

# CAL FOR PHYSICALLY HANDICAPPED AND DISABLED ENGINEERING STUDENTS

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## SYNOPSIS

*Normal student has many aids to learning like graphically illustrated books, charts, pictures, games, educational TV, Radio and conventional class-room contact with teachers and other students. Unfortunately physically abnormal, handicapped and disabled students can not easily make use of same. Special types of learning resources devised for handicapped disabled learner in the form of computer as an aid to learning is outlined in this paper.*

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### Introduction :

As per prevailing rules approved by the Government of Maharashtra and Directorate of Technical Education Maharashtra State, 1 percent of the total intake capacity i.e. @ 23 seats out of 2277 seats in all nine Maharashtra Government and aided Engineering Colleges are reserved for Physically Handicapped students. At present total 91 Physically Handicapped students are undergoing various courses of Engineering at different Engineering Colleges. These bonafide physically handicapped belong to different cases of lower limbs & upper limbs, however they are fit to undergo all parts of theory, workshop and laboratory practicals, etc. of the degree courses in various Engineering branches inspite of their above Physical disability.

Objectives of this paper are two fold. First, to give an indication of how Computer Aided

Learning (CAL) can help those with special needs. Second, to provide an outline of some of the basic requirements of CAL Software for handicapped engineering student.

### Role of CAL :

CAL is concerned with communication and development of learning process, it is ideally suited for handicapped and disabled students. CAL techniques augment deficient or malfunctioning channels of communication and provide new ones where none previously existed. A simple and cost effective approach to provision of a communication aid for student having certain type of physical handicap is illustrated schematically in Figure (1)

It is based on standard personal computer to which is interfaced special types of pointing devices for interaction with learning software. Support software for system dis-

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plays a special menu on video display screen consists of predefined words, letters of the alphabet, the decimal digit and certain command words to control status of a workspace. Various options are selected by means of a flashing cursor whose position is controlled by the specially designed input devices. Many users are unable to type. Although a type writer keyboard may be attached to the equipment (for those who are able to use it), a wide variety of other interaction aids may also be used. In case of upper limb disability, number of input devices are available for interaction, particularly when only one finger works, Switches (Mouse) is suitable. For at least two fingers, thumb along with either Index-finger or Middle-finger or Ring-finger or Little-finger, are in good condition; Digitizer-plate will be suitable as an input device for interaction. In case of all fingers handicapped, Joy-Stick or Pressure-pad can meet the requirement. However when both hands are completely disabled, Suck-blow Tube can be used as a pointing device for operating interactive CAL program. A range of software has to be developed to enable these systems to be used both as a general aid for the disabled and as a medium for CAL.

**Basic Requirement of "CAL Software" for Handicapped :**

- 1) Software program must support input devices such as Joystick, Suck-Blow Tube, Mouse, Digitizer, Pressure Pad and conventional Key-board. This may be achieved by incorporating special Subroutines to check as well as activate these associated peripherals (pointing Devices).
- 2) Provision for selection of various input devices should be made at beginning of CAL.
- 3) Program which interacts with student should confirm background

knowledge/concepts required for learning subject.

- 4) If required, learner should be in position to refresh his memory by revising certain important topics through same package.
- 5) Computer should explain Aim & Scope of topic along with visual field applications explained with help of sketches & bar charts for comparison, numerical and/or statistical data. Animation in graphics makes these presentations more effective.
- 6) Program should ask for level up to which topic is to be studied Viz Elementary, Intermediate and Advance (in depth). Facility of skipping Elementary & Intermediate levels of studies while learning at higher level should be available, if so desired.
- 7) Software will also ask for speed at which topics are to be covered. Viz Slow, Normal & Fast. At Slow speed more number of problems or detailed explanation will be provided for every point under discussion.
- 8) Topics can be divided in two categories. i.e. Analytical & Informative. These two can be dealt differently.
- 9) In informative topics information will be given in stages & questions will be asked frequently to assess whether displayed information is being understood in right way. In case topic is not understood, capsule of more details in simpler way is given to student. Once the point is assimilated next point is considered. After completing the topic, some questions which connect various points are asked, in case answered rightly the

topic is completed. Otherwise further explanation is given. While covering such topics appropriate figures, photographs etc. are to be given.

- 10) When topic is analytical, questions may be numerical and progressively difficult. First few problems are solved & solution of remaining problems are to be given only in case asked.
- 11) After completion of topic, questions will be posed to enable student to know if he has understood the subject.
- 12) To make package interesting even to revise the subject, illustrations should

be different for different runs of package.

### Conclusion :

Today, computers play an important role in society. They influence, quite significantly, all aspects of modern living; they are used in planning, in controlling, in manufacturing and, of course, in education. Applications of the computer within education are likely to include general administration, management of learning and various approaches to Computer Assisted Learning. Presently, within the CAL domain there is much potential that will considerably shape and mould its future to help handicapped Engineering students.

