

**DEVELOPMENT OF VIRTUAL LABORATORY FOR
A-LEVEL & ADFP SCIENCE SUBJECTS**



**INSTITUTE OF RESEARCH, DEVELOPMENT
AND COMMERCIALIZATION**

**UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM, SELANGOR
MALAYSIA**

BY:

**Dr. SUGANTHI DEVADASON
PROF. MADYA NAZLINDA ABDULLAH
NESAMALAR KANTASAMY**

JUNE 2005

Dr. Suganthi Devadason
Lecturer, INTEC,
UiTM Section17 Campus,
40200 Shah Alam, Selangor Darul Ehsan
Malaysia.

Date: 15 June 2005

To
The Assistant Vice-Chancellor (Research)
Institute of Research Development and Commercialization,
Universiti Teknologi MARA,
40450 Shah Alam.
Selangor, D.E., Malaysia.

Kind attention: Research Head of Science and Technology

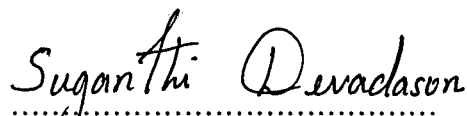
Madam,

**DEVELOPMENT OF VIRTUAL LABORATORY FOR A-LEVEL & ADFP
SCIENCE SUBJECTS**

The above Research Project has been completed. We enclose herewith 3 copies of the final project report to IRDC for your records, references and for further action.

Thanking you,

Yours sincerely,


.....
(SUGANTHI DEVADASON)
Project leader

ABSTRACT

Use of virtual experiments to supplement traditional classroom lectures is recommended by many researchers to increase interest, motivation, and retention, as well as to improve higher order thinking and reasoning skills of students. The effectiveness of a given simulation may depend upon when it is administered within an instructional sequence.

In the present work computer simulation experiments were developed based on A-Level syllabus of Edexcel London Board of examination. The development of computer simulation experiment was carried out using MATLAB, a technical computing software. Simulink, a software package for modeling, simulating, and analyzing dynamic systems was also used to create the virtual experiments. MATLAB and Simulink were integrated so that simulation of physical models could be carried out using both the software simultaneously. GUIDE, the MATLAB Graphical User Interface development environment was used in creating graphical user interfaces (GUIs). This tool greatly simplified the process of designing and building GUIs.

A-Level students of INTEC were exposed to an additional method of learning technique using computer-based virtual laboratory experiments. The present study was designed to determine whether the virtual experiments improve students' learning process of interference of light waves in Physics. The effectiveness of this method has been tested using a pre-test and a post-test. The students had previous hands-on experience of the experiment on interference in a Physics laboratory prior to this

study. The finding in this study suggests that computer-based virtual experiments can offer a suitable cognitive and constructive learning environment for students. It is suggested that effective integration of computer simulation into traditional lecture-lab activities could enhance the performance of the students. Students' response to the new instructional technology using computer simulated experiments was found out using a questionnaire. The responses to the questionnaire were statistically analysed and it is found that students were very much interested in doing virtual experiments and they were much benefited by these experiments.

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