USING LANGUAGE AND STUDENTS' RELATIONSHIP TO AUTHORITY TO UNDERSTAND THE LEARNING PROCESS

David DiBiasio1, Lisa Comparini2, William Clark1, Anthony Dixon1

Abstract — In this presentation we describe work aimed at understanding student learning in the early stages of their professional education. The role of language—that of the teacher and that used by students during the learning process, is an important factor in understanding learning. The students’ relationship to authority can also be an important indicator of their intellectual development. Our work probes these effects and suggests how as teachers we can approach the limits in student learning. We will use transcripts and/or video of student groups, and written student work from project reports and exams as evidence for our analysis.

Index Terms — situated learning, cooperative learning

Instructional design based upon situated learning theory includes authentic activities and contexts, collaborative knowledge construction, and opportunities for articulation of knowledge during the learning process. Usually upper level courses provide these elements. Providing them at lower levels of the curriculum is problematic. We believe that situating learners solely as students, early in the curriculum, puts them at a disadvantage compared to learning environments that situate them more like novice engineers. We will present evidence for why this learning environment works as early as the sophomore year in chemical engineering and discuss its limitations.

We videotaped student teams working on open-ended problems [1]. Analysis of the tapes showed that teams producing superior solutions exhibited a markedly different verbal exchange than did other teams. Group problem solving was more advanced when students participated in a discourse of engineering that included particular kinds of verbal communication and relationships to authority. Successful teams used language that aids them in problem solving. They use authoritative sources such as the professor and textbook as useful resources, and generally take a stance of authority similar to that of a novice engineer. Through language they situate themselves as chemical engineers attacking a problem. Less successful teams seek answers from authoritative sources before constructing a solution. Very often their solution is naively built or it contains errors that are not recognized or challenged. Such teams situate themselves more as students of chemical engineering, searching for a solution rather than constructing one. Their language reflects distance from the discipline, and frustration and difficulty with their relationship to authority.

We believe that this learning process directly results from the educational context. We know that small group cooperative learning is effective and that language is not the only factor involved in student learning. However, language used in class, homework assignments, and projects that mirrors an authentic situation promotes successful problem solving and student confidence. The absence of such language reinforces situating the learner as student---a subtle but important difference. Our results also suggest that cooperative learning in the absence of such language may be much less effective than when authentic language and contexts are present.

Late in the sophomore year we combined an open-ended group project with a requirement that students assume a high level of authority—that of the teacher. Results from two years of this exercise indicated limited success. Even the best students struggled with this learning context and produced mediocre work. It appears that the complex relationship among authority level, verbal and written discourse (particularly the role of audience), and context can result not just in limitations in student learning, but may even be detrimental. Understanding these limitations is important if we are interested in optimizing student learning. Throughout our presentation we will use transcripts and/or video of student groups, and written student work from project reports and exams to support the above discussion.

ACKNOWLEDGEMENT

The authors acknowledge funding by the Department of Education (FIPSE), grant number P116B60511.


1 Department of Chemical Engineering, Worcester Polytechnic Institute, 100 Institute Rd., Worcester, MA 01609
2 School of Family Studies, University of Connecticut, 348 Mansfield Road, U-2058 Storrs, Connecticut 06269-2058