## Topic Category Education and Professional Development

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### Diversity is the Key to Innovation-Connecting diversity in the Molecular Foundry user program and beyond

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This report investigates and evaluates diversity, inclusion, and equity (DEI) among users at Berkeley Laboratory's Molecular Foundry. The researchers assessed and quantified inclusion among users from Minority-Serving Institutions (MSIs) in the user programs and proposal review boards by compiling demographic data of Foundry users, analyzing trends over time, and testing correlations between user proposal acceptance rates from MSIs and primarily white institutions (PWIs). The results show a mean average of a nine percent difference in user proposal acceptance rates from MSIs and PWIs from 2015 to 2021. In addition, demographic trends over time demonstrate a lack of growth specifically among Black, Latinx, and Native American users. The discrepancy in user proposal acceptance rates from MSIs and the lack of increase among underrepresented minorities highlight the need for formal and strategic outreach programming. The research group recommends that the Foundry develop and implement DEI outreach programming by partnering with diverse institutions, engaging in existing programs, establishing mentoring programs, and creating a more robust visiting faculty program.

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### The Biochemistry Authentic Scientific Inquiry Lab (BASIL) provides a framework for learning Michaelis-Menten kinetics

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BASIL (Biochemistry Authentic Scientific Inquiry Lab) is a course-based undergraduate research experience (CURE) that focuses on enzyme function prediction. The Protein Data Bank (PDB) contains the structures of over 4000 proteins of unknown function and BASIL provides a basis to assign functions by combining computational and *in vitro* analyses. The final BASIL module focuses on a kinetic analysis of the purified protein. In this pilot study we investigated if the BASIL CURE promotes the development of student understanding of Michaelis-Menten kinetics. Through content analysis of the written BASIL modules and inductive analysis of instructor interview transcripts, an "expert answer" was determined and categorized into three overarching themes: the function of an enzyme is to convert a substrate to a product; an assay can visualize the conversion of a substrate to a product; and data from an assay needs to be graphically organized to yield useful information to characterize function. The ideal answer subthemes then were aligned with the course-based undergraduate research abilities (CURAs) identified by Irby et al. (2018). Student research posters and semi-structured interviews with students who have participated in BASIL at Ursinus College were analyzed in order to compare them with the "expert answer." Results suggest that students appear to understand the function of an enzyme and can interpret findings from an activity assay, yet they are lacking an in-depth understanding of the required data manipulation or underlying meaning of a graphical analysis of kinetics data. In the longer term, this research is aimed at informing improvements in the teaching, learning, and assessment of this area of the BASIL CURE. In particular, the findings will focus on addressing the various identified student difficulties so that the BASIL CURE can come closer to achieving its primary goal of developing students as research scientists.

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