PHYPHOX SMARTPHONE LABS IN PHYSICS EDUCATION: BREAKING THE VICIOUS CIRCLE OF STUDENT DISENGAGEMENT

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Since the late 1960s, there has been a consensus that rote science learning has long-range negative consequences for student learning. Across the Western world, a number of well-funded reforms attempted to address this problem. Yet, the vicious circle of student science disengagement has continued. We believe that one of the reasons for this phenomenon is that, by and large, science teaching hasn't changed sufficiently to meet the changing needs of the 21st century students. While many novel science education technologies have emerged lately, few secondary teachers have taken full advantage of these innovative tools. Surprisingly, instead of using already available technology, such as phyphox smartphone app (Staacks et al., 2018), to alter how secondary students engage with physics learning, technology is too often used to support old ways of learning physics, such as passively watching videos of recorded experiments or doing cookbook labs with computer simulations. Even the COVID-19 school closures and remote teaching are yet to become catalysts for re-evaluating secondary student science engagement. Paradoxically, as students become more engaged with their new digital tools (e.g., smartphones) in their personal lives, they become more disengaged from their formal K-12 science learning.

We discuss how smartphones, novel technologies that 21st century students already have in their pockets and use daily for social interactions, can help break the vicious circle of secondary science disengagement by inspiring students to do data-driven science at school and at home (Milner-Bolotin & Milner, 2022; Milner-Bolotin et al., 2021). First, we propose a pedagogical approach for using smartphones in a science classroom to conduct hands-on inquiry that focuses on experimental design, data collection, and analysis. Second, we describe our experience of using this approach in a secondary physics classroom, as well as during the province-wide annual Physics Olympics event that takes place at the University of British Columbia (Milner-Bolotin et al., 2019). Third, we discuss how science educators can support new and practicing teachers in implementing this novel smartphone technology – phyphox – in their classrooms through mentorship during the physics teacher education and professional communities of practice.

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