

## Computer assisted learning (CAL) as a teaching learning method in teaching experimental pharmacology

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### ABSTRACT

**Background:** Computer assisted learning (CAL) for teaching experimental pharmacology is becoming fast acceptable in many medical colleges, where there is not only shortage of animals, support staff, financial aid but also ethical issues and unwanted cruelty to animals. The objective of this study was to ascertain the efficiency of CAL in teaching experimental pharmacology using pre-test and post-test questionnaire before and after CAL respectively and also compare the outcome among average and under performers while using CAL.

**Methods:** Average (A, B) and under performers (C) were identified using their university exam results. All the 3 groups (A,B,C) with a sample of 30 students each underwent pre-test in the topic selected, then they were given a brief on CAL after which they individually worked on the computer and then a post test was given.

**Results:** All the 3 group students pre and post test result analysis showed an improved performance in the outcome with significant p values ( $p < 0.0003$ ,  $0.0001$ ,  $0.0001$ ). Further on comparison within the groups suggested outcome differences in underperformers in comparison with average performers (A Vs C, B Vs C p values  $0.0069$ ,  $0.0009$  respectively).

**Conclusions:** Thus this study suggests that CAL is a good teaching learning method in all groups of students and the average performers outdo the underperformers in terms of outcome analysis after CAL.

**Keywords:** Computer assisted learning, Experimental pharmacology

### INTRODUCTION

Laboratory based practical classes, have been the corner stone of undergraduate pharmacology learning. Ethical issues with the use of animals and rapid development of information technology has led to newer trends in teaching and learning such as computer assisted learning.<sup>1</sup> Preliminary studies indicate that the introduction of multimedia CAL is popular with undergraduates<sup>2</sup> and that the appreciation of the programs is not influenced by any previous computer experience nor by a predominance of a mathematical or biological background prior to the tertiary education level. Moreover, there was a high rank correlation between assessment of student performance by computer and traditional appraisal by written examination.<sup>3</sup>

With all these findings about CAL, we decided to evaluate the outcome after CAL. We also tested the same on average and under performers to find out whether

there was any difference in any improvement among them. After getting proper ethical approval and approval from the head of the department of pharmacology the study was carried out.

### METHODS

**Participants:** 3 groups of II MBBS students were selected. The first 2 groups were the average performers with no history of failures in the first year MBBS university exam. The third group were the under performers who had history of failures in the I MBBS university exam. In each group 30 students were recruited. All the students had prior theoretical knowledge of the topic selected for CAL. The Software used was EX-PHARM T 1.00 designed by Dr. Raveendran JIPMER. The topic was effect of drugs on the rabbit eye.

**Ex-Pharm:** The software is aimed at helping the UGs understand, remember and recall drug actions. CPCSEA through its letter number CPCSEA/CH/ORG/Pharm/2003 dated 18-06-2003 has directed all the institutions conducting diploma degree courses in pharmacy to use Ex-Pharm, is demonstration software developed by JIPMER, Pondicherry, India. The package contains programs such as effects drugs on the rabbit eye, effects of drugs on the frog heart, bioassay of histamine on the guinea-pig ileum, effects of drugs on the frog oesophagus and effects of drugs on dog BP and heart rate. These programs can simulate drug actions. The user can conduct experiments and collect data. Each program can be run in two modes (a) Tutorial mode (b) Examination mode.<sup>4</sup>

**Study design:** The study was done on 3 separate days. Each day 30 students from group A, B average performers and group C underperformers underwent a pre-test on the topic then the brief on CAL was given by the facilitator. CAL was done with all doubts cleared by the facilitator. At the end of the class post test was given. Each session lasted for 2 hours.

**Data collection and analysis:** Pre-test questionnaire and post test questionnaire out of ten score was given (Table 1). Mean, SD, SEM were analysed for all the groups. Using these values for each group separately for pre and post test, using unpaired t test p value was determined. p value was also calculated comparing the 3 groups.

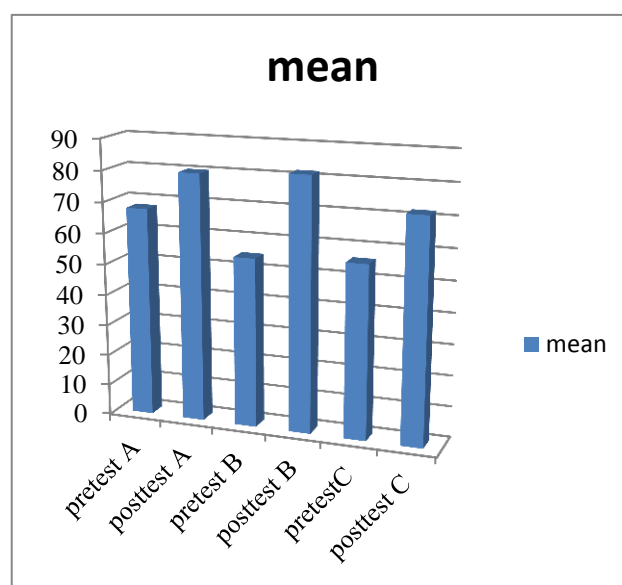
**Table 1: Pre and post test questionnaire.**

1. Which drug causes miosis A. pilocarpine B. atropine C. lignocaine D. ephedrine
2. Which drug causes loss of light reflex? A. pilocarpine B. atropine C. lignocaine D. ephedrine
3. Corneal reflex is absent in A. Cr 5 paralysed B. Cr 2 paralysed C. Cr 7 paralysed D. Cr 3 paralysed
4. Circular muscle fibres of iris contain A. alpha1 B. M3 C. beta 2 D. PGF2alpha
5. IOT IS decreased by A. pilocarpine B. atropine C. lignocaine D. ephedrine
6. Stimulation of alpha1 fibres causes A. miosis B. mydriasis C. increase IOT D. none
7. DOC for iridocyclitis A. pilocarpine B. atropine C. lignocaine D. ephedrine
8. Pilocarpine is the first DOC in A. POAG B. CAG C. Iridocyclitis D. conjunctivitis
9. Drug contd in glaucoma A. pilocarpine B. atropine C. lignocaine D. ephedrine
10. DOC for diagnostic purpose of refractive test A. atropine B. tropicamide C. pilocarpine D. lignocaine

**RESULTS**

Data of the percentage improvement from pre-test to post score is given in detail (Table 2 and Figure 1), which shows a significant improvement in post test score in all

the groups. The mean values of each group have increased from pre to post test with a p value of 0.0003, 0.0001, and 0.0001. This appreciates the efficiency of CAL in experimental pharmacology. The p value within group A VS B is 0.381 (not statistically significant) because both groups are average performers unlike, comparison of group A Vs C and group B Vs C p values 0.0069, 0.009 are very statistically significant because the under performers outcome is not in par with the average performers. The percentage improvement of group C from 56% to 72% is not so appreciable than in the groups A and B (67.7% to 80%, and 54.7% to 81.7% respectively).



**Figure 1: 10 mark questionnaire with mean pre and post test score.**

**Table 2: Percentage outcome improvement on pre and post test.**

Group	Percentage
Pre-test A	67.7
Post-test A	80
Pre-test B	54.7
Post-test B	81.7
Pre-test C	56
Post-test C	72

**DISCUSSION**

Due to the complexity of pharmacology as a discipline, it is important to develop innovative methods to improve student performance.<sup>5</sup>

CAL may play an important role in any instructional situation, whether practical or theoretical. It has the qualitative and quantitative potential to raise teaching standards to new levels of sophistication and it invariably proves cost effective especially when time is limited and equipment is in short supply.<sup>6</sup> Our results also suggest

that overall good outcome measure derived from pre and post test in all type of students.

Fletcher claimed, by reviewing 47 studies, that using CAL reduced 31% of the time required from students to perform the training compared to the traditional method.<sup>7</sup> Our study also took only 2 hours per student to understand the whole topic using CAL. Reduction in expenses involved for animal experiments is a definitive advantage of this method. Dependence on computers and technical problems arising during class are possible disadvantages of this method. CAL software can be used as an acceptable method of teaching practical pharmacology demonstrations to students.<sup>8</sup> Many studies have highlighted the usefulness of CAL.<sup>9-11</sup>

Our study has also proved the effectiveness of CAL as a teaching learning method by significant p values in all the groups studied. The limitation of this study is outcome is not compared with any other teaching learning method. Another limitation is that average and under performance selected from pass or failure in I MBBS subjects, anatomy, biochemistry or / and physiology and not on our subject of interest that is pharmacology.

## CONCLUSIONS

The uniqueness of this study is, there is a statistically significant difference in the improvement after CAL in average performers, when compared to the under performers concluding that the change in outcome is more significant in average performers. But more studies should be conducted to declare that CAL is more effective in average performers than under performers. Anyhow the total outcome in all groups of students is well appreciated.

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