic	Values / Life skills integrated & imbibed	Activities
Sources of Energy	<p>Core Values Responsibility, Equality and Environmental Awareness</p> <p>Other Sub Values: Sharing and caring.</p> <p>Life Skills: Creative and Imaginative skills.</p>	<ol style="list-style-type: none"> 1. This is a discussion activity which helps to create environmental awareness in the children Refer B.1. 2. This is a listing activity which helps the children to understand their social responsibility. Refer B.2. 3. A slogan writing competition on conserving energy that helps to improve the creative and imaginative skills of the students. Refer.C.1.

Materials / Resources needed

- 1) NCERT text books of Class X.

Description (of the points of discussion)

This chapter gives an overview of the different sources of energy - conventional and non-conventional; and how to conserve energy through upgradation of technology..

The points of discussion are

- the classification of energy sources into conventional and non-conventional sources of energy.
- why it is important to conserve energy, know the various methods for energy conservation and how to use technology for the same.
- the environmental consequences of using different sources of energy which will help the children understand the importance of being responsible in energy utilisation.
- how to ensure equality in sharing the energy resources and how we should share equally the available resources amongst the whole of human population.

Unit 14**Sources of Energy****Responsibility, Equality and Environmental Awareness****I. Introduction**

Energy is the capacity of a physical system to perform work. Energy exists in several forms such as heat, kinetic or mechanical energy, light, potential energy, electrical energy or in many other forms. Energy is the ability to do work. Sources of Energy sources can be classified as renewable and non-renewable. This chapter gives an overview of the different sources of energy - conventional and non-conventional; and how to conserve energy through upgradation of technology.

This chapter enables teacher to make children aware of environmental impact of using different sources of energy and how one should behave responsibly to conserve energy. It also brings to focus the necessity of equality in distribution of resources and how one should share the resources available on this earth equally amongst all of us.

The core values focused upon are Responsibility, Equality and Environmental Awareness along with sub values such as Sharing and caring.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Learn the classification of energy sources into conventional and non-conventional sources of energy.
- Understand why it is important to conserve energy, know the various methods for energy conservation and how to use technology for the same.
- Learn about the environmental consequences of using different sources of energy which will help the children understand the importance of being responsible in energy utilisation.
- Learn how to ensure equality in sharing the energy resources and how we should share equally the available resources amongst the whole of human population.

III. Process & Action Plan

Through this chapter, teacher gets an opportunity to highlight the importance of equality and sharing and caring for others by distributing the resources among the world population. It also helps in making the children understand the importance of conserving energy and be aware of the environmental impact of using some sources of energy.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:
Equality and Caring and Sharing Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Environmental awareness

This is a discussion activity which helps to create environmental awareness in the children Refer B.1.

2. Responsibility

This is a listing activity which helps the children to understand their social responsibility..
Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1. A slogan writing competition on conserving energy that helps to improve the creative and imaginative skills of the students. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** – Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Responsibility, Equality and Environmental Awareness* along with sub values such as *Sharing and caring*.

The unit also provides the scope to develop the following skills in the students like *creative and imaginative skills*.

IV. Activities & Related Discussion

A. Teacher will bring out a flashlight without batteries and ask a student to turn it on. The flashlight will not turn on and the teacher will ask "how can we make it turn on?" Students will discuss the fact that there may not be batteries. When students investigate and realize there are none, they will put them in and notice that it will work. The teacher will lead a discussion on how a battery is a source of energy. The battery was a source of energy and it stored the energy inside it. Energy can be converted from one form to another- in this case it was in the form of electricity, converted to light. Teacher can continue the discussion on the type of energy conversion in a cell. He/ She can take the discussion towards the fact that the ultimate source of energy in this world is sun. Teacher can point out that sun distributes energy equally to everything on the earth. It can be emphasized that we should see to it that energy sources are shared equally among all in this world and should not be confined to a few groups.

B. Activities:

B.1. The teacher can initiate a discussion on various sources of energy used to meet out energy requirements. Children can be asked to write about the advantages and disadvantages of using any one source of energy. Teacher can explain the negative impacts on our environment on using certain sources of energy like fossil fuels and the importance of switching over to renewable energy sources. They cause pollution and also contributes to green house effect. This will help to make children aware of their responsibility to preserve the environment and avoid the use of energy sources that harm our environment. Teacher can ask the children to undertake a pledge to protect our environment.

B.2. Teacher can ask the children to write down five important steps they will take in their daily life to conserve energy. Some examples for the same are shown below.

- Use public transport to come to the school
- Use a bicycle or come to school by walking
- Switch off all the appliances like lights and fans before leaving the classroom.

This activity helps the children to understand their role in conserving energy and make them feel the responsibility.

V. Assignments

C.1. Class Assignment.

Teacher can conduct a slogan competition in the class related to the topic 'Energy conservation'. The best one can be rewarded. This will help to enhance the creative skills of the children in addition to their imaginative skills

Resources

References:

- NCERT Class X Science Textbook.
- Context activity courtesy: <https://www.commonsense.org/education/lesson-plans/energy-sources>.

Topic	Values / Life skills integrated & imbibed	Activities
Our Environment	<p>Core Values Interdependence, Harmony and Respect</p> <p>Other Sub Values: Environmental awareness, Gratitude and Social Responsibility</p> <p>Life Skills: Observation skills and inquisitiveness, Communication skills and Analytical thinking skills.</p>	<ol style="list-style-type: none"> 1. This is a debating activity which teaches children interdependence and also importance of giving respect to others Refer B.1. 2. Home Assignment that helps the children to relate to values like Social Responsibility and Environmental Awareness and to improve their observation skills and inquisitiveness. Refer.C.1.

Materials / Resources needed

- 1) Any book to read, A thick sheet of cardboard, a glass prism and a screen.
- 2) NCERT text books of Class X.

Description (of the points of discussion)

This chapter helps children to get an overview of the different components in our environment, how they interact and co-exist in harmony and how human activities interfere adversely with these factors.

The points of discussion are

- the various components of ecosystem and their interdependence.
- each and every being has its own role in this world. So learn to respect every one irrespective of their economic and social status.
- how human activities negatively impact our environment and how technology can help us to reduce this impact.
- the causes of environmental problems like ozone layer depletion and greenhouse effect.
- Realise the importance of less garbage generation and proper garbage disposal.
- all components of ecosystem are interdependent on each other and live in harmony. Every component has an important role in an ecosystem.
- Realise about the social responsibility and take necessary steps to reduce the negative impact of human actions on our environment.
- Realise that all our energy needs are ultimately met by the sun and our life is possible on this planet only with the help of mother nature. Hence we should be grateful to mother nature for providing us with all that we need.

Unit 15**Our Environment****Interdependence, Harmony and Environmental awareness****I. Introduction**

Environment is everything that is around us, which includes both living and nonliving things such as soil, water, animals, plants etc, which adapt themselves to their surroundings. It is nature's gift that nourishes life on the earth. This chapter helps children to get an overview of the different components in our environment, how they interact and co-exist in harmony and how human activities interfere adversely with these factors.

The teacher gets an opportunity to make children aware of the interdependence and harmony among the various abiotic and biotic components of ecosystems. The dependency of every living being on one another and on nature can be emphasized while explaining food chains and food webs. Children should get the message that every organism on this earth including human beings, has to depend on one another for survival and then only harmony can be established. Even micro organisms have an important role in this world. Children should be urged to respect each and every one around them irrespective of their financial or social status, as everyone has an important role in this world. While explaining about the adverse impact of human activities on our environment like ozone layer depletion, greenhouse effect etc., teacher can remind the children of their social responsibility and urge them to take necessary steps towards reducing their negative impact.. All our energy needs are ultimately met by the sun and our life is possible on this planet only with the help of mother nature. Teacher can sow the seeds of gratitude in the minds of children towards mother earth.

The **core values** focused upon are *Interdependence, Harmony and Respect* along with sub values such as *Environmental awareness, Gratitude and Social Responsibility*.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Learn about the various components of ecosystem and their interdependence.
- Appreciate that each and every being has its own role in this world. So learn to respect every one irrespective of their economic and social status.

- Learn how human activities negatively impact our environment and how technology can help us to reduce this impact.
- Know about the causes of environmental problems like ozone layer depletion and greenhouse effect.
- Realise the importance of less garbage generation and proper garbage disposal.
- Understand that all components of ecosystem are interdependent on each other and live in harmony. Every component has an important role in an ecosystem.
- Realise about their social responsibility and take necessary steps to reduce the negative impact of human actions on our environment.
- Realise that all our energy needs are ultimately met by the sun and our life is possible on this planet only with the help of mother nature. Hence we should be grateful to mother nature for providing us with all that we need.

III. Process & Action Plan

Children should be made aware of the importance of preserving our environment and in this chapter teacher gets a chance to do that. A socially responsible generation can only save this world from an environmental disaster and teachers are the best proponents of this idea. In addition to this, teachers can make children understand why they should respect every other being on this planet and how-to live-in harmony with them.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:
Gratitude Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Interdependence and Respect

This is a debating activity which teaches children interdependence and also importance of giving respect to others Refer B.1.



C. Aid generalization of the concepts learnt, through assignments (given below).



1.Home Assignment that helps the children to relate to values like Social Responsibility and Environmental Awareness and to improve their observation skills and inquisitiveness. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** - Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Interdependence, Harmony and Respect* along with sub values such as *Environmental awareness and Social Responsibility*.

The unit also provides the scope to develop the following skills in the students like *observation skills and inquisitiveness, communication skills and analytical thinking skills*.

IV. Activities & Related Discussion

A. The teacher can start the lesson with a discussion on who is the ultimate source of energy for all living things on earth. Teacher can ask students where they get energy to walk or to play. He/ she can explain from where we get our food and point out that the plants who supply us food, get their energy from the sun. Similarly, children can be asked where they get energy to cook their food or to make their car move. He/ She can point out that the fuels we use ultimately get their energy from sun, which is stored as chemical energy in them. Teacher can give a detailed picture of how energy flow takes place in the ecosystem. This will help children to understand the interdependence of various elements in the environment and encourage them to be grateful to mother nature for what she has given us.

B. Activities:

B.1. This is a debating activity. Teacher can divide the class into five groups and assign each group with any of the following names.

1. Abiotic components (Includes sun, soil, water, atmosphere etc.)
2. Producers
3. Primary consumers
4. Secondary consumers
5. Decomposers

Teacher can now ask the leader of each group to come forward and present before the class, why they should be considered as the most important component of an ecosystem. For e.g. Producers group can argue that they are the sole suppliers of food for all animals and hence they are the most important ones. All groups can present their points and finally teacher can conclude saying that everyone is very important in an ecosystem. Every group has an important role to play for maintaining harmony and keep

life going. So everyone should be given due respect and none is superior or inferior. This principle can be extended to our day to day life. Children can be made to understand that they should respect each and every one in the society. Whether a person is a sweeper or a driver, he /she commands respect from others, since he/ she has an important role to play in the society. This activity also helps to improve the communication skills and analytical thinking skills of the students.

V. Assignments

C.1. Home Assignment.

A home project can be given to students to classify the garbage generated in their house and the disposal methods to be followed for each type. They can be asked to do a survey activity on how garbage is collected and disposed in their neighbourhood .This activity will help to make children realize their social responsibility and also enhance their observation skills and inquisitiveness.

Resources

References:

- NCERT Class X Science Textbook.

Sustainable Management of Natural Resources

Topic	Values / Life skills integrated & imbibed	Activities
Sustainable Management of Natural Resources	<p>Core Values Unity, Cultural awareness and Simplicity</p> <p>Other Sub Values: Responsibility and Environmental awareness.</p> <p>Life Skills: Observation skills, communication skills ,critical thinking skills, writing and comprehension skills.</p>	<ol style="list-style-type: none"> 1. This is a debating activity which helps to make the children understand Social Responsibility and Unity Refer B.1. 2. This is an activity which helps the children to relate to values like Simplicity and Environmental Awareness .Refer B.2. 3. Home Assignment that helps to improve the writing and comprehension skills. Refer.C.1.

Materials / Resources needed

- 1) NCERT text books of Class X.

Description (of the points of discussion)

This chapter gives an overview of how to utilize our resources in a sustainable manner and how to reduce pollution. It also touches upon water harvesting, waste management and preservation of forest wealth.

The points of discussion are

- preserving the environment was deeply rooted in our Indian culture.
- the various methods for sustainable utilisation of resources.
- the various methods for conserving water and forests.
- the importance of balancing industrial development and exploitation of resources.
- about moving to renewable energy resources.
- Become socially responsible citizens and encourage steps to reduce human impact on environment.
- five R's of waste management and implement simplicity in life to reduce garbage generation.
- the importance of the whole world uniting together to address global issues like ozone layer depletion, green house effect, drinking water scarcity etc.

Unit 16**Sustainable Management of Natural Resources****Unity, Cultural awareness and Simplicity****I. Introduction**

Natural Resource Management refers to the sustainable utilization of major natural resources, such as land, water, air, minerals, forests, fisheries, and wild flora and fauna. Together, these resources provide the ecosystem services that provide better quality to human life. Natural resources provide fundamental life support, in the form of both consumptive and public-good services. Ecological processes maintain soil productivity, nutrient recycling, the cleansing of air and water, and climatic cycles. This chapter gives an overview of how to utilize our resources in a sustainable manner and how to reduce pollution. It also touches upon water harvesting, waste management and preservation of forest wealth.

This chapter gives the teacher an opportunity to explain the importance of preserving the environment and its connection to our culture. This chapter also highlights the fact that the whole world should unite and chalk out immediate necessary steps to reduce the negative impact of human activities on our environment. Another theme to be given more emphasis is the five R's of waste management. 'Refuse' can be correlated to simplicity in life. If we lead a simple life we will generate less waste. Also attempt can be made to reduce, repurpose, reuse and recycle waste.

The core values focused upon are *Unity, Cultural awareness and Simplicity* along with sub values such as *Responsibility and Environmental awareness*.

II. Learning Objectives / Outcomes

Through this unit, the students will achieve the following grade appropriate academic and value based goals.

- Realise the fact that preserving the environment was deeply rooted in our Indian culture.
- Comprehend the various methods for sustainable utilisation of resources.
- Learn the various methods for conserving water and forests.

- Realise the importance of balancing industrial development and exploitation of resources.
- Learn about moving to renewable energy resources.
- Become socially responsible citizens and encourage steps to reduce human impact on environment.
- Understand five R's of waste management and implement simplicity in life to reduce garbage generation.
- Learn about the importance of the whole world uniting together to address global issues like ozone layer depletion, green house effect, drinking water scarcity etc.

III. Process & Action Plan

A good teacher can only mold the students into responsible citizens, who are sensitive to environmental issues and who insist on working towards sustainable utilization of natural resources. Children should be made to understand the importance of using renewable sources of energy and also proper conservation of water and forest resources.

The values and life skills integration within this unit may follow the following process and action plan, as depicted in the flow chart below:

A. Introduce the context activity:
Cultural awareness Discussion. Refer A



B. Carry out the varied activities in class (given below) in the sequence specified.



1. Social Responsibility and Unity

This is a debating activity which helps to make the children understand Social Responsibility and Unity
Refer B.1.

Simplicity and Environmental Awareness.

This is an activity which helps the children to relate to values like Simplicity and Environmental Awareness.
Refer B.2.



C. Aid generalization of the concepts learnt, through assignments (given below).



1.Home Assignment that helps to improve the writing and comprehension skills. Refer.C.1.

While it would be ideal to expose the students to all the activities as given, and the discussion that would ensue, you may choose as per your convenience and availability of time, the activities that would be relevant to the content being taught and/or suited to the cognitive and emotional maturity of the students.

This topic incorporates the **core approach** - Knowing, Understanding, Valuing and Acting the values embedded in the topic.

The **core values** being considered are *Unity, Cultural awareness and Simplicity* along with sub values such as *Responsibility and Environmental awareness*.

The unit also provides the scope to develop the following skills in the students like *observation skills, communication skills, critical thinking skills, writing and comprehension skills*.

IV. Activities & Related Discussion

A. The teacher can start the lesson by discussing on how environmental preservation is given supreme importance in our Indian culture. For the people of India, environmental conservation is not a new concept. Historically, the protection of nature and wildlife was an ardent article of faith, reflected in the daily lives of people, enshrined in myths, folklore, religion, arts, and culture.

One of the finest examples of traditional practices in India based on religious faith which has made a profound contribution to nature conservation has been the maintenance of certain patches of land or forests as 'sacred groves' dedicated to a deity or a village God, protected, and worshipped. These are found all over India, and abundantly along the Western Ghats, the west coast, and in several parts of Kerala, Karnataka, Tamil Nadu and Maharashtra. In Kerala there are hundreds of small jungles dedicated to snakes ('Sarpakavu', 'Sarpa' meaning snake, 'kavu' meaning jungle). Teacher can ask children to study about these sacred pieces of protected forest land and thus understand the importance given to forests and ecosystem in our culture. If possible they can prepare a writeup on the same and collect pictures from the internet. Teacher can highlight that though it was related to faith, it actually was a method devised by our ancestors to inculcate environmental awareness and propagate the idea through the generations.

B. Activities:

B.1. This is a debating activity. Teacher can give the following topic for group debate:

“Sustainable development hampers Industrial progress”

Children can argue for or against the topic. They can be encouraged to come up with suggestions on how to overcome the hurdles in going ahead with development. This activity not only improves their communication ability, but also enhance their critical thinking ability. Students can be made aware of their social responsibility. They can also

be educated on the importance of the whole world uniting together to address global issues like ozone layer depletion, greenhouse effect, drinking water scarcity etc.

B.2. This is an activity which helps children to understand the importance of simple living that leads to generation of less waste. Children can be asked to write down a ten-step plan to reduce the waste generation in their houses. Some sample suggestions are given below.

- Use reusable cloth bags for shopping instead of plastic bags.
- Use stainless steel tiffin boxes.
- Make proper meal plans to avoid wastage of food.
- Rectify leakages in the pipelines.
- Use refills in pens instead of throwing away the pen as such. Better use ink pens.

This will help the children to understand the 5 R's and implement simplicity in their life. Everyone can contribute to this great cause. Children can be asked to advocate the principle of 5 R's to their family members also. This activity also enhances the observation skills of the children.

V. Assignments

C.1. Home Assignment.

Children can be asked to prepare a write up on 'Namami Gange project'. 'Namami Gange Programme', is an Integrated Conservation Mission, approved as 'Flagship Programme' by the Union Government in June 2014 with budget outlay of Rs.20,000 Crore to accomplish the twin objectives of effective abatement of pollution, conservation and rejuvenation of National River Ganga. This will help to enhance the writing and comprehension skills of the children in addition to improving general awareness.

Resources

References:

- NCERT Class X Science Textbook.

SCIENCE

Grade X

Integration of Values

Teacher's Manual

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