

A STUDY OF SIMULATION OF TRADITIONAL PHYSICS AND ELECTRONIC EXPERIMENTS AND THE EFFECT OF ITS IMPLEMENTATION

Neeta Lele¹

Abstract

This project is an attempt made to simplify the traditional electronics experiments like basic gates, adders, subtractors, rectifiers, timers using simple simulation techniques . Electronic experiments usually involve lot of connections and wirings and it often becomes difficult for a teacher to pay individual attention .Thus these kind of experiments often become tedious and time consuming .

The project mainly focuses on making a student understand an experiment thoroughly using simulation technique, saving a teacher's time and also saving number of practical sessions getting consumed by such experiments. The study also involves effectiveness of simulation by comparing student's feedback on traditional method and simulation method.

Introduction

Simulation is the imitation of some real thing, state of affairs, or process. For example if we create a computer game in which there is entire Cricket team is playing the game as per the rules, we can have the entire game played without actual people. The task is done virtually. This game will imitate the real play and it is called as Simulation of the game!!

Simulation is used in many contexts, such as simulation of technology for performance optimization, safety engineering, testing, training, education, and video games. Training simulators include flight simulators for training aircraft pilots. Simulation is also used for scientific modeling of natural systems or human systems in order to gain insight into their functioning. Simulation can be used to show the eventual real effects of alternative conditions and courses of action. Simulation is also used when the real system cannot be engaged, because it may not be accessible, or it may be dangerous or unacceptable to engage, or it is being designed but not yet built, or it may simply not exist.

Key issues in simulation include acquisition of valid source information about the relevant selection of key characteristics and behaviors, the use of simplifying approximations and assumptions within the simulation, and fidelity and validity of the simulation outcomes.

Traditionally, the formal modeling of systems has been via a mathematical model, which attempts to find analytical solutions enabling the prediction of the behavior of the system from a set of parameters and initial conditions. A computer simulation, a computer model, or a computational model is a computer program, or network of computers, that attempts to simulate an abstract model of a particular system.

A computer simulation is an attempt to model a real-life or hypothetical situation on a computer so that it can be studied to see how the system works. By changing variables, predictions may be made about the behavior of the system. Computer simulation has become a useful part

¹Lecturer,C.K.Thakur College of Management, Panvel Email: neetalele24@gmail.com

of modeling many natural systems in physics, chemistry and biology ,and human systems in economics and social science well as in engineering to gain insight into the operation of those systems.

Several software packages exist for running computer-based simulation modeling (e.g. Monte Carlo simulation, stochastic modeling, multimethod modeling) that makes the modeling almost effortless.

Statement of the problem

To study the simulation of traditional Physics and Electronic experiments and the effect of its implementation.

Purpose

- To make student aware of emerging technology like Computer Simulation
- To show the simulation of some basic Physics and Electronic related experiments and to make an attempt to model a real-life or hypothetical situation on a computer so that it can be studied to see how the system works.
- To study the feedback of students as well as the teachers about simulation of these experiments.
- To take the feedback of various students from various courses related to Electronics and Physics (e.g. B.Sc Physics, Electronics, B.Sc. IT and Computer Science.)
- To make the statistical analysis of collected data and feed backs.
- To design the method of implementation depending upon the analysis.

Significance of the study

- This study will help student understand the experiments in a better way since they can actually try different possible conditions on a simulator which they probably can't do practically (e.g. effect of zero gravity on a bar pendulum).
- This would also help in practicing safety engineering.
- Simulations can help them understand the details of an experiment before they actually perform it.

Hypotheses

Simulation software's are not used efficiently at graduation level. The efficiency of these software's has not been studied in terms of

Feedback of students

- Their Performance in the practical's
- Effect of it on teachers.
- Overall Effect of simulation on the course.

Methodology

Restate purpose and research questions or null hypotheses

- To study the simulation of traditional Physics and Electronics Experiments and the effect of its Implementation.
- To make student aware of emerging technology like Computer Simulation.
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- To study the feedback of students as well as the teachers about simulation of these experiments.
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Population and sampling

Population: The population will be students and teachers from Degree College(B.Sc.Physics and I.T,Computer Science) of various colleges.

Sampling: Researcher will choose statistical sampling technique.

Instrumentation

- Microsoft power point 2008
- also some programming languages and online simulations will be used.

Validity and reliability

Student's response will be checked for different simulations, their performance for the practical will be studied and thus the validity and reliability of the research will be decided.

Scope and limitations

The researcher will limit the study to BSc.Physics the v, Electronics, IT and Computer Science. But there is a wide scope to extend the study to engineering students as well.

Conclusion

For concluding the validity of the simulation one must compare it with. The traditional method of teaching electronics experiments. The traditional method expects a teacher to personally explain each step of an experiment. (Which is very time consuming) Whereas the simulation method shows each step on screen to which a student can easily follow with his or her pace. As the simulation method warns about dos and don'ts of an experiment beforehand, it becomes easy for the students to understand the precautions. A student himself can correct his error following step by step implementation of simulation. Finally the whole idea is to make the students understand the digital electronics in a very easy way and to make them handle the practical sessions independently.

To prove the validity of simulation, We would make two groups of students one group will be exposed to the traditional method of teaching and another to the simulation method. Both the

groups will be given a similar kind of questionnaires which checks the basics of an experiments from the students. Comparing the two will definitely emphasize the importance of Simulation.

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