# Innovative Teaching Methods in Science

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*The basic aim of teaching any subject is to bring about desired change in behavior. The change in behavior of child will be indicated through children's capacity to learn effectively. This is only possible by adopting various methods of teaching. Innovative ideas of teaching science are: Hands on Learning, Role Play, Instructional Conversations, Graphic Organizers, Virtual science labs, Thinking Maps, Argue with Science, Computational thinking, Science museums, Multimedia Approach, Video clips, Power Point Presentation, Science Fair, Peer-to-Peer Teaching, Science Exhibition, Field trips, Science clubs, Interactive science journals, Flipped Classroom, Guided Discovery Problems and Science Quiz. We are living in a scientific world and the advanced teaching strategies are helping students to discover and explore science every day. Teachers looking for advanced techniques to help students to experience the beauty of science.*

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## Introduction

The basic aim of teaching any subject is to bring about a desired change in behavior. The change in behavior of child will be indicated through children's capacity to learn effectively. This is only possible by adopting various methods of teaching. The teacher cannot utilize any method to any type of students in any type of environment. He / She have to choose and adopt the right method of teaching keeping in mind the capability of the students and the curriculum. The Student engagement and understanding of materials is given more emphasis in today's education over spoon feeding the facts. Therefore, using black-boards or the typical lecture methods are not adequate to teach science and other related subjects. Many scholars and researchers have proposed advanced ideas and they claim that virtual teaching scenarios or simulations can help to build better understanding of subjects among students. More than just conveying the facts or findings in science, students will love to explore the world of science. These innovative teaching methods in science can substitute the typical teaching techniques to achieve the goal.

Hands on Learning

This is the best teaching method invented so far that involves the active participation of students to experience scientific concepts than to just have an audience view. Schools are promoting the use of low cost apparatus in classrooms to helps students to have hands on learning experience.

Role Play

This innovative method is becoming an integral part of science education as students can intellectually and physically involve through activities while learning a new concept. Activities can be organized in classroom sessions where a group of students can take the role of atoms or molecules to study a chemical reaction or they can represent a scientist group to demonstrate the particular scientist's laws.

Instructional Conversations

Building instructional conversations is a key method to teach science vocabulary. Let them talk in between the lectures about the experience they had with an application related to the topic of discussion. This promotes their dialogue construction in science as they communicate using scientific and technical terms.

Graphic Organizers

This teaching approach is helpful for students to interact with science in a more organized and structured way. Teachers can use different types of templates to represent the data according to the topic that is being handled. A typical format for graphic organizer contains a central point from which different branches are formed and there may be sub-branches in certain cases. Arrows are used to point the direction or sequence of a process.

Virtual science labs

There are many virtual science labs available online for free and therefore, this approach almost gives hands on experience of learning the subject without much expense. Detailed diagrams, illustrations or close up pictures allow students to virtually get inside a plant or animal part without actually doing it.

Thinking Maps

This is an ideal way to visually represent different thought processes which help to organize the science education with a better flow. There are different types of thinking maps available which can be chosen wisely to represent the particular topic. This includes bridge maps to teach relation between ideas, brace maps to break larger objects into smaller parts, flow maps to show sequence of events, multi-flow maps to show effects or causes of an event, tree maps to classify objects or ideas and more.

Argue with Science

Learning through argumentation gives students a widened thinking to contrasting ideas which in turn deepen their understanding. They can refine ideas with others and engage with open-ended questions, and re-state observations or remarks in a more scientific language. Teachers can also guide them in their approach and share the intellectual expertise with them.

Computational thinking

This is an advanced technique to improve thinking and problem solving skills. The method comprises decomposition i.e. breaking large problems into small units and pattern recognition-related problems to the ones which were already solved successfully in the past. Computational thinking skills also cover algorithms-step by step approach to reach a solution; abstraction-neglecting unimportant details and debugging-refining these steps.

Science museums

Give opportunity to students to visit a science museum as part of the learning process. This gives them access to innovative resources and they can visualize data they learnt in class. They can have a look at the real work of scientists which improves their urge to learn about it further. Regular visits to museums make learning science more engaging and interesting.

Multimedia Approach

This method is a blend of text, audio, animation, video, still images or interactivity content forms to teach diverse difficult to understand concepts in science. The educator can convey vast information using advanced media, devices and techniques, and involve a wide range of activities to provide a meaningful learning experience.

Video clips

This teaching technique makes use of instructional video clips available online or in libraries to show and teach a new concept. The animation of a process or evolution can be conveyed better with videos. It can also be videos of demonstration of an idea or an application side of a theory or an interview with a scientist, tutorial by a subject expert and more.

Power Point Presentation

Instead of the conventional talk and chalk methods, teachers now include power point presentations in their classroom sessions to make it more interesting. They connect the computers to projectors to address a larger classroom and include interesting slides with diagrams and flow charts to make the teaching more interactive**.**

Science Fair

Schools should conduct science fairs as part of their teaching strategy to promote students interest in the subject as well as to evaluate their level of students are given a time frame to

answer a question or perform a task through a range of experiments and research. They showcase the output in the form of reports, display board, or as models.

Peer-to-Peer Teaching

Students take the role of teaching each other that promotes excitement learning science. In Peer-to-peer teaching approach, they are really engaged in the content by discussing scientific topics, generating questions and working in teams to explore new information. Some of the activities involved in this approach include buzz groups, solution groups and critic groups.

Science Exhibition

Encourage your students to take part in science exhibitions as part of school level or inter-school level competitions. This is a great opportunity to bring out their creativity in science and design an application based on a scientific concept.

Field trips

In the middle of boring classroom sessions, take your students out for field trips to experience science while learning. Go to an aquarium, a nature center, a scientist's home or visit a pet store. You can also spend some time with the students in the bird park or simply go on a nature walk to experience the science around while learning new concepts.

Science Clubs

Set up science clubs in your schools or community, which is an ideal approach to STEM education that assimilates high quality hands-on instruction. This is the right place for science enthusiasts to share and discuss new happenings in science world and to connect innovative ideas to what they actually learnt.

Interactive science journals

This is an advanced version of lecture notes in which students express the information they learnt into different templates and elicit their own responses. Students can use this technique effectively to have a deeper connection to their learning and this activity promotes their higher level thinking. They can be creative with their notebooks using pictures, charts and comments, thus, building an encompassing resource for future reference.

Flipped Classroom

In this innovative teaching technique, students are asked to go through video instructions or tutorials in the initial stage, i.e. digital learning. The second stage will be in classrooms where they involve in challenging tasks and assignments based on the information gathered through video assets. This flipped learning frees up class time for activities such as hands-on labs, guided practice or online simulations.

## Guided Discovery Problems

Understanding science is more than just knowing some facts and the guided discovery problems method makes it possible. This technique can be integrated into lecture, lab and field courses. It refers to understanding science step-by-step through the discovery process and involves collection and processing of data, debugging and explaining it through intriguing puzzles, structured hands-on activities and right presentation of information. The conceptually difficult or counter-intuitive topics are better handled with this approach.

## Science Quiz

Include quiz as a part of your classroom sessions when teaching science. This can be done as a whole class activity by splitting the group into 4 or more sets. The questions can include the application of the theory taught in class. Students can discuss and share ideas to find the solution within the stipulated time frame. This teaching approach helps students to think from different angles and sometimes, to think out of the box.

## Conclusion

We are living in a scientific world and the advanced teaching strategies are helping students to discover and explore science every day. Teachers looking for advanced techniques can also try for group discussion, case studies, laboratory experiments, seminar, outdoor teaching, creative illustrations, crafts, dramatization, and interactive lecture demonstrations to help students to experience the beauty of science.

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