

Lemongrass room
1.35-2.00pm

Building inquiry-based writing into the laboratory classroom

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There has been a widespread effort in recent years to move classroom laboratories away from step-by-step experimental instructions and toward inquiry-based learning experiences (Baseya & Francis, 2011). However, this turn toward inquiry-based learning is only now developing instructional methods for integrating inquiry-based writing practices, which have been widely successful in the social sciences and humanities, into the scientific laboratory course. Based on the proposal by Moskovitz and Kellogg (2011), we designed and implemented inquiry-based laboratory sessions with inquiry-based writing as the assessment in a tertiary level introductory bioinformatics course.

We designed a pipeline to generate unique, novel, biologically plausible DNA sequences for each student where the unknown sequences present authentic, challenging scientific problems. After guided instruction in relevant bioinformatics tools, students investigated their assigned sequences independently. With the novel and unique sequences, the learning experience represented a true inquiry. The key components of assessment were writing assignments that were condensed forms of a typical scientific research paper, focusing on the reasoning of their strategy, appropriate implementation of tools and algorithms, and critical interpretation of results. Because the sequences were double-blinded, the teaching staff—the audience—assessed student writing as scientists read other scientists, evaluating how clearly and convincingly their arguments were formulated.

We tested the approach first in a seven-day workshop (35 students) at Perdana University Graduate School of Medicine in Kuala Lumpur. We observed dramatically improved student engagement, and indirect evidence of improved learning outcomes over an earlier workshop with identical content but no inquiry-based writing programme. Student feedback showed initial discomfort with the challenge represented by the writing component quickly abated in favor of an overall positive response and increasing comfort with the high demands of student writing. We ran a full programme in a semester-long undergraduate module at the National University of Singapore (155 students) and saw similarly encouraging results.

References

Baseya, J. M., & Francis, C. D. (2011). Design of inquiry-oriented science labs: Impacts on students' attitudes." *Research in Science & Technological Education*, 29(3), 241–55.
<http://dx.doi.org/10.1080/02635143.2011.589379>

Moskovitz, C., & Kellogg, D. (2011). Inquiry-based writing in the laboratory course. *Science*, 332(6032), 919–20. <http://dx.doi.org/10.1126/science.1200353>