How Evidence Based Teaching Methods Have Transformed University Education and Hastened the Death of the Traditional Lecture

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American Higher Education has undergone dramatic changes in the past 10 years. A myriad of political, socioeconomic, and demographic changes have reshaped the composition of the University undergraduate population. For example, 19% of incoming first year students at the University of North Carolina are first generation college students, and 13% come from families with yearly incomes more than 200% below the national poverty line. Furthermore, the Latino enrollment in two and four year colleges and Universities is growing at a rate that outpaces immigration, making Latinos the largest underrepresented minority group in the nation (excluding Asians). Simultaneously, the United States economy is changing from manufacturing to an innovation and technology driven economy that requires a 34% increase in Science, Technology, Engineering, and Mathematics (STEM) graduates. Lamentably, the United States has fallen far behind other industrialized nations in reading comprehension, math, and science. Furthermore, we are failing to retain students from all demographics in the STEM disciplines, particularly minorities and first generation students. The President's Council of Advisors on Science and Technology noted that only 14% of minority students who originally began matriculating in a STEM field completed a Science degree. Importantly, while race and gender do play a role in STEM completion, the socioeconomic status of a student is a significant factor in STEM retention. National data have shown the traditional lecture format, which was embraced and used for hundreds of years, fails to meet the desired learning objectives for this changing population of engaged students. As a result, American higher education is moving away from the model of the "teacher centered" classroom to a more "student centered" environment. The process of challenging one's deeply engrained belief in "lecture dogma" and actively moving towards a highly structured, student focused classroom is a difficult task for student, professor, and institution. However, our data show that by using techniques such as reverse course design, problem based learning, and experiential education improve student learning independent of socioeconomic background, race, or gender. The ability to rigorously and formatively assess student learning outcomes has shown learning gains to be statistically significant for all undergraduate students in our large introductory courses.