Volume 17 Number 1 2001 ISSN 0949-149X

The International Journal of Engineering Education

Contents

improves mathematics achievement and attitude, and communication skills, and hence, equips more students to consider the field of engineering. Potentially, it could increase the numbers of engineering students among underrepresented groups, especially females.

Student assessment and the development of transferable personal skills are receiving increasing attention in higher education establishments. This study examined the potential for enhancing student learning through the development of groupwork, presentation and self- and peer-assessment skills on an industrial engineering undergraduate course. A methodology is described which indicates the approach adopted and a questionnaire evaluates students' impressions of the process. The overall conclusion to be drawn from the investigation is that skill development does take place and that students find groupwork an enjoyable learning experience. With regard to self- and peer-assessment, students were not as enthusiastic. Ultimately, there is a need to continue to involve students so that they can see evaluation in a positive, developmental light and to encourage students to take a more proactive role in assessing their performance.

This paper details a model for integrating communication skills (oral, written, group/team, and leadership) across an undergraduate biological engineering curriculum. Instruction in these areas is provided within some of the core courses and has been key for student success. Communication skills are expanded upon as students progress through the curriculum and culminate with the senior capstone design sequence. In this paper, we present this model and discuss the positive ramifications it has had on student learning. Problems encountered include student and faculty resistance and lack of resources. Recommendations for implementing such a model in any engineering curriculum are detailed.

Student Achievement and Attitude Towards Instruction

The author proposes a model combining standardized test scores and psychosocial variables to predict students' academic success. The Scholastic Aptitude Test (verbal, mathematics, and total) scores and the Non-Cognitive Questionnaire (NCQ) were used for predicting grade-point-average (GPA) of 690 engineering freshmen in a public research university in Southeastern United States of America. Multiple step-wise regression analysis revealed SAT scores and psychosocial variables for predicting student academic performance. Different predictor variables were found based on gender. This study shed light on admissions criteria and academic intervention programs for enhancing academic success of engineering students.

Recent initiatives by the National Science Foundation (NSF) and Accreditation Board for Engineering and Technology (ABET) have promoted changes in classroom practices to move instruction from a traditional lecture to structured activities that require students to use the knowledge, skills, and abilities required by engineers in the workplace. For instructors to make valid inferences about whether students have mastered these work-related skills, assessments must be aligned with these new curricular emphases. Performance-based assessments offer a more direct method of assessing student outcomes identified in the ABET criteria. Such a shift in instructional and assessment practices in the classroom requires a concomitant shift in the evaluation of the effectiveness of such engineering programs. This article summarizes lessons learned by the authors in two disciplines, engineering and educational research, in the implementation of an assessment system and the use of performance-based assessments to evaluate student and program outcomes.

This study was conducted to investigate cognitive style patterns among students in a lower division engineering course and differences in the academic performance of those students related to differences in their cognitive styles. The Group Embedded Figures Test was administered to 130 undergraduate engineering students enrolled in CE 214 Engineering Mechanics-Statics at North Carolina State University. Analysis of variance was used to examine differences in academic achievement of students in relation to their different cognitive styles. The findings identified a highly skewed distribution on the cognitive style scale, with the vast majority being highly analytic. In addition, students who manifested an analytic (field independent) cognitive style achieved significantly higher grades in the course than those with a Global cognitive style.

The primary purpose of this study was to incorporate principles of learning styles theory into the design and delivery of Internet-based education. Learning styles theory has long been used by educators to enhance the learning experience by individualizing it to accommodate the various ways that students perceive and process information. Although learning style principles have been widely applied to more traditional teaching-learning formats, educators have just begun exploring the potential application to asynchronous formats. This paper first describes Kolb's (1984) theory of learning styles, and then describes how principles from the theory can be adapted for use with computer-delivered instruction. Finally, we report the results of a study designed to measure the effect of customized instruction on students' perceptions of the learning process, and discuss the implications for the increasing numbers of faculty and students involved in on-line teaching and learning.