

## MULTIMEDIA IN CHEMICAL ENGINEERING EDUCATION : UNIVERSITI TEKNOLOGI MALAYSIA EXPERIENCE

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### INTRODUCTION

The application of multimedia packages has enormous potential in Chemical Engineering education. These packages provide interactivity, clarity and attractive visual and sound effects, which books cannot provide. Multimedia packages, therefore, can be useful tools in making the learning process more interesting and motivating. At the Department of Chemical Engineering, Universiti Teknologi Malaysia (UTM), the need for such a tool is critical because there has been a large increase in students intake. The number of students in a lecture has increased from 35 in 1989 to more than 80 in 1994. In light of this, a project was initiated to develop multimedia packages for Chemical Engineering subjects as a learning aid that is interesting, as well as easy to use and understand. Topics that are of high priority are unit operations and process control.

In this paper, the application for one of the packages on evaporation is highlighted. This package, called *Evaporator Professional*, was developed using *Authorware Professional*. It contains various aspects of evaporators, such as types and uses of evaporators, design and selection of evaporators, energy conservation and others. A program written in *Visual Basic* for determining design parameters for multi-effect evaporators is also incorporated in *Evaporator Professional*.

### SOFTWARE DEVELOPMENT

Authorware Professional Windows Edition is chosen as the main authoring package to develop the main shell for the software. Visual Basic (Professional Edition) is selected to provide the programming environment for calculation intensive features in the software, such as simulations and iterative design calculations. Various other packages are used to provide graphics, visual and sound effects. Nevertheless, for the time being, scanned images and

video clips are omitted to avoid creating a huge software (i.e., take up a lot of memory).

The software is developed on a 486DX2/66MHz IBM compatible personal computer with 16 MB RAM, 1 GB hard disk, Soundblaster audio card (with CD-ROM drive, speaker and microphone) and color monitor display. The display is set to the default VGA 16 color display. Delivery platforms must at least have 386 (preferably 486DX) microprocessors and Windows 3.1, with 4MB RAM and VGA graphics. The *Evaporator Professional* program takes up about 7 MB of hard disk space, but can be distributed in two 3.5 inch high density disks in compressed form.

### **THE *Evaporator Professional* SOFTWARE**

There are five major parts in the software: Introduction, Types and Uses of Evaporators, Design of Evaporators, Selection of Evaporators, and Energy Conservation. Since the software is designed in a multi-layered approach, there are many other sub-sections that the users can select to go through or omit. In addition to presenting information interactively, the Design of Evaporators part also contain a multi-effect evaporator design program to calculate the heat duty and the heat transfer area of each evaporator, and the steam economy.

The software is suitable for introducing evaporation to students and non-chemical engineers working in the chemical industry. However, detail design calculations are currently not presented in the software.

### **STUDENTS RECEPTION**

The *Evaporator Professional* software was installed in computers at the computer laboratory in the Department of Chemical Engineering, UTM. The software was used as part of the reference and teaching material for third year chemical engineering undergraduates, and the students were instructed to go through the software at the beginning of the topic on evaporation. At the end of the semester, a survey was given to the students to evaluate the software.

In the survey, respondents circle a rating of 1 to 5, where 1 is signify strongly disagree, 3 to agree and 5 strongly agree. Figure 1 shows the response of 142 students to the following questions in the survey.

1. The overall presentation of the software is good.

2. I feel interested in going through all sections in the software.
3. I would like to use similar multimedia softwares for other topics.
4. It is easier to understand evaporation using the software than a book.

Figure 1 clearly shows that most of the students were satisfied with *Evaporator Professional*. Out of 142 respondents, only 2.8% felt that the presentation of the software is poor (question 1), 4.2% felt uninterested in going through the software, 4.9% do not want to use multimedia softwares in other topics and 4.9% felt easier to understand from a book.

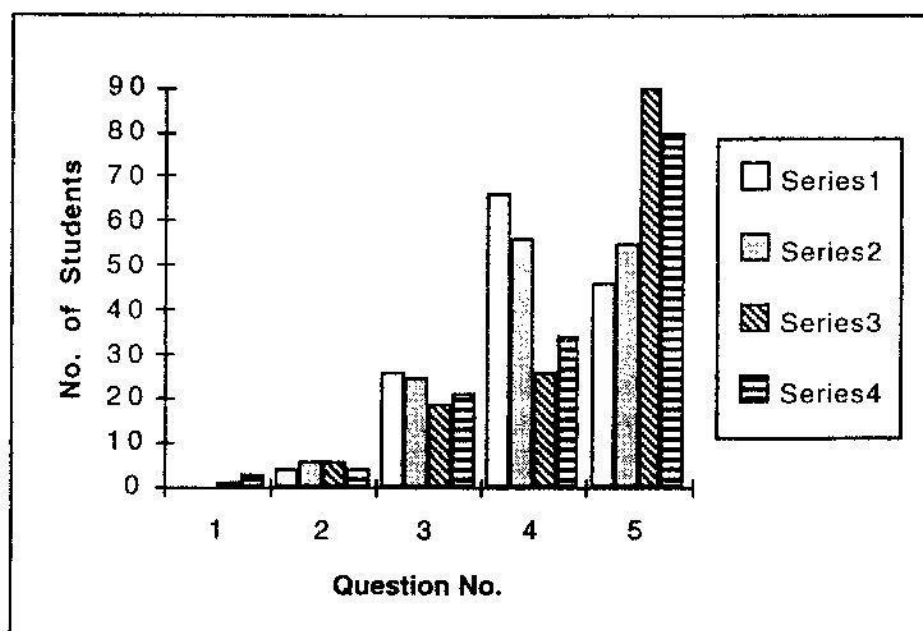


Figure 1. Response to survey

## CONCLUSION

On the whole, the two lecturers teaching evaporation to students found it easier to introduce students to the topic. Judging from the survey, the students also found the software to be useful. There are undoubtedly several improvements that can be made on the software, and its implementation. Nevertheless, it is felt that developing and utilizing multimedia softwares as supplements in lectures can be beneficial to both students and lecturers.