Chemistry Placement at the University of Michigan: Burdening At-Risk Students while Propelling Others?

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The Michigan Model

Since 1989, the University of Michigan has employed a curriculum model that allows well-prepared freshman students to opt out of the first semester of general chemistry. Chemistry and math placement exams are routinely given during orientation and used to determine placement. If a student performs above the 70th percentile in chemistry and the 30th percentile in math or if they have a chemistry AP score of 4 or 5 they are advised to take organic chemistry first. If not, they are advised to take general chemistry. General chemistry (Chemistry 130) stands alone, as it either fulfills the chemistry requirements for disciplines like engineering or it strengthens the background of students who did not meet departmental standards for direct placement in organic chemistry.

We report the results of a post-hoc analysis of 10 years of archived student data (ca. 26,000 students) who have taken chemistry courses from Fall 2002 - Fall 2012.

Who took introductory chemistry courses?

How does CSP affect students?

The Comprehensive Studies Program (CSP) was established to support and retain underrepresented and economically disadvantaged students. Some students are advised to take the CSP section of general chemistry, but not all students follow this advice.

Does taking Chem 130 help students in their subsequent chemistry courses?

Conclusions

1. Women, African American and Hispanic students were often placed into Chemistry 130. White males and Asian students were more often placed in Chemistry 210. Males were more likely to take Chemistry 130 against advising, even when the engineering students were removed from the set. Females were more likely to skip Chemistry 130 against advising.

2. Students who opted to skip Chemistry 130 and take Chemistry 210 first, paid a small but noticeable grade penalty in both Chemistry 210 and 230 relative to students who performed similarly on the placement exam. This is also observed when the same comparison is made for students who did not take it against advising. Importantly, students in at-risk ethnic groups who took CSP were the second least likely to persist to Chemistry 230. Students who took Chemistry 130 against advising had the lowest withdrawal and second lowest failure rates. Hispanic and African American students, have the highest failure and withdrawal rates of any ethnic group in all three course and were the least likely to persist to Chemistry 230.

Acknowledgements

Additional thanks are due to the Center for the Education of Women Reicker Undergraduate Research Fund and Arianna Griffin.