Abstract

Personalized Learning and Technology for Designing Motivational Chemistry Courses
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Many advances have been made in the learning sciences and instructional sciences that can improve the ways we teach chemistry. To attract more students to become chemists, motivational design of chemistry courses is key. In his *Needs Theory*, David McClelland (1987) identifies three great motivators: need for achievement, need for affiliation, and need for power.

Need for achievement can be addressed by using competency-based learning (CBL), whereby students only advance to a new topic when they have mastered the current topic. Mastery gives the student a powerful sense of accomplishment. Furthermore, problem-based learning (PBL) creates more authentic achievement and a more intrinsically motivating goal than just getting a grade, so it further enhances the motivational effect of achievement. Design issues include personalized selection of problems based on course objectives and assessment of individual mastery of chemistry concepts, principles, and procedures.

Need for affiliation can be addressed by using collaborative learning (CL) or team-based learning for PBL projects. The social dimension of learning is a powerful motivator if done well. Design issues include selection of team members, coaching of teams, and reflection on team processes and solutions.

Need for power can be addressed by using self-directed learning (SDL) by both teams and individuals during PBL. Design issues include selection of problems, organization of teams, management of the problem-solving process, assessment of learning, and reflection-in and -on practice. Personalized learning and advanced technologies are highly instrumental for affording this kind of learning environment.

This presentation will offer specific validated guidelines for designing such motivational learning experiences for chemistry courses by implementing CBL, PBL, CL, and SDL through the use of both personalized learning and technology tools.

McClelland, D. C. (1987). *Human motivation*. Cambridge, England: Cambridge University Press.