

“Innovation in the Engineering Curriculum through Active Learning”

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We are on the cusp of a sea change in STEM education. The adoption of active learning approaches is accelerating, and 20 years from now we may well view this era as a turning point. The concept of active learning is not new, and its advocates have long extolled the value of experiential approaches to teaching and learning. The catch phrases may have changed – hands-on now includes “minds-on,” and experiment has evolved into empowerment – but the core concept has remained true: when it comes to learning, there is greater value in learning by doing. It is not enough for students to merely know the “how” (i.e., how to solve a partial differential equation), but what is more important is the “why” (why is this equation needed, and when is it applicable). This convergence of trends has provided impetus to the notion that now is the time for teaching to change. Although the foundations of theoretical knowledge are as essential as ever, millennial “digital natives” hunger for relevance and interaction. Today’s professor must therefore be more guide than guru.

Georgia Tech has been a leader in this area– from both a curricular and co-curricular point of view. We have done so by revising curricula, introducing new pedagogical approaches, and creating new spaces for students to explore, all for the purpose of tapping the imagination and enterprising nature of our students. We have pioneered the use of problem based learning – a student-focused approach in which the students learn by direct experience (with minimal lecturing) – as an introductory approach for students in newer fields like biomedical engineering. Further, we have developed a Vertically Integrated Projects (VIP) program in which cross-disciplinary teams of students – from sophomores to PhD students – function like design teams in industry and work on projects that can last several years in duration. We are enabling these curricular initiatives with innovative learning spaces such as our “Invention Studio” and complementing them with co-curricular competitions like the “Inventure Prize.” In short, what we are doing is empowering students and researchers to be interdependent learners who are fearless in the face of complex problems. This lecture will explore and discuss these various initiatives.