

CHANGING EDUCATIONAL PRACTICES—UNCOVERING THE REAL ISSUES

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Abstract – In several past endeavors, we have found that effectively changing educational practices is difficult. Thus, this work seeks to identify the root-cause problems that should be solved in order to effectively change practices of engineering education. To develop insights, we gathered qualitative data from a team of professors during the course of a semester as these professors applied a teaching process that is aligned with modern understandings of human learning. We identified three central issues: (a) most professors believe that the present system is nearly optimal--thus they have little motivation for change, (b) professors need to see potential benefits to balance risk and time commitments, and (c) learning effective teaching practices requires effective facilitation plus significant time and commitment.

Index Terms – Change Process, Coaching, Faculty Development.

PROBLEM DEFINITION

A National Research Council committee [1] suggests that “a new theory of learning is coming into focus that will lead to very different approaches to the design of curriculum, teaching and assessment.” While the benefits of this new theory may be profound, several past projects have revealed that effectively changing practices is very difficult. This finding led to a question: “*What are the central issues (i.e. most important problems) that arise when we endeavor to change teaching practices to align with scientific understandings of human learning?*” The aim of this work is to begin to uncover the real problems that are associated with creating change. The population of this study is the engineering faculty on our campus. Our context is limited to the perspectives of classroom teachers, and our sample is a group of ten professors and two graduate students.

METHODS FOR UNCOVERING ISSUES

We gathered qualitative data from professors during the course of a semester. During this time, these educators implemented a teaching process called the Coaching Paradigm Model (CP-model). The CP-model is based on (a) inquiry methods used by science educators and on (b) a teaching process developed by Wiske et al. [2]. The CP-model recognizes the individual uniqueness of each student and centers on the student as an active performer of engineering, not as a passive recipient of knowledge. The role of the teacher is to structure learning (select outcomes, design experiences, select methods, assess, etc.) and to coach the students so that they take control of their own learning.

The team met approximately six times during the semester. Between meetings, professors implemented one cycle of the CP-model. At meetings, we discussed successes, failures, and issues. In addition, team members read short selections from relevant literature, and we discussed these readings. Synthesis activities near the end of the project were used to create results.

SYNTHESIS OF RESULTS

At the end of the project, the professors discussed this question: “*What is challenging about the new ideas of teaching and learning?*” A summary of the results (priority order) is presented in Table 1. One interesting finding relates to the individual perspective of each professor. Strengths of one professor will be a weakness of another.

Table II shows a result developed by discussing a second question: “*Why is it that most engineering educators continue to teach in traditional ways, even though cognitive researchers and educational practitioners have revealed methods that are far more effective?*”

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Table I Challenges Identified by Professors
Knowing learners. Establishing personal connections. Determining developmental level and learning style. Assessing performance abilities. Learning students' background experiences.
Assessing Learning (formative assessment) Establishing validity. Developing time-effective methods. Not being overwhelmed by assessment.
Setting goals (outcomes) for learning. Intertwining process and content goals. Intertwining lesson, course and curriculum goals. Setting a few goals. Designing iterative learning experiences.
Providing feedback. Being time effective. Giving a balance of positive and negative feedback. Being honest when performance is poor. Aligning feedback with student motivations.

Regarding the last topic in Table II, one professor had a very interesting insight. When learning to teach, professors need to play the roles of students who are in an effective learning environment. That is, faculty development programs should use team-based learning that involves learning by doing, and continual feedback to help each professor improve performance. This concept, which is sometimes called a Professional Learning Community, has been identified as effective for faculty development [3, 4].

Table II Reasons to Explain Inertia in Education
Lack of Awareness. Beliefs that present teaching/learning practices are nearly optimized. Inability to comprehend or consider that there are new possibilities. Beliefs that traditional education works because "it worked for me when I was student." Beliefs that traditional practices are acceptable because everyone else follows these practices. Lack of training.
Perceived Risks Versus Rewards. Risks due to potentially lower teaching evaluations. Required time commitments. Lack of papers and proposals to support tenure, promotion and annual evaluation. During evaluations, others will not recognize any value in changing educational practice (after all, teaching is nearly optimized).
Effective Learning of Teaching Practices is Challenging. Relevant literature is difficult to learn and transfer to practice. Professors need an effective learning environment that involves learning by doing. New ideas are hard to transfer to practice. Teachers need to be taught using "highly effective" methods that are aligned with the science of learning. Teachers and students are very comfortable with lecture and homework format.

CONCLUSIONS

Taken as a whole, our results suggest that the central issues that stand in the way of education reform are:

1. **Awareness.** Overall, most professors believe that present practices are effective. Thus, there is no real reason to change.
2. **Risk and Rewards.** Once professors become aware of the need for change, they have to invest the requisite time and energy. This requires risk and commitment and is not very well supported by the traditional reward system.
3. **Learning is effortful.** Once professors become aware of the possibilities of effective practice, they need to learn many new performances. This learning requires both an effective process for learning and a substantial investment of time and effort.

These results are tentative and limited to the sample population used in this study. The next phase of this project involves a two-year professional development project that involves about 40 professors.

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