DEVELOPMENT OF FLUID MECHANICS
AS AN ACTIVE LEARNING COURSE

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SUMMARY

In order to enhance the ongoing preparations of different engineering programs for ABET EC2000 accreditation, several colleges are encouraging transforming basic engineering courses into active cooperative learning environment. The introductory fluid mechanics course represents a good candidate for such transformation because it is a mandatory course for several engineering programs. The fluid mechanics course under consideration in the present work is a 4-credit, 6-contact hours course and enrols about 120 students in 5 sections per semester.

The course was redesigned and delivered during the last semester for one section only in order to compare results and evaluate the experience with respect to the other four sections having classical lectures but using data shows and power point presentations. The new course design reflected the 5 pillars of active cooperative learning, namely; positive interdependence, individual accountability, face to face interaction, social cooperative skills, and group processing. In order to address ABET EC2000 requirements, the course goal, course outcomes, and the outcome related course learning objectives were defined. Those learning objectives were based on Bloom’s Taxonomy levels of learning. The course could address five ABET technical outcomes (3.a, 3.b, 3.c, 3.e, and 3.k) and three non technical or soft outcomes (3.d, 3.g, and 3.i). The course assessment matrix was used to map the course learning objectives into those outcomes and indicate the level of learning at which each objective addresses the corresponding outcome.

Assessment of active cooperative learning outcomes in that one section was achieved in two dimensions. The first was the level of confidence the students had in their competency level of an itemized list of thirty three course learning objectives. This was assessed by the students themselves through a common questionnaire. In this regard, the students in the active cooperative learning class outscored their counterparts in the classical classes in each item of that list, and averaging by about 12% higher on overall. The second dimension was the students’ grades by the end of the semester. Again, the students of the active cooperative learning section had higher grades than those of the classical sections by about 34%, even though they had common exams and evaluations in 80% of the course. These two strong results put active cooperative learning as a more appropriate strategy of introducing engineering courses than classical lectures.