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2024 SEA Faculty Meeting Abstract

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Gamify Growth: A literature review on metacognition and gamification in CURE courses

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Course-Based Undergraduate Research Experiences (CUREs) are a high impact pedagogical practice designed to include more students in research in a course setting. Previous studies have demonstrated that CUREs enhance students’ confidence and scientific identity which also improves persistence in science. A CURE builds on the foundation for student success by giving students an opportunity to learn techniques, design and carry out their own experiments and then interpret data and communicate their results. In research-based courses the thrill of discovery is equally met with the dismay of a failed experiment. Students in the same course are also in different phases of the experiment and instructors are challenged to mentor the students through the uncertainty of research while still trying to unify all the students enrolled in a course. These aspects highlight two instructional challenges for CUREs are the need for student reflection on their research progress and motivation. This presentation will review published literature on two pedagogical approaches that may meet these challenges: metacognition and gamification. Metacognition (reflecting on one’s own learning) can contribute to student learning irregardless of phase of the experiment as well as future success in research. Metacognition is especially important in research due to the cyclical nature of the scientific process. While there may be informal metacognition that occurs during the CURE course, previous work has analyzed the impact of formative assessments designed to promote metacognition. Gamification is a pedagogical practice that incorporates elements like badges into non-game contexts with the goal of increased motivation. Previous studies have successfully incorporated gamification in science courses to promote student achievement. It is possible that the incorporation of some aspects of these metacognitive and gamification practices may promote student learning and increased research skills.