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## EXPLORING TEACHVISION'S POTENTIAL IN PHYSICS: INNOVATIONS FOR A BRIGHTER FUTURE

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### ABSTRACT

The article discusses the method of teaching Physics in theory and practical, the criteria and role of innovative teaching methods in revealing the meaning of physical phenomena in physics. Most of the Physics classes are delivered through traditional teaching methods. More specifically, in the traditional lecture method, the information was transmitted unilaterally from the teacher to the student and hence the students are only passive participants. The problem is solved by introducing modern teaching methods. The new teaching method which we called the modern teaching method is more activity-based and centres the learner's mind which involves them entirely into the process of learning. In the modern teaching method, curriculum teaching and planning are done keeping the learner as the primary target. This is all done by engaging in activities and by adopting innovative modern teaching techniques. Engaged pedagogy, as a novel interactive teaching method and as well as a vector of success in teaching and learning Physics, is discussed in this paper. Additionally, the impact of technology on the proposed teaching pathway is presented.

**Keywords: Pedagogical technology, educational process, educational system, teaching elements, interactive method, teacher and student.**

The word Physics is derived from Greek word physics which means knowledge of nature. It is a natural science that studies matter, its motion and behaviour through space and time, and the related entities of energy and force. Physics is one of the most fundamental scientific disciplines. It is essentially applied mathematics. It deals with fundamentals such as tiny atoms to complex such as stars and planets. It accounts energy, force, sound, matter, light, motion etc. to interpret the nature and relationship between them. The ultimate goal is to understand the universe around us. Physics is ever changing, updated, improved over the years. The knowledge of Physics forms the basis for technological advancement of any nation. The future of any country and its contribution to the global economy is linked to its ability to develop its human capital in the field of science and engineering. Physics describes how the natural world works through applied mathematical formulas. It deals with the fundamental forces of the universe and how they interact with matter looking at everything from galaxies and planets to atoms and quarks and everything in between.

Thus Physics needs to be taught very well in order to enable students develop interest in the subject and thus improve achievement. It is obvious that teaching is very challenging but it is the responsibility of the teacher to make sure that learning has taken place.

Teaching methods is classified into traditional and innovative methods. The Traditional methods focuses that teacher is the only source of information in the class room. Traditional methods include: lecture method, discussion, and demonstration, questioning and project methods. The most commonly used and the oldest in traditional method is the lecture method. It is a complete verbal presentation of the subject matter. The major advantage of the lecture method is that it would be used to cover a large content area within a very short period and does not require the use of the laboratory. However, it is regarded as one-way mode of communication. Learners are always passive and so not suitable for gaining practical skills as required in practically oriented courses like Physics and leads to poor academic achievement. Effective teaching is measured by the expected outcome that follows instruction. For effective teaching/learning in the classroom there must be a good teacher-students interaction, to promote innovative teaching (1).



Today, interactive methods, which are an element of advanced innovative technology, are widely used. The interactive method helps to increase the effectiveness of the lesson through teacher-student collaboration, encourages the student to think independently. Each student tries to find the answer individually, in pairs, in groups, independently, actively participates in the set goal, thinks, writes, remembers formulas, speaks, try to cover the problem with evidence and bases appropriate to their experiments in physics. This will be remembered for a long time by the participants.

The correct introduction of innovative technologies in the process of teaching physics leads the physics teacher to act as the main organizer or consultant in this process. This requires more independence, creativity, and willpower in the student's acquisition of physical concepts. The application of any innovative technology in the process of teaching physical knowledge in different sections of a physics course depends on the individual character, to whom the physics teacher teaches physics and who teaches the student science. The use of innovative technologies in physics class will satisfy the desire of young people to express their attitudes to important life achievements and problems, give them the opportunity to think, to justify their views. Often, physics can be challenging for students to learn. It is difficult for teachers to capture students' attention using traditional physics teaching methods. Therefore, teachers may adopt advanced creative methods to teach physics to their students. Some effective ways to make physics topics more interesting and easier to understand are as follows:

### **1. Learn through Storylines**

Telling stories about the topic makes the connection between people and ideas. It can also help build trust between teachers and students. Students pay more attention and show more interest in stories. So, stories can make topics easier for students to understand.

### **2. Encourage your Students to Practice Simple Formulas**

Teachers should discuss the basic formulas with their students. For instance, the average speed formula is  $S = d/t$ . This formula is used to calculate the average speed of a moving object for the distance covered and time duration. When you teach the average speed formula, you can explain to them basic information about the formula. The speed ( $S$ ) and distance ( $d$ ) are the scalar quantities that give magnitude but do not tell the direction.

### **3. Perform Interesting Experiments to Explain How Physics Works**

If you want to make your physics lecture more exciting for students, you should teach your students several examples related to the topic. For example, you can use the flashlight to explain the principle of how light travels. You can throw the pen upward, which can come back due to gravity. It can help to explain the gravitational force. Students will remember these little activities or experiments performed in the class. They can also understand the topic with the help of these experiments.

### **4. Relate Physics to Everyday Life**

Several interesting events take place in our everyday life. Physics plays an essential part in the occurrence of these events around us. For instance, steam iron, ballpoint pen, car seat belt, or headphones. With advanced technology, physics is used in every important application that we use in our everyday life. So, students may find the topic more interesting to understand if teachers provide examples related to the real world. To understand electrical resistance, application of Ohm's law helps students to understand resistance, resistivity.

### **5. Encourage your Students to Ask Questions**

While teaching physics, asking questions is a great way to ensure that students can understand the topic. You, as a teacher, can allow your students to ask questions relevant to the topic. It can be helpful to know whether your students understand the topic or not. It can also help to clear any kind of misunderstanding related to the concept. Asking questions can reduce the chances of misunderstanding and enhance the student's attention to the topic.



## 6. Use Interactive Visuals

Interactive simulations that run through a regular Web browser can be highly effective. Using an existing simulation also often takes less preparation time than more traditional materials. Interactive visuals can bring otherwise complex concepts to life, when visualizing it. One way to use these visuals is through bite-size 3D animation videos. The possibility to access information through clicking, sliding, or zooming-in might provide a more direct and personally meaningful experience of abstract phenomena and thus facilitate comprehension and learning.

## 7. Host a virtual field trip

Virtual field trips are effective in enhancing learning and can also keep students more engaged. On a field trip, teachers can take the students to the museum or park, which helps them to understand the topic better. Teachers can't take their students on field trips regularly. So, a virtual field trip can help to explain the physics topics to the students appropriately.

Innovative method of teaching is the process of introducing new teaching policy and methods into the classroom. Innovative method of teaching includes: peer tutoring, problem-based learning, discover/inquiry, etc.

### **Peer tutoring**

Peer tutoring is the plan of linking high achieving students with low achieving students. The underlying theory is peer interaction which can have a powerful influence on academic motivation and achievement (2). Peer tutoring also is an organized learning experience in which one student serves as the teacher or tutor, and one is the learner or tutee. Student could work independently and gives an opportunity to use their knowledge in a meaningful, social experience (3).

### **Inquiry-based learning**

Inquiry-based learning is a method of teaching that encourages student to ask questions and investigate real world problems. Problem-based learning (PBL) is a free form of approach and problem solving approach to Inquiry-based learning. The PBL process does not focus on problem solving with a defined solution, but it allows for the development of other desirable skills and attributes. This includes knowledge gaining, enhanced group collaboration and communication. It encourages self-directed learning by meeting students with problems and stimulates the development of deep learning (4).

### **Discovery Learning**

Discovery Learning is a technique of investigation-based learning and is considered a knowledge construction-based approach to education (5). Discovery learning takes place in problem solving situations where the learner draws on his own experience and prior knowledge and is a method of instruction through which students interact with their environment by exploring and manipulating objects, struggling with questions and controversies, or performing experiments. Students in the experimental group, who recorded high performance, were taught with the use of more activity-oriented teaching methods.

### **Cooperative learning**

Cooperative learning is a Think – Pair - Share educational approach. In cooperative learning, the teacher get involved to guide the students and assign them a specific role. Students must work in groups to complete tasks collectively toward academic goals. Unlike individual learning, which can be competitive in nature, students learning cooperatively can benefit from one another's resources and skills. The successful cooperative learning tasks are intellectually demanding, creative, open-ended, and involve higher order thinking tasks (6). These learning techniques are practically oriented (7), and helps to minimize process of memorizing of scientific concepts and principles based on repetition, encourage knowledge and skill acquisitions. It encourages team work and shared decision making and active participation of learners and enhances learner's attainment of science process skills (8).



Students taught with cooperative teaching method perform significantly better than those taught with peer tutoring, problem-based, discovery methods. This shows a positive impact of cooperative method in the teaching of Physics over the three methods. This finding is in agreement with Ibitoye (2011) and Eze (2003) when they stated that cooperative method being an innovational approach has greater impact on student's academic achievement in Physical Science subjects (9).

## **Modern Teaching Methods**

Over the period, the importance of Advantages of modern teaching methods and education equipped with high technology is felt and hence started incorporating the new techniques into education. New methods and new technology-based gadgets have been introduced in classrooms. New gadgets such as computers or Laptops with Wi-Fi connection, LCD Projector and Interactive white boards. Whiteboards allow both teachers and students to write or draw on it by providing touch control of the computer. It is an interactive and exciting medium to use. Not only teachers but also students can explain anything on white boards.

## **Advantages of Modern Teaching Methods**

Advantages of Modern teaching methods. However, these advantages are the disadvantages of traditional teaching methods.

- Unlike traditional teaching methods, modern teaching methods are more interactive and keep students intact. It maintains the interest of students by animations and videos.
- The visual medium is way better than any other medium to give instructions. It helps to memorize the concept fast and for a more extended period than reading.
- Modern teaching methods are less time-consuming. Teachers take less time to cover the syllabus. Writing on the blackboard is not required.
- Blackboard explanation of content is less explanatory than a representation of videos and animations used in the modern teaching techniques.

## **Conclusion**

Teaching physics involves more than writing formulas on a chalkboard. It involves helping students to see the world in a new way. Teaching and learning introductory physics are both challenging tasks. After a detailed study of different teaching methods, modern teaching methods in this time are necessary as it opposes the idea of traditional forms of repetition and memorization of the syllabus to educate students. To develop decision-making skills, problem-solving skills, and critical thinking ability, modern teaching techniques are best suited. The new ways of teaching make students more productive and encourage them to collaborate. Both methods are effective but which will be done during this time is the question, and clearly, the importance of modern teaching techniques should be aggressively adopted with the intention to promote student's performance. Additionally, the paper highlighted the importance of technology as a platform to support Active learning.

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