

SSLEQ-PHYSICS: DEVELOPING AND VALIDATING A SURVEY TO MEASURE STUDENT ENGAGEMENT IN SCIENCE LABORATORIES

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Student engagement is a holy grail in science learning, and it is a multifaceted construct having different dimensions (Fredricks, 2011). It has been conceptualized and measured (Sinatra et al, 2015). However, this area is under researched in undergraduate physics. In science, experiments can often be used to engage students providing hands on experience in connecting theory to the practical; some students engage with it, others don't. Designing of experiments to engage students is not a trivial task. The research we are presenting aims to design experiments using a novel idea of integrating inquiry skills, modelling and technology and explore student engagement in physics laboratories (Kota, 2019). A survey, SSLEQ (Science Student Laboratory Engagement Questionnaire) was used to measure students' cognitive, behavioural and emotional engagement. The questionnaire from the ASLE survey (Barrie et al., 2019) and the AEQ-Physics Prac (Bhansali & Sharma, 2020) were adapted. SSLEQ includes items measured on a Likert scale and open-ended questions. The items for cognitive engagement are about *motivators* underpinning understanding of content and development of skills. The items for behavioural engagement query the *resources* provided such as experimental lab notes and demonstrators' help. For the emotional engagement, *emotions* explored positive and negative thoughts. Confirmatory factor analysis and descriptive statistics conducted with a sample of 304 first year physics students confirm the reliability and internal validity of the survey for the purposes of this study. This survey can now be used in other contexts providing academics with measures of three types of engagement for use in science courses to positively influence students' engagement with physics laboratory exercises.

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