Application of Excel Marco Programming to Core Chemical Engineering Subjects

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ABSTRACT

This project aims to initiate the teaching of Excel VBA programming in chemical engineering using practical examples where the student is required to write Excel VBA programs to solve practical chemical engineering problems. The objective is to introduce computer applications "in the real world" that can be easily accessed not only on campus but also in students' future working environments. Microsoft Excel is an easy-to-access programmable office software that can help them solve chemical engineering problems.

INTRODUCTION

Chemical engineering practice has been profoundly influenced by advances in computer hardware and software. This has led to considerable debate about the best way to teach computer applications "in the real world". Our current chemical engineering curricula involves students being taught programming languages (C++) in computer science, which they will not use further in either chemical engineering courses or their future working environment. On the other hand, most chemical engineers entering the workplace spend at least half their workday at their computer doing work mostly involving user-friendly commercial software. It is believed that graduating chemical engineers would be more suitably equipped to contribute in an industrial setting if they were taught how to effectively use Excel (and, in particular, VBA) rather than how to write a computer program in a language they may never use again. This project aims to initiate the teaching of Excel VBA programming in chemical engineering using practical examples where the student is required to write Excel VBA programs to solve practical chemical engineering problems.

COURSE DEVELOPMENT

This Excel VBA programming course will initially be taught to first year students in the winter section as an industrial training module. It will include self-learning, tutorial and practice and be divided into two major parts and four components. Basic Excel skills will make up the first part. Basic Excel VBA programming, examples of Excel VBA programs for chemical engineering problems and practices will make up the second.

Basic Excel skills will be introduced to students through self-learning materials. This part will be completed before Excel VBA programming is introduced to give students an idea of

what spreadsheet and Excel are and how they work.

The objectives of the second part are (1) to introduce Excel VBA programming and (2) to show students how to make use of programming to solve chemical engineering problems. In order to achieve these objectives, we will not only deliver VBA syntax to students but will also focus on how to convert a problem into a useable program. Also, practical examples in chemical engineering core courses will be used to give students more idea of how to make use of programming to solve chemical engineering problems. Excel VBA will also be demonstrated and compared with other methods of solution which they could use (e.g. Excel spreadsheet or Polymath). Those examples and exercises emphasise the power of using programming to replace time-consuming hand calculations, and the use of variable input / output as a generic solution to the problem. With the aid of computer technology, it is possible to let students solve more complicated problems in future.

Development of the course was started at the beginning of 2007 and it was test run at CENG 364 (Biomolecular Engineering) during the Spring semester 2007 and CENG 361 (Introduction to Biochemical Engineering) during the Fall semester 2007. It will be delivered to first year students in 2008.

CONCLUSION

Excel VBA is a useful tool for chemical engineering students “in the real world”. Students can easily master and apply it to solve problems they encounter during study and later on as well. A tailor-made programming course with many chemical engineering examples can help them better understand both chemical engineering and programming disciplines. Students are encouraged to use Excel and VBA to solve problems. It is expected that they will use these skills throughout their chemical engineering training.