

SECTION – 3

SECTION – 3: Methods in Environmental Education

Introduction

A teaching method may be visualized as a structural representation of the content or concepts. Its role in any teaching – learning situation is critical, as the achievement of the stated instructional objectives depend on the teaching methods employed. To this extent, teaching methods are nothing but the mechanisms employed to transfer information and skills.

Educators have been using a variety of methods to make their teaching effective. These range from the conventional method to more sophisticated methods such as problem-solving, discovery, individualized instruction, slide-tape methods etc. Some of them have been found more appropriate than others in the teaching of certain disciplines. For example, demonstrations and experimentation have been found more useful and effective in the teaching of science concepts as compared to the chalk-talk method. Likewise, in the promotion of Environmental Education, methods such as surveys, projects, field trips, games, brainstorming, discussion, experimental investigations, etc., have been found more effective in not only maximizing learner's participation in the teaching – learning process (directly or indirectly), but also in helping them to retain the information and its transfer to varied situations.

Keeping in view the deliberate need to training teachers in employing effective methods of teaching EE concepts, in this section, five methods to teaching have been dealt in detail to demonstrate how they could be utilized for infusing and transacting EE concepts. These are **Surveys, Project, Field trips, Games and Role-plays**. These methods have been enumerated by concepts from both Science and Social Science topics.

As it would be difficult to treat all the methods in detail in a workshop of this kind, an attempt has been made to provide thumbnail sketches of a few of them. These are presented in **ADD. Notes** appended at the end of the section.

For convenience, the section is cast under four sessions devoted to the topics:

- 1) Survey method
- 2) Project method
- 3) Games
- 4) Field trips
- 5) Role plays.

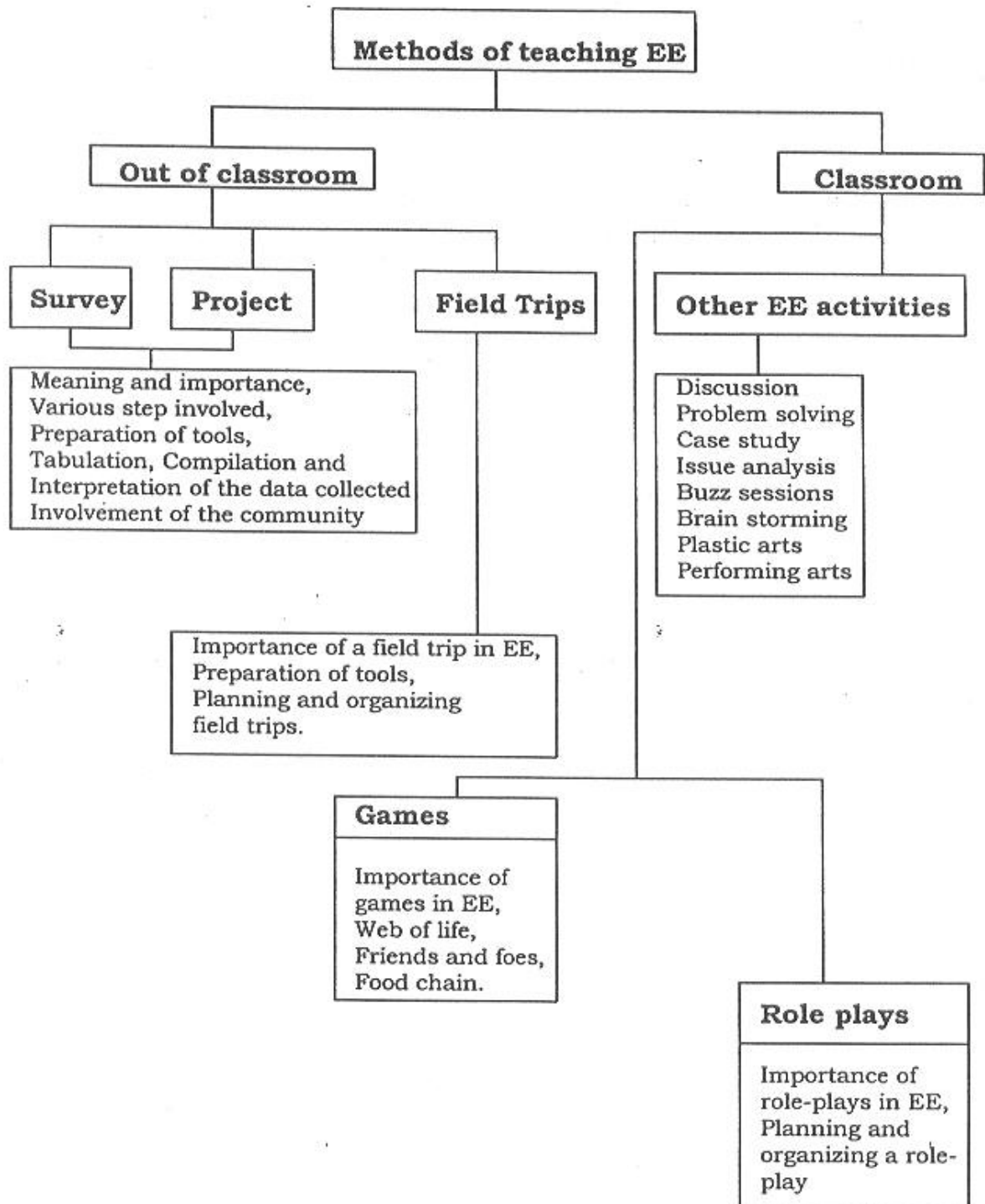
The sessions, besides highlighting the significance of these methods in the teaching of EE, also enumerate the various steps involved in employing them in classroom situation by taking specific examples from the school textbooks.

You could use four sessions, each of one and half hours duration for providing this understanding. In the workshop schedule, these sessions have been indicated as:

- **Introduction to different methods in EE, organizing trip and Games.**
- **Planning and organizing Surveys.**
- **Planning and organizing Projects.**
- **Role plays and other methods in EE.**

An overview of the contents covered in the Session has been given in the flowchart.

Overview



Before you begin, ENSURE that :

You have read this section meticulously taking down the important points for highlighting, details of the activities to be conducted and transparencies to be used.

You have all the **TRAN** sheets, appended at the end of this section, photocopied on transparency sheets for projection and arranged sequentially. Transparency sheets are available in any stationery shop. The process of photocopying is like any other paper being xeroxed or photocopied.

You have arranged the overhead projector, trial run one or two transparencies to ensure their proper focus.

You have copies of Handouts 1 to 3 and Activity Sheets 1 & 2 for use and distribution during the sessions.

You have all the required items for organizing games and other activities.

Session 1: Organizing Field Trips and Games

- Recall to them the different objectives of EE discussed in the earlier session. **TRAN-1** and **TRAN-2** could be used to help teachers recall the objectives and key characteristics of EE. Explain to them the central importance of choosing appropriate teaching methods for achieving the desired objectives.
- Brainstorm with the teachers the various methods one can use to achieve different instructional objectives and infuse EE dimension.
- Discuss with them how the teaching methods could be broadly classified as classroom and out of classroom methods. Use **TRAN-3** to show the classification of teaching methods.
- Keeping the list of methods mentioned in **TRAN-3**, let the teachers discuss and identify some of methods which have more potential for achieving the various objectives of EE and for incorporating the key characteristics.
- Consolidate the discussion and highlight the importance of our of classroom activities in EE by using **TRAN-4**.
- Conduct the following activities to help the teachers understand the potentials of field trips and games in EE.

Activity

Take the teacher out into campus or near by park / garden. Help them observe various things or elements in nature during the walk and record their observations.

Divide the group into 4 to 5 smaller groups. Give each group a copy of the Activity sheet- 1 containing activities on soil and its texture, water and its characteristics, plant and animal life.

Ask the groups to carry out the activities and record their observations in the space provided on the activity sheet.

- Assemble the groups and allow them to compare and discuss their observations. Generate a discussion on the importance of field trips, environmental concepts that can be taught through field trips, relevance of out-of-classroom activities in the teaching of EE concepts.
- Highlight the following points about field trips.
 - A field trip is a carefully planned and task oriented activity.
 - It enriches the teaching experiences by providing learners with first hand experience of immediate environment.
 - It introduces the learners to various aspects of the environment.

- It helps to develop skills of observation, investigation, measurement and mapping.
- Emphasize that field trips can help children in learning about the environment by being in the environment.
- Field trips also provide opportunities to a teacher to organize various other EE activities. For example, games.

A field trip can be planned under three stages,

- Pre-activity,
- Activity and
- Post – activity stage.

Details to be looked into in the pre activity stage:

- It is essential to identify the EE concepts that could be taught through the field trip.
 - Determine and procure before-hand the materials needed for the field trip.
 - Decide the objectives of the field trip and the difference aspects to be studied during the field trip.
 - Identify the location for the field trip and the time duration.
 - Prepare any observation sheets / Activity sheets.
 - Provide necessary instructions on the aspects to be studied, information to be recorded, activities to be carried out and the materials to be carried for the field trip.
 - During the field trip ensure that live specimens are not collected and the natural surroundings are not disturbed.
- Recall to the teachers the details of the game Web-of-life played by them during their earlier sessions. Conduct the following game to help teachers appreciate “Games” as a potential teaching method.

Game

Use activity sheet-2 to help the teachers play the game ‘Food Chain’.
 Elicit from the group the EE message focused through the game and discuss the important EE concepts that can be infused through this game.
 Using the different questions provided in the activity sheet, enumerate the learning outcomes of the game.

- Back in the class, using **TRAN-5**, discuss the importance of games in the teaching of EE, Explain to the teachers that field games are only one type of games, and an insightful teacher could convert many of the commonly

available games in the market for teaching EE. For example, board, card and series games, puzzles and cross-words.

- Conduct the following activity to give teachers some experience of board game.

Activity

Using **TRAN-6** discuss the aims of the game 'Friends and Foe' and the EE concepts that can be taught through it.

Ask the group to examine the board game for its merits and usability.

Divide the teachers into 4 to 5 smaller groups as done earlier.

Ask the groups to choose a topic / concept from the textbook which could be taught through board games. The green textbooks could be used to identify relevant concepts / topic for preparing the game.

Provide them with the necessary materials such as chart paper, poster colours and other stationery items to develop a board game for the topic / concept chosen.

Let the group exhibit the developed games for others to review and comment.

- Conclude the session by giving the teachers a take home activity. As part of which, ask teachers to develop the details of organizing a field trip on the topic 'Diversity seen in the plant kingdom'. Distribute copies of **Handout-1** to the teachers and ask them to make use of these hand outs in developing the field trip.

Session 2: Planning and Organizing Surveys

- Recall the exercise given to them as a take home activity on field trips. Ask the teachers to present details of the field trips planned and the activity sheets worked out by them for the field trip.
- Introduce the group to the importance of surveys and projects and their potential in teaching EE concepts. **TRAN-7** will help you to highlight these points.
- Conduct the following activity to enable the teachers understand the different steps involved in a survey and the details of organizing it.

Activity

Divide the teachers into four or five smaller groups.

Provide the groups with suitable topics for the survey (refer the following foot note) or guide the groups in selecting a topic from either Sciences or Social science textbooks.

Using **TRAN-8** explain the various steps of a survey and their importance in arriving at meaningful conclusions.

Keeping in view of the various steps of a survey, ask the groups to discuss and write the details of the survey planned by them. Give them sufficient time to develop the overall plan of the survey with specific details.

Ask each group to present the details of the survey planned by them. Encourage others to reflect on the details and suggest measures for refinement of the action plan.

Three examples have been provided as exemplars, namely , “ *A study of the problems of contamination of drinking water resources in the neighborhood*” , “*A study of the causes and problems of migration of people from rural areas to the cities*” “*A study of the solid waste disposal system in a city*”. You can take up any locally relevant environmental issue for involving students in a survey.

- Conclude the session by recapitulating the advantages of a survey and the steps to be followed to make the survey systematic.
- As a take home activity, ask the teachers to draw a list of EE concepts, from Sciences and Social Sciences, which could be taught using a survey. From the list, let them select a topic for developing a survey for his/her students. If the teachers, as part of their earlier exercise had worked on a topic in Science they

could choose the topic from Social sciences and vice-versa and develop the specific details of the survey.

Session 3: Planning and Organizing Project

- Recall to the teachers the introduction given on projects – definition and importance – in the earlier session.
- Using **TRAN -9**, explain the potential of a project as a teaching method, its specific advantaged in imparting EE, the different stages in organizing a project and the significance of each stage. Emphasize that although surveys and projects are very identical, yet there are subtle differences, which differentiate them from each other.
- Conduct this activity to enable the teachers to develop a project either in Sciences or Social sciences and understand the various stages in organizing it.

Activity

Divide the teachers into four or five smaller groups as was done earlier.

Provide the groups with suitable topics for the survey (refer the following foot note) or guide the groups in selecting a topic from either Sciences or Social science textbooks.

Using **TRAN-10** explain the different stages of the project in detail , along with their importance.

Keeping in view of the various stages of the project, ask the groups to discuss and write the details of the project planned by them. Give them sufficient time to develop the overall plan of the project with details of the various stages.

Ask each group to present the details of the project. Encourage others to reflect on the details and suggest measures for refinement of the action plan.

- Conclude the session by recapitulating the advantages of a project, the steps to be followed in systematically organizing it.

As was done under Surveys in the earlier session, you could use the following examples for involving trainees in a project “*A study of the management of solid wastes, methods, problems and solutions of collection and disposal*” and “*An investigation of vehicular pollution through an analysis of exhausts and levels of emission*”. However, you may also choose any two topics, one from Sciences and the other from Social sciences, for providing an understanding of the various stages of a project to the teachers, by selecting topics from the green text books.

- As a take home activity, ask the teachers to draw a list of EE concepts, from Sciences and Social Sciences, which could be taught using project method. From the list, let them select a topic for developing a project for his/her

students. If the teachers, as part of their earlier exercise had worked on a topic in Science they could choose the topic from Social sciences and vice-versa and develop the specific details of the project.

Session 4 : Additional Methods and Role-plays

- Put up **TRAN-3** and help teachers recall the various methods of teaching EE.
- Using **TRANS 11 to 20**, discuss the merits of discussion, panel discussion, debate, problem solving, case study, issue analysis, buzz session, brainstorming, plastic arts and performing arts.
- Using **TRAN-21**, explain the importance of role-plays in imparting EE and discuss the different steps of organizing a role play.
- Conduct this activity to enable the teacher to understand the significance of role-plays in EE and help them to enact one such role-play.

Activity

Divide the teachers into two group and distribute **Hand outs** 2 and 3 on Forest Fire and Animal Court to the groups.

Ask the groups to study the handouts, examine the EE concepts that are infused through the role plays and the details of the characters involved. Let each group decide the role-play which they would like to enact and the team for it. Encourage the group to enact the role-play before the other group.

Let others comment on the merits of the role play, their appropriateness for teaching EE concepts, suitability to the learners, appeal, etc

- Conclude the session by debriefing them on :
 - The importance of our of class activities in EE.
 - The different types of activities in EE.
 - The importance and various steps involved in organizing a field trip, surveys, projects, games and role plays in EE.

Methods of Teaching EE – Discussion, problem-solving, case study, issue analysis, buzz session and brain storming.

In addition to the methods of EE discussed in this module, there are many more methods which could be successfully employed in imparting Environmental Education. An overview of some of the methods has been provided in what follows .

Discussion method

Discussion, as a method, provides opportunities for students in developing analytical and communication skills. A well planned and organized discussion on an environmental topic can lead to creating positive attitude towards the environment and help in value clarification. Discussions could prove effective when used in combination (either at the beginning or at the completion of the activity) with other methods like lecture, demonstration, exhibition, projects / surveys / field trips, etc.

During a well planned discussion, different viewpoints are presented by members on an issue / topic, and the moderator or the anchor person consolidates the salient features that emerge from the discussion.

In a panel discussion, usually a panel (team) of experts deliberate on a topic / issue. The differing perspectives and viewpoints expressed by the panel are discussed and analyzed by the group. It is also a question answer session, where in the panel of experts clarifies the queries or questions raised by the participants.

Debate is yet another form of discussion and involves individuals or teams discussing on a topic or an issue. In a debate, generally, arguments are presented in favour and against the topic. At the end, the moderator summarizes to focus the significant points.

A few topics for discussion could be

- Hazards of building a power plant in the vicinity of a town / city – Discussion .
- Tourism v/s protection of environment – debate
- Towards urbanization – need for a comprehensive plan – Panel discussion.

Problem solving method

As the title indicates, it is a method aimed to help the participants arrive at a solution or alternative solution for a given problem. It is a teaching learning approach which centers around an environmental issue or a problem and generally involves investigation. A problem is identified along with the underlying concepts and the principles. The various aspects / dimensions of the problems are discussed

and deliberated to arrive at the alternative solutions. After arriving at the alternative solutions, the participants choose the most appropriate one which can help solve the problem. The entire process of problem solving can involve a number of other teaching techniques such as field work, project works, surveys, experimentation, discussion, etc.

A few topics for problem-solving method

- Pollution or air caused by industries processing chemicals.
- Use to alternative sources of energy for domestic use.
- Sage disposal of solid waste.

Case study method

The case study is another investigatory strategy which can be used to teach concepts in Environment Education. Case studies related to specific locations or events. Details about such events may be obtained from newspaper stories/ television programmes/ magazine reports and other media events. Such reports provide opportunities for identification of the environmental issues and problems involved in a situation. It may lead to situation for alteration of beliefs or changes in opinions.

More specifically, the steps under this method are a) identifying a case, b) listing the objective /s for the same c) collection of data and analysis and d) discussion of the findings. The next step is the compilation of the data from the different groups, arriving at generalizations and deciding the possible course of action.

A few topics for a Case study

- Environmental degradation in Mangalore city.
- Devastation caused by floods in several parts of the country.
- Problems of degraded soil due to excessive use of fertilizers, insecticides and pesticides.

Issues analysis method

Issues involve debatable problem. For example, the proposal to start a nuclear power plant in Kaiga, North Kanara district is an issue by itself. This includes many environment related problems such as reduction in forest cover, destruction of the natural habitat of many species, displacement of the people living in and around those areas, spread to diseases etc., all because of the nuclear power project.

An issue analysis technique is based on the value analysis model developed by Frankell. It involves understanding the issue on hand, analyzing the problems involved in the issue, suggesting possible alternatives for mitigating or containing

the problems, debating over of the alternative for its merits and de-merits, choosing the appropriate alternative.

A few examples for issue analysis are :

- The erection of Tehri Dam on the river Bhagirathi in the Garhwal region.
- The raising of the Almatti dam height on Krishna river in Karnataka.
- Rehabilitation of the people displace due to Narmada Dam Project in Gujarat.

Buzz sessions

This is a group exercise used as a teaching strategy to influence learning through participation. Small groups of learners discuss among themselves several aspects of an environmental issue or a problem. The problem or the issue selected could be divided into several aspects and put on the chits which are picked up by the participants for discussion in small groups. After the discussion, one member of each group would present the outcomes of the discussion to the other groups. The main points are noted on the board and consolidated by the moderator.

A few examples for buzz session are :

- How to conserve natural resources ?
- Economic prosperity is responsible for environmental degradation in the developing countries.

Brain storming method

This teaching method is employed to elicit un-inhibited responses from the participants on a topic / issue. Such sessions involve participants coming out spontaneously with several alternatives and at the end each alternative is weighed for its merits and advantageous in terms of cost and time, and the best alternative is selected for implementation.

A few examples for brain storming are :

- Control of vehicular pollution.
- Minimizing poaching in a sanctuary
- Optimal re-use and re-cycling of the household solid waste.

Through plastic arts:

Activities such as drawing, painting, collage are called as plastic arts. There is a wide scope for depicting various aspects of environment through these media. The outcomes of such activities can be put together as an exhibition.

Through Performing arts:

Performing arts like dance, drama, Puppetry, street plays can be very effective in communicating environmental messages. As they appeal more to the affective domain, the messages are retained for a long time.

TRAN – 1

Objectives of EE

Awareness :	To help the individuals and social groups acquire awareness and sensitivity to the total environment and its associated problems.
Knowledge :	To help the individuals and social groups acquire basic understanding of the total environment and the associated problems.
Attitudes :	To help the individuals and social groups acquired a set of values and feelings of concern for the environment and motivation for actively participating in environmental improvement and protection.
Skills :	To help the individuals and social groups acquire the skills for identifying and solving environmental problems.
Evaluation :	To help the individuals and social groups evaluate environmental measures and education programmes in terms of ecological, political, economic, social, aesthetic and education factors.
Participation :	To help the individuals and social groups with in opportunity to be actively involved at all levels in working toward resolution of environmental problems.

TRAN – 2

Key Characteristics of EE

1. **Interdisciplinary and Multidisciplinary** – EE should be a part of every subject taught.
2. **Multilevel** – EE should be taught at all grade levels from kindergarten to grade twelve and beyond.
3. **Global views** – EE involves the development of an integrated environmental ethic.

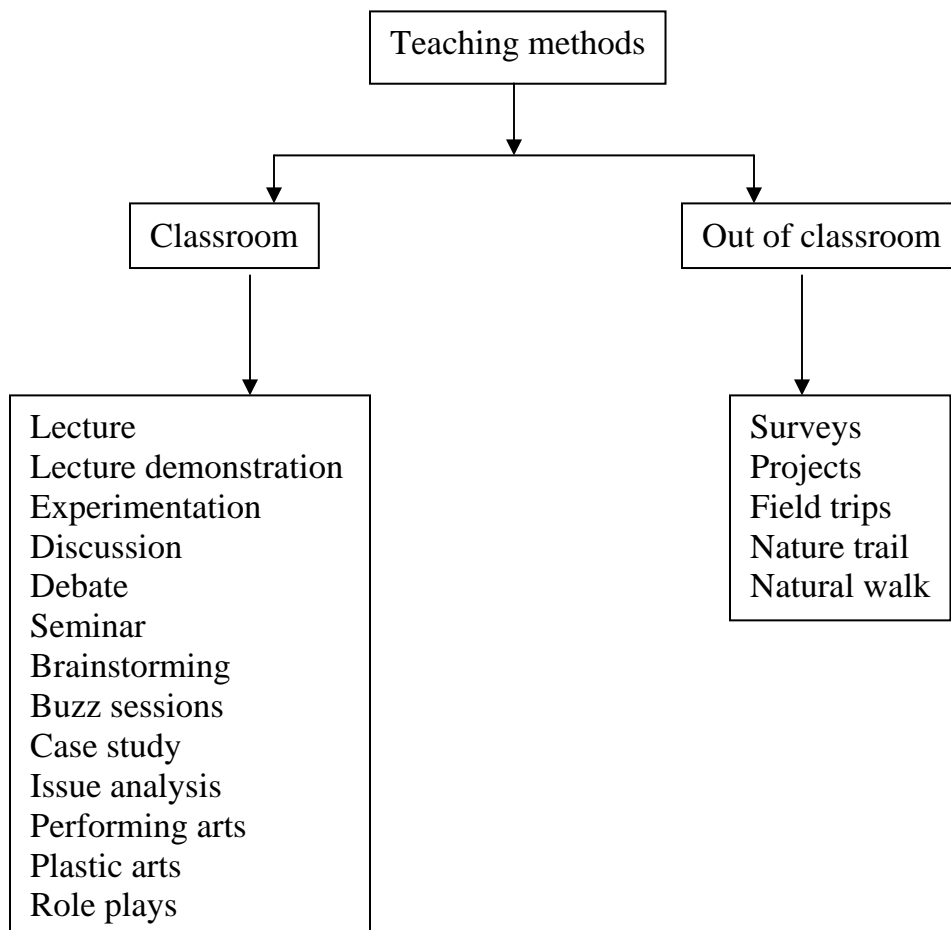
4. **Concepts** – EE entails awareness and understanding of basic ecological & environmental concepts (e.g. limiting factors, carrying capacity).
5. **Process development** – EE involves development of cognitive, affective and skill behaviour processes, especially for the development of attitudes and values which motivate people to become involved in environmental problem solving.
6. **Problem solving** – EE involves helping students develop process of thinking which could be more effective in resolving complex environmental problems.
7. **Values clarifying** – EE involves exploring personal assumptions, values, and feelings toward self and society as well as relationship of these to natural world.
8. **systems thinking** – EE implies that one must learn to think in terms of systems interacting factors that is to think not only rationally about the parts of a complex system but to develop an intuitive feel for the dynamic behaviour of such a system as a whole.
9. **First-hand experiences and activities** – EE teaching requires a commitment to the development and utilization of all situations where learning can be best nurtured through first-hand experiences and activities which foster a deep respect and love for the natural world.
10. **Environmental issue oriented** – EE entails use of locale environmental issues, as well as case studies, role playing, simulations and games which provide opportunities to examine and participate in the complexities of decision making, understanding of personal and alternative values and the actual operation of systems natural and manmade.
11. **Present and future orientation** – EE does not exist in the reactive sense only but continually assesses the present and promotes an ideology which examines desirable images of the future.
12. **Active participation** – EE emphasizes active participation in preventing and solving environmental problems.
13. **Individual learning** – The breadth of EE and variety among students implies that individual learning programmes involving certain degrees of independent study of a diverse number of interdisciplinary environmental problems will be appropriate.

14. **Team approach to teaching / learning** – EE involves teacher participation in environmental problem solving learning situations as team members.
15. **New productive student-teacher relationships** – Personal responsibility and group interaction – EE places an emphasis on problem solving which implies many things including recognition of the values and biases of oneself and others and responsibility for working individually and collectively in a process of informed environmental decision making.
16. **Community oriented** – EE involves the entire community as a learning environment in the achievement of environmental education objectives.
17. **Field studies (urban and natural environments)** – EE includes provision of field experiences – that group of first-hand experiences which are best suited to areas outside the classroom and school.
18. **Communications networking** – EE entails communication skills as a process which can provide more complete and accurate images about environmental problems. It is important to understand how environmental information flows through networks linking the members of a system together.
19. **Coordination and co-operation** – International, national, regional, and local – EE promotes that value of and necessary for local to international co-operation in the solution of environmental problems.
20. **Flexible administrative organizational patterns** – Institutional flexibility is required to cope with evaluation and provide adequate instruction, given the interdisciplinary problem-solving nature of EE.
21. **Reform of educational processes and systems** – EE implies modification of existing educational structures.
22. **Curriculum development base** – EE, because of its programme component and support elements and strategies, implies active involvement in the development of the new curricula.
23. **Curriculum evaluation base** – Evaluation is required for effective program development in EE as to guide selection of adequate EE programmes, examine all processes that lead toward achievement of intended outcomes, and judges its appropriateness for support or adopting.
24. **Research Base** – EE requires more objective evidence of its benefits and effects in order to buttress rhetoric with instances of success and failure.

25. **Teacher education** – EE involves continued improvement in professional development through in-service and pre-service channels to assist in the development of an environmental ethic.

TRAN-3

Classification of Methods



Advantages of Out-of classroom activities:

- Help learning about the environment in the environment.
- Help learners observe and record various elements, process phenomena in the environment.
- Make learning the EE more interesting.
- Make EE participatory by realistic.
- Bring in greater interaction and group dynamics in the teaching.

Potentials of games

A Game is defined as a division in the form of a chance, endurance, or a combination of both pursued according to set rules. They are communication devices which are of great value in the teaching-learning process.

- Games emphasize learning by doing and promote participatory learning. They are usually low cost, have high acceptability, come in a vast variety and are easy to create or adapt.
- Games provide meaningful learning situations of make learning enjoyable and fun. Learning about the principles of the environmental and its complexities is made easy by the use of games.
- Games also provide opportunities to sensitize the students to the problems and issues in the environment and develop appropriate skills and attitudes to take action to mitigate them.

Sketch and details of Friends and Foe- a board game

43 Rod	44 Bomb	45 Grass	46 Cement	47 Soil	48 Cap	49 Earth
42 Grain	41 Forest	40 Ant	39 High building	38 Robot	37 Polythene	36 Fruit
29 Factory	30 River	31 Paper	32 Tiger	33 Vegetable	34 Wool	35 Venice
28 Flower	27 Candle	26 Dust	25 Water	24 Wood	23 Plastic	22 Silver
15 Cotton	16 Smoke	17 Lens	18 Gold	19 Tank	20 Liner	21 Lizard
14 Air	13 Book	12 Desert	11 Sand	10 Sea	9 Glass	8 Tree
1 Sun	2 Butterfly	3 Pen	4 Parrot	5 Stone	6 Wind	7 Rope

This game explains how basic elements such as air, water, soil, energy are required for the existence of life on earth. As a board game, Friends and Foe is played as per the rules of Snakes and Ladders game. For playing this game, the students have to know the different life support systems on Earth and man's impact on the environment. The game can be conceived in different formats – bingo, series, etc. The game helps the participants do:

1. Recognize the elements that support life on Earth.
2. Recognize the man-made elements in nature that pose a threat to life.
3. Create an awareness for the conservation of natural resources.

EE concepts dealt through the game

In nature, the elements such as air, water, soil, space and energy support life on Earth. These are called as the life support systems. Human beings, through their various activities, are destroying and degrading these elements without realizing the consequences of their actions. It is necessary that man becomes aware of these facts and tries to preserve nature for his own good and for other living organisms.

TRAN – 4

Projects and Surveys

Surveys are used to gather information, facts, attitudes, opinions, views. Surveys help in providing not only a basic understanding of the problem or the issue but provide a holistic view of the environment.

Project is a problem solving method often undertaken in a natural or a social environment. It promotes investigatory skills necessary for learning about the environment and its problems.

Surveys and projects help provide scope for the investigation of many aspects of an environmental problem or issue.

Surveys and projects help in the collection of information related to environment which can be analyzed and interpreted to arrive meaningful conclusions. These conclusions are made use of in planning strategies of action leading to the mitigation or solving of environmental problems.

TRAN – 8

Various steps of a survey

- Statement of the problem and objective.
- Determining the various aspects of the survey.
- Identification of sources and tools for the survey.
- Working out the organisational details of the survey – development and duplication of the survey tools – questionnaire, interview schedules, check lists, etc. Identification of the localities, target groups, administering the tools of data collection, instructions for data collection and interpretation, etc.
- Compilation of the data and dissemination of the results of findings.
- Formulation of an action plan – educating the community in resolving the problem.

Project as a teaching method

A project work is one of the techniques for strengthening outdoor education studies.

It is a learning experience involving mental as well as physical activities aimed at researching or solving a problem in a natural environment.

Involvement of community and independent investigation by learners Holistic view of the environmental problem or issue.

A well planned project as a systematic process involves :

- 1. Pre-activity stage,**
- 2. Activity stage, and**
- 3. Post-activity stage**

Differences between a survey and a project.

There are many steps common to a project and a survey, yet there are basic differences which distinguish one from the other. Survey deals with the mere collection of the data and does not involve any experimental investigation where as projects center around experimental investigation.

From a survey a number of smaller projects could be taken up to study the different aspects of a problem.

Details of the steps of a Project

A project includes both field work and desk work. The strategy depends on the objectives to be achieved. As mentioned earlier it involves three stages.

Pre-activity stage

- Stating the problem and its objectives.
- Determining the various aspects of the project.

Activity stage

- Identification of sources and tools for the project.
- Planning and working out the organizational details of the project development and duplication of the tools for data collection, questionnaire, interview

schedules, check-lists, etc., Identification of the localities, target groups, administering the tools, instruction for data collection.

Post – activity stage

- Compilation, analysis and interpretation of the data. Dissemination of the results or findings.
- Formulation of an action plan – educating the community in resolving the problem.

TRAN – 11

Discussion Method

In this method, differing view points are presented by members on issues and problems and the moderator consolidate the salient features of the discussion.

This method helps the students in :

- Developing analytical and communication skills.
- Developing positive attitudes towards environment.
- Value clarification.

Discussion could be more effective when used in combination with order teaching methods.

TRAN – 12

Panel discussion

- It is a variation of the discussion method.
- A panel of experts deliberate on the topic or issue.
- Differing viewpoints and perspectives are expressed on an issue or a problem and are analyzed and discussed.
- Involves question and answer session, where in the panel of experts answers queries or questions raised by the participants.

TRAN – 13

Debate

- It is yet another form of discussion and involves individuals or teams discussing a topic or an issue.
- Arguments in favour and against a topic are expressed.
- Moderator summarizes to focus the significant points.

TRAN – 14

Problem solving method

It is method aimed to help participants arrive at a solution or alternative solutions for a given problem. It is centered around a problem or an issue.

In involves :

- Investigation of the problem to identify the causes and effects, its related concepts and principles.
- Discussing and deliberating various aspects of the problem to arrive at solutions.
- The use of a number of other teaching methods such as field work, project work, surveys and experimentation.

TRAN – 15

Case study method

It is yet another investigatory strategy.

Case studies relate to specific processes, locations or events and information about these are usually obtained from visits, newspaper stories, television programmes, media, research reports, etc. This information is used to identify the actual environmental issues and problems.

The various steps under this method are:

- Identifying and analyzing the case.
- Listing the objectives and the problem.
- Collection, compilation and analysis of information for studying the problem.
- Discussion of findings.
- Deciding the course of action.

TRAN – 16

Issue analysis method

Issues involve debatable problems.

Issue analysis technique is based on the value analysis model developed by Frankell.

It involves:

- Understanding the issue at hand.
- Analyzing the problem involved in the issue,
- Suggesting possible alternatives for mitigating the problem,
- Debating over the alternatives for its merits and demerits,
- Choosing the most appropriate alternative.

TRAN – 17

Buzz sessions

This is a group exercise used as a teaching strategy to influence learning of participants through participation.

This involves :

- Small groups of learners discussing several aspects of an environmental issue for a problem.

- One member of the group, after the discussion, presenting the outcomes to the other groups.
- Main points being noted on the board by the moderator.

TRAN – 18

Brain storming method

This teaching method is employed to elicit uninhibited responses from participants on a topic or an issue.

As a problem solving activity, it involves :

- Stating the problem in unambiguous terms.
- Participants coming out spontaneously with several alternative solutions.
- Weighing each alternative for its merits and de-merits.
- Selecting the best alternative for implementation.

TRAN – 19

Plastic arts

- Activities such as drawing, painting, collage are classified as plastic arts.
- These activities offer wide scope for depicting various aspects of the environment.
- The out comes of such activities could be put together as an exhibition.

TRAN – 20

Performing arts

- Dance, drama, puppetry, street plays are very effective in communicating environmental messages. They, as the name indicates, involve performance or action.
- The messages are retained for a longer duration of time as they appeal more to the affective domain.
- Help in de-mystifying superstitions and beliefs.
- Help in clarifying values.

TRAN – 21

Role-plays

A role-play can be conceived as a structured activity based on actual or real life situations. It can be a potential method for portraying issues that have many dimensions and on which opinions differ.

Role-plays help

- Children to look at environmental problems realistically from different perspectives (as they assume different roles or characters).
- To promote environmental awareness and consciousness.
- Reinforce EE messages.
- Develop and foster creativity.
- The various steps involved in planning and enacting a role play are :
- Discussing the environmental problem or issue with the participants by eliciting the various causes, effects associated with the issue.

- Identifying the various characters involved.
- Selecting participants to assume the various characters identified.
- Developing or providing role description cards / scripts to the selected participants.
- Allowing the participants sufficient time to examine the descriptions and use it to develop dialogues for the play.
- Fixing a time and enacting the role-play.
- Discussing the points emerging from the role-play and helping the participants appreciate the various dimensions of the issue.

Handout – 1

Details of organising a field trip on Diversity seen in the plant kingdom

Objectives of the field trip

By undertaking this field trip, the participants will be able to :

- identify a few of the familiar plants by their names.
- observe and record the differences in their external features.
- broadly classify them and appreciate the diversity seen.
- know the uses of the different plants.

EE concepts which could be taught through the visit:

<h5>EE Concepts</h5> <p>Plants constitute a major part of the environment. Plants are classified into three major categories considering the structure of the stems. They are the herbs, shrubs, and the trees. Besides, there are many unicellular and multi cellular organisms like algae, fungi, lichens etc. Plants are useful to us in many ways.</p>

Keeping in view the objectives of the field trip and the EE concepts to be taught, the various aspects to be observed are :

- Dew seen on the grass and plants in the park.
- Different plants.
- Barks of the trees.
- Growth of plants on barks of trees, undersides of rocks and in tanks and puddles.
- Variety in shapes, sizes and texture of leaves.
- Differences seen in the size and shapes of seeds and fruits.
- Differences seen in the flowers of plants.

With the information provided, describe the preparations to be made for the field trip, the details of the different stages, the different activities that could be organised, the activity sheets to be used for making the observations and recording them.

Role play

Title : Forest fire

Objectives : This role play would help the participants understand the causes of forest

fires and their prevention.

Place : A class room

No. of Characters : 10

Roles : 1) Student 2) Tourist 3) Official from an NGO 4) Two tribals
5) A poacher 6) District Forest Officer 7) District Commissioner/
Chief Conservator Forest 8) PWD Engineer 9) Park
maintenance staff

Materials required : 1. Labels depicting the different roles
2. Role description cards on each of the role identified.

Time needed : 30 minutes

EE concepts

Forests are our wealth. They are the natural resources of a country. A country's progress depends on this resource as they provide fuel, wood, medicines and other raw materials for the society. Forests play a significant role in checking soil erosion, absorbing carbon dioxide and various other pollutants. Forest fires are caused due to many activities to man in the forests and result in loss of vegetation and other natural resources leading to various environmental problems. Preventive measures have to be taken to protect forests by avoiding forest fire.

Role Description Cards

District Commissioner

He is the administrative head of a district. He is responsible for overseeing the development activities as well as for resolving any of the problems seen in the district. He is also the adjudicator for solving any controversies or issues that are seen in the district.

Engineer

He has undertaken a contract to repair the road that runs through the middle of the forest, used by the forest officials to conduct guided tours for the many tourists who visit the national park. His work has been delayed as it took the forest department several days to contain the fire and put it out. The forest fire has damaged the roads that he had already re-laid. He has incurred losses as the raw materials were also burnt to ashes.

Conservator of Forest :

He is the chief of the forest department at the state level. Under his jurisdiction all the activities connected with the development, conservation and protection of the forest are carried out. Knowing the forests well, he is responsible for making arrangements and calling necessary help for putting out the forest fires .

Student

The student is studying in the third year of college and has come to the forest for collection of plant specimens as part of his course work. He is unable to collect the required number of specimens as the forest fire has destroyed the vegetation. He has also witnessed the destruction of the resources of the forest due to the forest fire.

Tourist

A tourist had planned to spend his holidays with his family in the forest by visiting the national park situated in the core of the forest. His plans have been foiled as the national park has been temporarily closed due to the destruction caused by the forest fire to the flora and the fauna in the forest. He has been a regular visitor to national sanctuaries and parks and he knows the rules to be observed in the park.

Poacher

The poacher is worried about the dwindling resources as this limits his opportunities for getting good quality game. He also has not been able to hunt for a great length of time as the forest fires has damaged the roads and has cut off his access to the forest.

Forest Guard

He is overworked and needs more people and resources for protection of the forest. He has to patrol the forests at all times of the day and night and is given very little time off. He is also not very alert as he has not had enough sleep at times when he is on duty. He is quite aware of the activities of the tourists that cause harm to the forests.

Tribal 1

This tribal lives in the core of the forest, has observed the negligent actions of the tourist/s and has tried several times to stop the fire from spreading. He mentions about the usefulness of the forest, and the total dependence of his tribe on forest resources. Because of the forest fire the resources are destroyed and this puts a lot of pressure on the survival of his tribe.

Tribal 2 :

This tribal group lives in the periphery of the forest and is disturbed by the increased incidences of forest fires. He is less dependent on the forests for his needs than his counterparts who live inside the forest. This is due to his greater

access to the neighboring villages and towns. He complains about the reduction in labour opportunities for him inside the forest due to frequent forest fires.

Non-governmental Organisation Official (NGO)

The N.G.O. has been actively campaigning for recruitment of more staff to patrol the forests as it was found very difficult to maintain the forests with only 5-10 forest guards. The official is demanding for high level probe into the causes of fire, particularly about the nexus that is being observed between the poachers / smugglers and forest officials.

Handout – 3

Role Play

Title : Animal Court

Objective : To help the participants understand that a variety of plants and animals constitute the forest ecosystem and there is a inter-relationship between the different plants and animals. If one of them is affected, it has a resultant impact on the entire ecosystem.

Place : A park or a play ground

No. of characters : 10

Roles : 1) Man 2) Panther 3) A troop of Monkeys (2-3 spanning a generation) 4) Snake 5) Elephant 6). Neem Tree 7). Birds in the trees 8). Lion 9). Other trees in the forest.

Materials required :

1. Labels depicting the different roles.
2. Role description cards on each of the role played.

Time required : 30 minutes

EE Concepts

Forests may look alike, but each one has its own unique combination of plants and animals. Each of these has an important role to play within that forest ecosystem. If anything adverse happens to a particular type/s (species) of plants or animals, other get affected directly or indirectly disturbing the natural ecosystem.

The setting for this role-play is essentially a court scene where the residents of the forest are trying to decide if the actions of the panther in killing the goats and consuming them as food is justified or not. The different residents either support the actions of the panther or decry it depending upon their relationship with it. The role description cards should bring out the following characteristics about the residents of the forests.

Role description cards

Man

An agitated human being enters the forest carrying a large stick looking for the panther that has killed two of the goats after entering the village. The human being wants to kill the panther.

Troop of monkeys

These are long tailed langurs sitting on the branches of a tree and feeding on the leaves and the fruits. The human being requests the monkeys to him in locating the panther. The monkeys agree to help the human being as they consider the panther to be their enemy.

Neem tree

The other trees in the forest appeal to the wise old tree and the tree speaks on behalf of them as regards their role in the forest ecosystem and also the balance that exists in the forest highlighting the roles of the panther, monkeys and other organisms in the forest.

Snake

The snake supports the panther, as it feeds on the pea fowl which is the predator for the snake.

Panther

It is the accused, and it fights for its rights and opines that it is not at fault as it has killed the goats to satisfy its hunger.

Elephant

Elephant in the role of the arbiter, speaks about the contributions of the different residents of maintaining balance in the forest. The elephant is able to dispassionately talk about the pros and the cons of the actions of the panther.

Activity sheet – 1

Activities as part of the field trip- the different aspects to be observed and recorded.

Soil : Scoop out a measure of the soil and examine the following aspects.

1. colour of the soil.
2. texture of the soil (is it soft, lumpy, whether it contains any pebbles).
3. porosity of the soil. Take a small and thin plastic bag. Fill it half with the soil. Pour about half a tumbler of water slowly. Observe how the water seeps through and record your observation.

4. check the humus content by examining the constituents of the soil. Spread the soil on a piece of paper and observe with a hand lens to see if there are many worms, dead and decaying plant and animal matter.

Record your observations in the format provided below :

Colour	Texture	Organisms seen	Porosity	Humus content

Water : Collect at least 15 ml (2 table spoons) of the water in a glass bottle, observe and record the following aspects :

1. colour
2. taste & smell
3. temperature
4. pH of the water to test whether it is acidic / basic / neutral
5. minute organisms and any suspended matter in the water.

Record your responses in the format provided.

Colour	Taste	Odour	Temperature	pH	Suspended Materials	Organisms

Plant and animal life : Take a walk along the park or the ground. Observe the following and record your observations.

1. different plants and animals seen on the river banks.
2. plants/crops that are grown along the river banks.
3. pebbles and stones (shape/size, edges, etc.)
4. any growth of plants/animals on the undersides of the stones.
5. different activities of man on the banks of the river.
6. litter / garbage thrown along the river bank any froth, etc.
7. plumage of the birds, their feeding habits, nests, droppings, etc.

Record your responses in the format provided.

Plants/ Crops	Animals	Pebbles	Growth On the Rocks	Litter Seen	Human Activities	Birds

Activity sheet – 2

Game: Food chain

Food chain in simpler terms is the interaction between producers and consumers. It is the transfer of energy from the green plants through a series of living organisms.

As a field oriented game, it enables the participants to :

- Recognize that food is important for the survival of mankind.
- Identify the different food habits seen in animals.
- Gain knowledge about the food chain.
- Realize that sometimes the predator also becomes the prey and visa-versa.

EE concepts dealt through the game

Animals exhibit different food habits. The herbivores feed on plant and plant products, while the carnivores feed on other animals. All animals depend on plants for their food. Certain conditions like lack of food, air, water and other life supporting elements leads to the extinction of animals, as their scarcity affects organisms at all levels in a food chain.

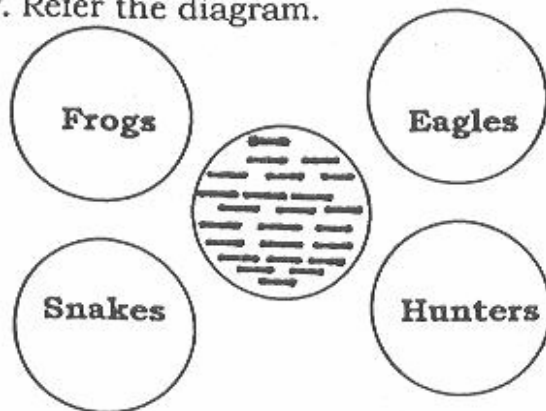
- Place :** An area measuring 12×18 meters.
Group size : 20 or more.
Materials needed – 2 boxes of matches, name tags or arm bands of 4 different colours to represent frogs, snakes, eagles and hunters.
Strings to tie the name tags.
Time needed : 30 minutes

Background knowledge

The game can be played effectively if the participants have a knowledge of the food habits of herbivores and carnivores. Smaller and less stronger animals become the prey for bigger and stronger animals.

Organizing the game

- Step. 1 Make four groups with the number of participants in the following ratio : **13 : 4 : 2 : 1** of frogs, snakes, eagles and hunters.
- Step. 2 Distribute the different name tags or hand bands to the groups representing frogs, snakes, eagles and hunters respectively.
- Step.3 Let the participants arrange themselves in four groups each representing a set of animals, leaving the circle in the center empty. Refer the diagram.



- Step. 4 Place the matchsticks that represent the food for the frogs in the circle in the center.
- Step. 5 Inform the groups about the rules to be observed and the methodology of playing the game, that is, names of the animals will be called, the group of animals have to pick up the match sticks or go to the circle that contains their food. For example, at the first call FROGS, the frogs must quickly go and gather as many match sticks as possible. This action represents their feeding. The second call would announce SNAKES, who would move to the circle of frogs to feed themselves. While the snakes are feeding on the frogs, the eagles will also be released simultaneously on to the area, where they would need to hunt for their prey. At the end, the hunters will be called upon to catch the eagles.
Frogs which have been collected less than 10 sticks and also those that have not collected any sticks are removed from the game. Snakes who have not caught the frogs are eliminated. So also Eagles and Hunters who could not catch their prey are eliminated.
- Step. 6 Call out frogs, snakes, eagles and hunters at intervals of 10, 6, 4 and 2 seconds. The order in which the calls are made could be changed depending upon the demand – supply system as seen in the game and the response of the participants playing the game. The calls would have to be made in quick succession.

After playing the game with the same players at least 4 to 5 times, ask the participants to record the number of surviving frogs, snakes, eagles and hunters. Using this data, discuss how the interdependence seen in nature keeps the numbers of the animals constant, contributing to maintaining the innate balance in nature.

At the end of the game, get the group of discuss the following questions

- What is the food of grogs apart from worms ?
- What is the food of snakes apart from frogs ?
- Discuss the different food chains seen in nature.
- Snakes are killed when they are sighted. Why ? Do you support this action ?
- Represent the food chain as observed in this game diagrammatically ?

Methods of Teaching EE – Discussion, problem – solving, case study, issue analysis, buzz session and brain storming.

In addition to the methods of EE discussed in this module, there are many more methods which could be successfully employed in imparting Environmental Education. An overview of some of the methods has been provided in what follows .

Discussion method

Discussion, as a method, provides opportunities for students in developing analytical and communication skills. A well planned and organized discussion on an environmental topic can lead to creating positive attitude towards the environment and help in value clarification. Discussions could prove effective when used in combination (either at the beginning or at the completion of the activity) with other methods like lecture, demonstration, exhibition, projects/surveys/field trips, etc.

During a well planned discussion, different viewpoints are presented by members on an issue / topic, and the moderator or the anchor person consolidates the salient features that emerge from the discussion.

In a panel discussion, usually a panel (team) of experts deliberate on a topic / issue. The differing perspectives and viewpoints expressed by the panel are discussed and analyzed by the group. It is also a question answer session, where in the panel of experts clarifies the queries or questions raised by the participants.

Debate is yet another form of discussion and involves individuals or teams discussing on a topic or an issue. In a debate, generally, arguments are presented in favour and against the topic. At the end, the moderator summarizes to focus the significant points.

A few topics for discussion could be

- Hazards of building a power plant in the vicinity of a town/city – Discussion
- Tourism v/s protection of environment – Debate
- Towards urbanization – need for a comprehensive plan – Panel discussion.

Problem Solving method

As the title indicates, it is a method aimed to help the participants arrive at a solution or alternative solutions for a given problem. It is a teaching learning approach which centers around an environmental issue or a problem and generally involves investigation. A problem is identified along with generally involves investigation. A problem is identified along with underlying concepts and the

principles. The various aspects / dimensions of the problem are discussed and deliberated to arrive at the alternative solutions. After arriving at the alternative solutions, the participants choose the most appropriate one which can help solve the problem. The entire process of problem solving can involve a number of other teaching techniques such as field work, project work surveys, experimentation, discussion, etc.

A few topics for problem – solving method

- Pollution of air caused by industries processing chemicals.
- Use of alternative sources of energy for domestic use.
- Safe disposal of solid waste.

Case study method.

The case study is another investigatory strategy which can be used to teach concepts in Environment Education. Case studies relate to specific locations or events. Details about such events may be obtained from newspaper stories / television programmes/ magazine reports and other media events. Such reports provide opportunities for identification of the environmental issues and problems involved in a situation. It may lead to a situation for alteration of beliefs or changes in opinions.

More specifically, the steps under this method are a) identifying a case, b) listing the objective/s for the same, c) collection of data and analysis and d) discussion of the findings. The next step is the compilation of the data from the different groups, arriving at generalizations and deciding the possible course of action.

A few topics for a Case study

- Environmental degradation in Mangalore city.
- Devastation caused by floods in several parts of the country.
- Problems of degraded soil due to excessive use of fertilizers, insecticides and pesticides.

Issue analysis method

Issues involves debatable problems. For example, the proposal to start a nuclear power plant in Kaiga, North Kanara district is an issue by itself. This includes many environment related problems such as reduction in forest cover, destruction of the natural habitat of many species, displacement of the people living in an around those areas, spread of diseases, etc., all because of the nuclear power project.

An issue analysis technique is based on the value analysis model developed by Frankell. It involves understanding the issue on hand analyzing the problems involved in the issue, suggesting possible alternatives for mitigating or containing

the problems debating over each of the alternative for its merits and de-merits, choosing the appropriate alternative.

A few examples for issue analysis are :

- The erection of Tehri Dam on the river Bhagirathi in the Garhwal region.
- The raising of the Almatti dam height on Krishna river in Karnataka.
- Rehabilitation of the people displace due to Narmada Dam project in Gujarat.

Buzz sessions

This is a group exercise used as a teaching strategy to influence learning through participation. Small groups of learners discuss among themselves several aspects of an environmental issue or a problem. The problem or the issue selected could be divided into several aspects and put on the chits which are picked up by the participants for discussion in small groups. After the discussion, one member of each group would present the outcomes of the discussion to the other groups. The main points are noted on the board and consolidated by the moderator.

A few examples for buzz session are :

- How to conserve natural resources ?
- Economic prosperity is responsible for environmental degradation in the developing countries.

Brain storming method

This teaching method is employed to elicit un-inhibited responses from the participatns on a topic/issue. Such sessions involve participants coming out spontaneously with several alternatives and at the end each alternative is weighed for its merits and advantageous in terms of cost and time, and the best alternative is selected for implementation.

A few examples for brain storming are :

- Control of vehicular pollution.
- Minimizing poaching in a sanctuary.
- Optimal re-use and re-cyling of the household solid waste.

Through plastic arts : Activities such as drawing, painting, collage etc., are called as plastic arts. There is a wide scope for depicting various aspects of environment through these media. The outcomes of such activities can be put together as an exhibition.

Through Performing arts : Performing arts like dance, drama, puppetry, street plays can be very effective in communicating environmental messages. As they appeal more to the affective domain, the messages are retained for a long time.

