

Scientific Literacy Assessment Summary

Executive Summary

During the Spring 2019 semester, the Drake Curriculum Analysis Committee (DCAC) reviewed the Scientific Literacy (SL) Area of Inquiry (AOI) by analyzing student self-perceptions of academic engagement and perceived learning gains, and by initiating a faculty review of student work in the AOI. The SL AOI consists of the following outcomes: (1) scientific methods, (2) scientific reasoning, (3) scientific theories, (4) interrelationships between human societies and the world, and (5) relevance of science.

1. Apply the methods of science for the generation, collection, assessment, and interpretation of scientific data and/or phenomena.
2. Use scientific methods and ways of thinking to solve problems.
3. Describe scientific theories on cognitive and behavioral, intellectual, or physical development.
4. Articulate the interrelationship of the development of human societies with the natural world around them.
5. Articulate the relevance of science to the global community in order to serve as active stewards for the natural environment.

Drake students rate their perceptions of their abilities to “read and understand scientific writings written for an informed lay audience” lower among the suite of general education skills and abilities (62% of undergraduates reported “strong” or “very strong” skills on the 2018 Drake Student Survey). However, students’ perception of their skills significantly change ($p < 0.05$) throughout their time at Drake and the growth in students’ perception of their skills for scientific literacy is higher than most of the other skills ($d = 0.42$; 2nd highest).

Faculty review of student work revealed basic competence of learning outcomes. Faculty largely found that students are able to understand (method, theories) and apply (reasoning, relationship, relevance) a body of scientific knowledge; however, students are less willing or able to go deeper beyond what faculty explicitly ask of them or make connections amongst disparate material. During the AOI workshop, faculty discussed that the primary challenge for this AOI is to encourage deeper investigation or higher-order learning about scientific concepts. Barriers toward achieving this goal include: (1) the difficulty of balancing content and skills or “the body of knowledge” with the “why,” (2) courses which serve to introduce a discipline, and (3) large class sizes. Opportunities to enhance achievement of this goal include: (1) integration of concepts, (2) effective pedagogies, and (3) intentionality in thinking about the needs of non-majors.

To address these concerns, DCAC has developed the following recommendations.

Concerning course development,

1. Examine curricular practices that enhance all students’ abilities to apply scientific concepts.

2. Investigate curricular practices that ensure the best pathways for non-major students.

Concerning pedagogy and practice,

3. Provide opportunity for faculty to learn new pedagogies and develop skills, including scaffolding, inquiry/problem-based learning, and case studies.
4. Provide best practices and resources (assignment design, course activities) to aid faculty in developing or improving AOI courses. Examples include the Case Study Resource Bank and the BlackBoard Community of Practice.

Concerning resources,

5. Investigate non-major pathways through the Scientific Literacy AOI to ensure that non-majors have expanded course options that provide the opportunity to develop the ability to apply scientific concepts.
6. Embed peer mentors in large science classes to allow faculty more time to spend on the application of knowledge, rather than learning the body of knowledge.