CER Technology Fellowship Program –2008

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Project Title: An Interactive Online Tutorial for Heat Transfer Education

Audience: Initially, the audience will be students in the *530.334 Heat Transfer* class. A broader goal is to create an international collaborative project for heat transfer education and make these tutorials a part of the educational content.

Pedagogical Issue: Problem solving methodology for heat transfer is currently taught in a classroom setting. Some of the common problems with the classroom setting are time constraints, lack of continuous attention, distractions, matching the learning pace of participating students who are at different levels, and ability to revisit portions of the problem solving procedure.

Solution: This team proposes to develop interactive on-line tutorials for the *530.334 Heat Transfer* class and for heat transfer education in general. Based on the experience with a previously developed design project, this team plans to develop an on-line tutorial that has significantly advanced interactive features for students and assessment capabilities for the instructor. After providing background and real life information on the relevance of the subject, the tutorial will guide the student through the model development steps (that have proven to be a key challenge in this course and education in general), solution steps and analysis/interpretation steps.

Technologies Used: Adobe PDF, Animation, C/C++, WebCT, Digital Audio, Digital Video, Graphic Design, HTML/Web Design, MatLab, PHP, PowerPoint, Respondus

Project Abstract: The goal of the project is to develop an interactive on-line tutorial for the *530.334 Heat Transfer* class and for heat transfer education in general. After providing basic background and real-life information on the relevance of the subject, the tutorial will guide the student through the steps of developing a mathematical model (the key challenge in this course and education in general), solution steps and analysis/interpretation steps. Several alternatives solutions will be offered to the student at every step of model development, some suitable for problem solving, others less suitable, including incorrect answers. Each option will have an explanation section the students will be able to look up. If they chose the wrong option, they will be given an explanation why the approach they selected is not suitable for that particular problem. All steps taken by the student will be recorded by appropriate software (PHP) and saved on a server. The responses will be coded and the software code will be developed to provide a statistical analysis of the problem solving approach of the individual student or a group of students. The instructor will be able to analyze the problem solving steps for individual students and the class in order to identify problem issues that can be addressed in class. A test related to the topic will be developed and administered to the students before and after the completion of the tutorial to evaluate the impact of the tutorial on the understanding of the subject

matter. The described problem solving methodology is currently taught in a classroom setting, with the usual associated problems. The proposed interactive on-line approach allows each student to practice on his/her own time and pace, make mistakes, obtain explanation and learn from mistakes.