

X ada lmba & Carri Kimploin.

INTERACTIVE PRELAB MODULES FOR SECOND YEAR ANALYTICAL CHEMISTRY LABORATORIES.

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The second year analytical chemistry laboratories consist of experiments covering topics in spectroscopy, separations and electroanalytical chemistry. The KUT 205 laboratory is taken by about 100 undergraduates majoring in Chemistry, Industrial Chemistry, Industrial Technology and Education (Chemistry) every semester. The KAT 243 laboratory is taken by about 45 undergraduates majoring in Analytical Chemistry every academic session. Interactive prelab modules have been developed for these two labs. Since these modules have also been placed on the university web server, the students can access these materials from their homes at their convenience. The objectives of these prelab modules are to prepare the students with the basic underlying principles of each experiment and to help them go through the main experimental procedures as well as the calculations involved. Problems such as misunderstanding of laboratory procedures in the laboratory manuals, unnecessary wastage of chemicals or errors in calculations could be overcome. The students' feedback on these modules will be presented.

Interactive prelab modules for second year analytical chemistry laboratories

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Abstract

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Second Year Analytical Chemistry lab

- Experiments on instrumental techniques in
 - Spectroscopy
 - Separations
 - Electroanalytical methods
- Gravimetric analysis
- Taken concurrently with theory course on instrumentation.

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Problems encountered

- Large number of students involved
- Time constraints of the laboratory experience
- Resources allotted for laboratory instruction
- Laboratory sessions not synchronized with lectures in class (with regards to topics taught).

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Development of modules

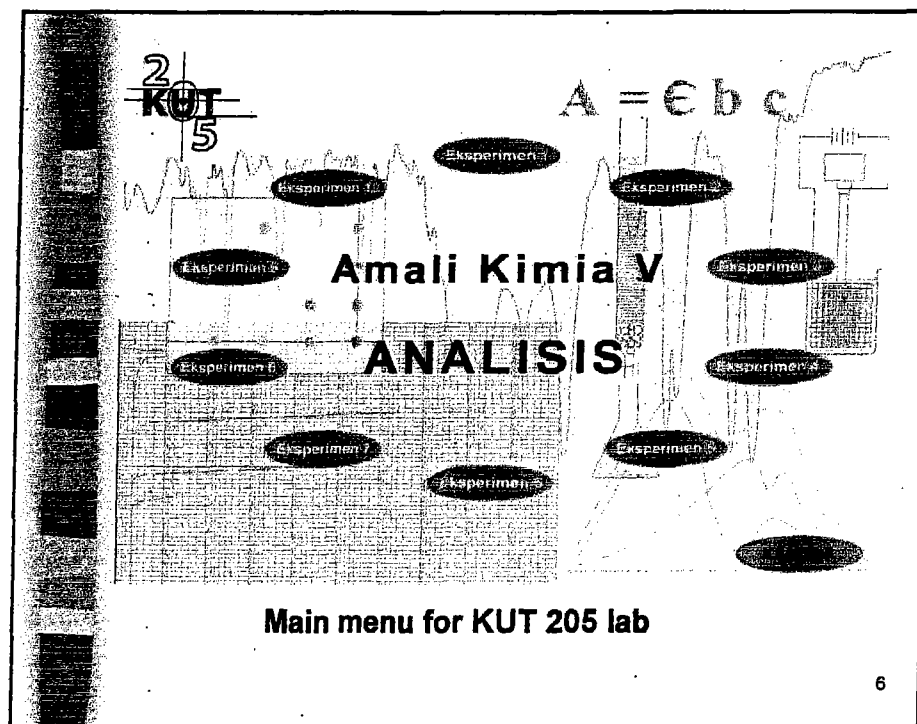
- Macromedia FLASH 5
- Chemistry final year project students
- On-line <http://www.usm.my/chem/>
 - KUT 205 prelabs (since 2002/2003 session)
 - KAT 243 prelabs (semester 1 2004/05)
- Available on 2 computers in the lab

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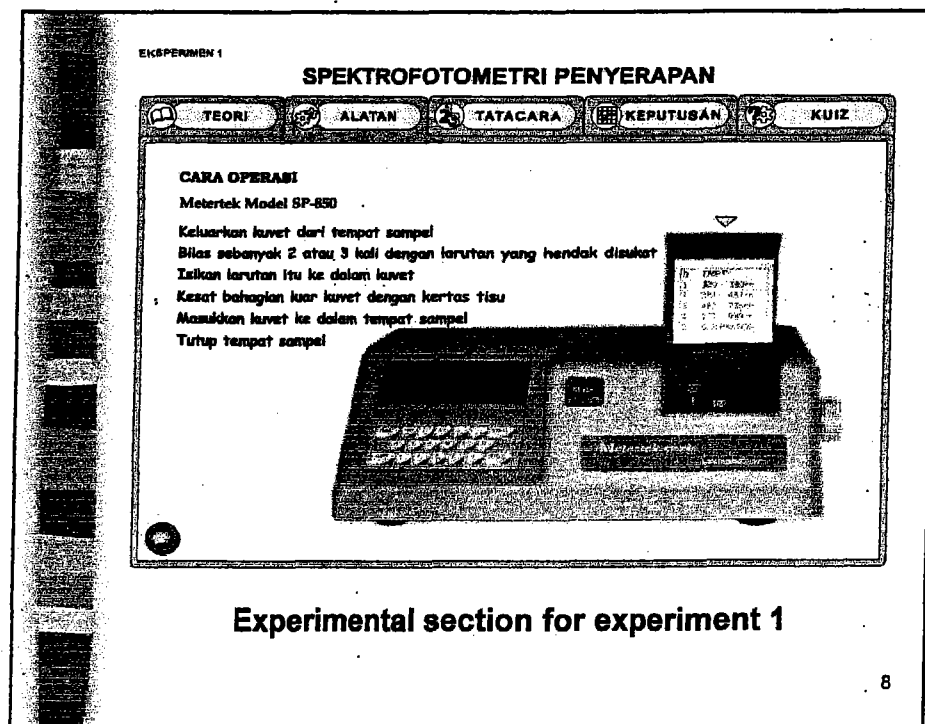
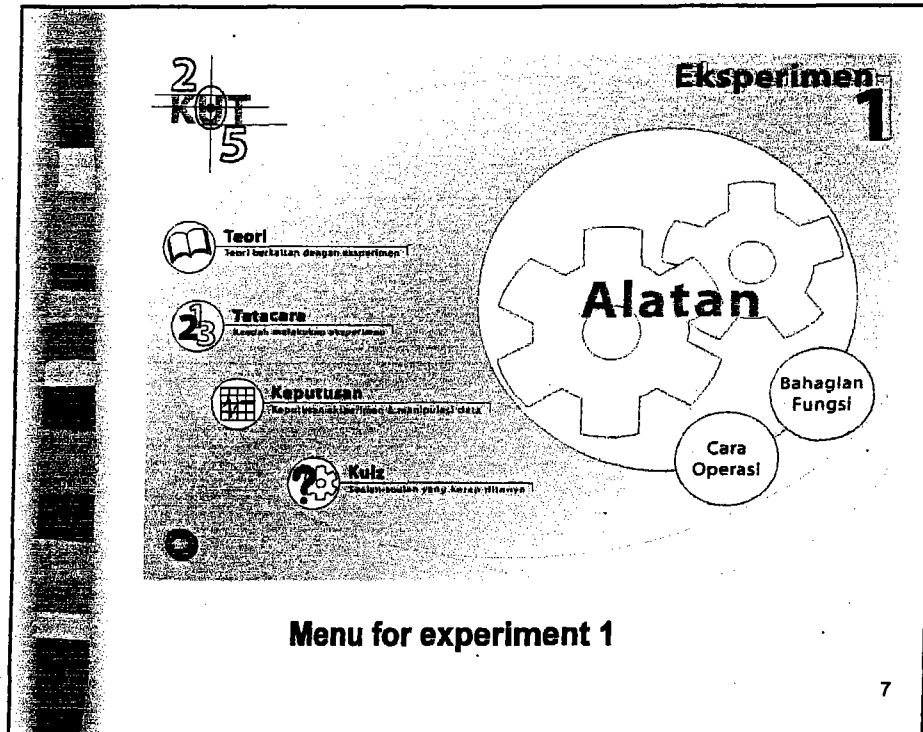
Objectives of modules

- Prepare students with basic underlying principles of each experiment.
- Help students prepare to do experiments or use instrumentation before they enter the lab.
- Help them with the calculations involved.
- Overcome problems such as unnecessary wastage of chemicals.

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Question 1

What is the relationship between fluorescence intensity and concentration at low concentrations?

- A. Fluorescence intensity is directly proportional to concentration
- B. Fluorescence intensity is inversely proportional to concentration
- C. Fluorescence intensity is proportional to concentration squared

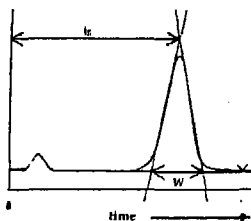
Quiz section for KAT 243 lab

Exercise 1: GC parameters and quantitative analysis of a mixture of hydrocarbons

Calculation of the no. of theoretical plates and HETP

Number of theoretical plates, $N = 16 (t_R / W)^2$

HETP, $H = L / N$



Results section for KAT 243 lab

Questionnaire

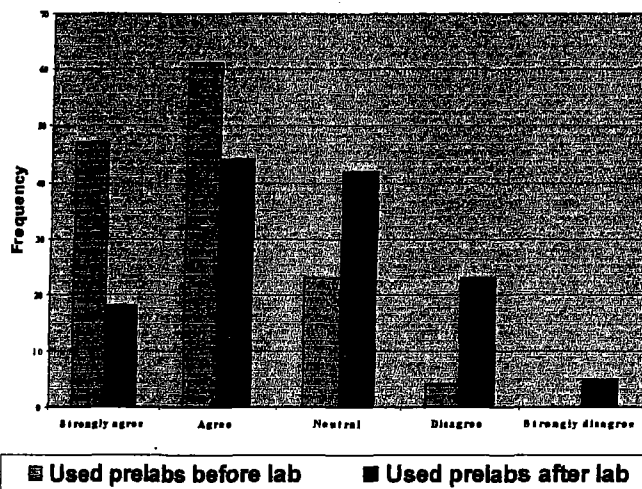
■ Sample (134 students)

- Chemistry majors (KUT 205)
- Education majors (in Chemistry)(KUT 205)
- Analytical Chemistry majors (KAT 243)

■ Semester 1, 2004/05 academic session

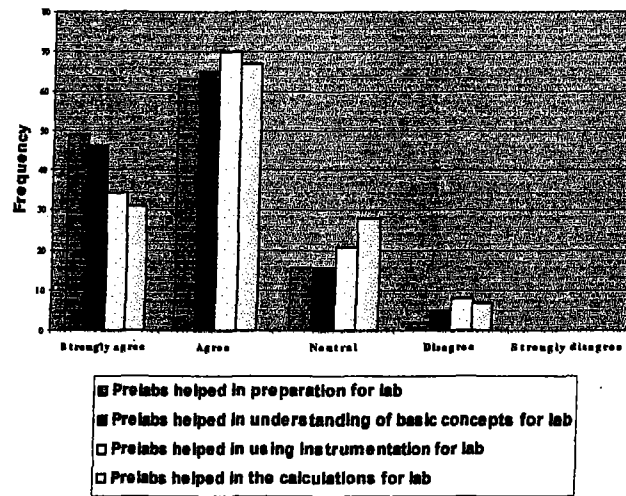
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Analytical Chemistry Prelabs



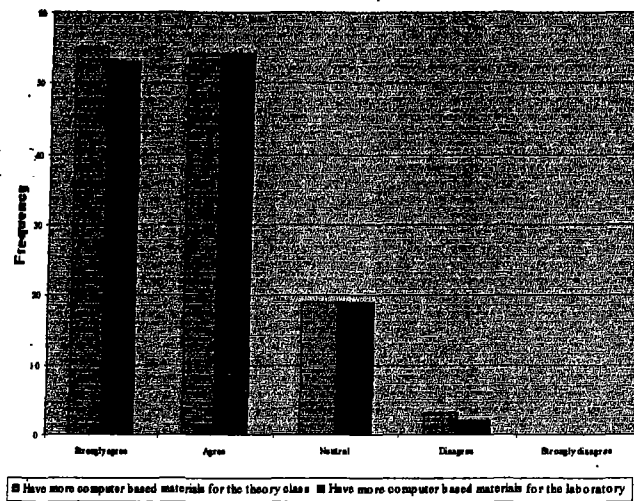
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Student Perception of Prelabs



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Use of computer based materials



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Conclusions

- Positive feedback from students about prelabs.
- Prelab modules can help students prepare for their labs and help teach the underlying principles of the experiments.
- Greater access to prelab modules needed.

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Acknowledgements

- Final year project students
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