

ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN PHYSICS LEARNING

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Abstract: ICT has become one of the fundamental building blocks of modern society. Many countries now regard the mastering of the basic skills and concepts of ICT as an inevitable part of the core of education. Now, various new models of education are evolving in response to the new opportunities that are becoming available by integrating ICT and Web-based technologies into the teaching and learning environment. Educational software can be used to teach difficult concepts or observe difficult skills in Physics. Learning of Physics always pose a big challenge to students, but when the concept is made clear to the student, the subject tends to become easy. Physics teachers and learners need to know exactly how ICT is used as a teaching and learning tool, for their own purposes and to help students to use them. This paper is about the role of ICT as a tool in the physics classroom for increasing the effectiveness of teaching and improving students learning.

INTRODUCTION

Information and communication technology (ICT) is defined by UNESCO as forms of technology used for creating, displaying, storing, manipulating, and exchanging information. ICTs, in general, consist of computers, hardware and software, networks, learning management systems, e-mail, internet, telephone, television, radio and so forth.

In the 1990s and 2000s, schools and universities started to use printed material, television, radio, overhead projectors and movies in teaching. Since personal computers and the internet began being more widely used in the late 1990s and early 2000s, the use of ICTs in education has grown rapidly.

Physics always pose a big challenge to students. The concepts, equations, problems and derivations are always hard to master. But when the concept is made clear to the student, the subject tends to become easy. That is where the role of ICT's come.

APPLICATIONS OF ICT IN PHYSICS LEARNING

Physics education comprises of numerical techniques, analytical geometry, trigonometry and calculus, mechanics and properties of matter, others are electromagnetism, basic and digital electronics, Physics methodology, heat, optics, modern and quantum Physics. ICT'S can be put to different types of use in teaching Physics which include, simulations, computer data acquisition, animations, presentations, games and many more.

Educational software can be used to teach difficult concepts or observe difficult skills in Physics. For example teaching of electric motor in Physics can be done with the aid of Encarta educational software. The rotation of the coil in the magnetic field will be best appreciated by student when seeing it demonstrated through this software. Most Physics -teachers could not explain the mechanism of either electric motor or generator to student properly because of its complexity. But when it is demonstrated in a computer through software, the problem of complexity will be over and student learning is enhanced.

Animations can be best used for the demonstration of physics concepts. When explaining about waves and electromagnetic transmission, it will be difficult for the students to grasp the correct concept. But when they are visualised through animations, students can understand the right meaning of the concepts. The animations always provide a better understanding. As Walt Disney said, "Animation can explain whatever the mind of man can conceive. This facility makes it the most versatile and explicit means of communication yet devised for quick mass appreciation."

Many physics experiments are very difficult to carry out in the laboratory due to its nature. The radioactive decay, nuclear fusion, fission can never be demonstrated in live conditions. That's where the simulations pop in. There are software's available for the best demonstration of these experiments. The "Universal Sandbox" can mimic the trajectories of planets, stars, satellites and even the whole galaxy. It can be used to explain the gravitational interactions. The Electronics experiments in the labs can be a bit costly since even a small short circuit can destroy the whole components. Software like "Circuit Design" and "Circuits For You" can help the students to construct the circuit and make it work in a virtual environment. It even explains the flaws of the circuit made and suggests corrections. There are phenomena that looks abstract to students like optical phenomena, magnetic and mechanic phenomena; some of them are too fast for the student to comprehend, computer simulation will slow down the speed while students will be able to study them and learn. Movement of air molecules, its interactions and collision cannot be well taught except through computer simulation and video.

Plotting of graphs for complex functions are always a nightmare for the students. Software like MATLAB can help the students in this case. MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. MATLAB is a well suited tool for modelling the physical world and using it can be beneficial to students studying physics and engineering. MATLAB can be used as a teaching and learning tool enabling students to gain a deeper understanding of physical principles. On the web, there are many excellent simulations which include animations but the physics behind these simulations is kept secret. But using MATLAB one can study the m-scripts to learn more about physics and using MATLAB. Writing your own simulation is much better than running an apple.

BENEFITS OF ICT IN PHYSICS LEARNING

There are numerous benefits both physics students and teacher can derive from ICT when properly applied. Some of these benefits are given below.

- Most of the Physics concepts, laws and theories were learnt by memorization which can easily be forgotten by students; the use of ICT help student to learn them with ease and retain them in their memory for a very long period.
- It improves physics student's participation in classrooms.
- It helps physics students to gain access to current physics references and standards.
- It affords physics students the opportunity of holding conferences, seminars and workshops on issues relating to Physics education across the globe without boundary restriction.
- It enables physics students to exchange ideas, learning materials and teaching strategies quickly.
- It helps physics students to sustain and update their knowledge in physics education. Knowledge is not static. Physics education changes every day and ICT will assist both student and teacher not to rely on obsolete information.

CONCLUSION

Information and Communication Technology (ICT) is no longer a dream vision in the field of classroom teaching and learning. It has successfully been used for improving the quality of learning as well as expanding the frontiers of higher education learning. Thus it plays a more important role not only to provide meaningful learning experiences to the students but also to reorient teachers with the latest developments in the respective fields. By utilizing various media and materials, we can make the teaching learning process more effective and interesting. Therefore by gaining how to use ICT as a tool for designing new learning environments in physics, we can develop and facilitate ICT based learning activities in the context of learning physics also.

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