Five-year Assessment report: Objective 5

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A. Evaluate the assessment plan for each course, together with its implementation, Provide a brief summary of the Committee's findings in this area. Describe any recommended changes.

The committee reviewed all of the approved and pending assessment plans for Objective 5, with descriptions of each below.

BIOL

The BIOL 1100/1100L/1101/1101L assessment plan details how each objective is assessed, in what format, and how frequently. It also provides examples of common exam/quiz questions and lab exercises that are administered to all sections of this course. The BIOL 1101/1101L assessment plan also provides detailed goals and objectives of the course and how they are aligned to Objective 5. The Committee considers the assessment plan is appropriate and offers no suggestions; the Department of Biological Sciences' Undergraduate Education Committee, however, has expressed plans to consider revising the assessment plan over the next year to better suit their needs.

CHEM

The assessment plans for CHEM 1100, 1101, 1102/1103L, 1111/1111L, and 1112/1112L use targeted multiple choice questions, free response questions, and, for lab classes, laboratory reports to assess the Objective 5 learning competencies. Classes with no associate lab component do not include assessment of competency 5 due to the nature of that learning outcome. Data for assessment in all courses is collected every fall semester. The Committee finds the assessment plan to be appropriate and offers no suggestions.

GEOL

The GEOL 1100/1100L and 1101/1101L assessment plans detail the use of specific exam questions, homework assignments, and lab exercises to measure student achievement in the Objective 5 learning competencies. Grading rubrics and sample assignments are included in the plan appendices. The Department of Geosciences notes that recent curricular changes toward more local, place-based geologic examples will be included in future revisions of the assessment plan for this course. They also note that they are currently redesigning their lower division curriculum and may choose to discontinue GEOL 1101/1101L pending further discussion. The Committee considers the assessment plans appropriate and offers no recommendations.

NTD

The NTD 2239 assessment plan describes the use of specific exam questions and assignments to evaluate student learning in competencies 1-4. Because this course does not have a lab component, learning objective 5 can not be assessed. Grading rubrics are used for evaluation of assignments. The assessment plan and the implementation of that plan are appropriate for evaluating these learning objectives. Of note, due to significantly increased class sizes (from 50 students per semester to 300 students per semester), evaluation methods for the approved assessment activities described above are being reevaluated to make the assessment process more manageable and efficient. A revised assessment plan will be submitted to reflect the changes in the evaluation process. The Committee considers the assessment plan appropriate and supports the Department of Nutrition & Dietetics in their consideration of revising the plan given their increased enrollment.

PHYS

The following courses do not yet have approved assessment plans, nor are their drafts available to this Committee: PHYS 1100, 1101/1101L, 1111/1113 (lab), 1112/1114 (lab), 2211/2213 (lab), 2212/22014 (lab). New assessment plans are being developed by the Physics Program but have not been available to the Committee to review.

PHYS 1152 and 1153 (lab) do not currently have approved assessment plans. The pending plans describe how each objective will be assessed, how frequently, and what tools will be used. Pending plans detail the use of standardized astronomy concept tests at the beginning and end of the course for competency 1; the evaluation of a formal lab report and process of science lab for competencies 2, 3, and 5; and an essay assignment for competency 4. The Committee considers the pending assessment plans in keeping with approved assessment plans for other Objective 5 courses, but would suggest the addition of samples of the assignments used in an appendix.

B. Evaluate the assessment outcome for each course. To what extent are students in each course satisfactorily achieving the learning outcomes for the objective? Provide a brief summary of the Committee's findings in this area. Describe any recommended changes.

BIOL

The outcomes provided come from the lab sections, which all students are enrolled in and from which comprehensive data are collected by the faculty coordinator. For AY 2018-2019, the average passing for each competency under Objective 5 was 95% (BIOL

1100/1100L) and 97% (BIOL 1101/1101L). Students are satisfactorily achieving the learning outcomes for Objective 5. However, the Department of Biological Sciences has hired many new faculty that teach Objective 5 courses and the department's Undergraduate Education Committee plans to revisit assessment plans over the next year with input from faculty.

CHEM

The outcomes come from both lecture and lab portions of Chemistry courses. The average success rate for each competency under Objective 5 for all semesters reported were 87% (CHEM 1100), 85% (CHEM 1101), 94% (CHEM 1102), 99% (CHEM 1103), 85% (CHEM 1111/1111L), and 91% (CHEM 1112/1112L). Students are satisfactorily achieving the learning outcomes for Objective 5.

GEOL

Students in GEOL 1100/1100L are satisfactorily achieving competency in Objective 5. For the past three years, the average student pass percentage across all competencies has been 84-89%. Similarly, assessments of student learning in GEOL 1101 and 1101L scored greater than 70% for all competencies over a five-year period.

NTD

Students in NTD 2239 were reported to have achieved at least 80% in each of the measured competencies based on exam questions, case studies, diet analyses, and critical review assignments. This class satisfactorily meets the competency expectations for Objective 5.

PHYS

As there are currently no approved assessment plans for PHYS courses, the results reported here are based on pending/unaccepted plans. Competency 4 has not been evaluated in these plans, however, the Physics Program has been developing a new assignment specifically for this learning competency. The reported data indicate that the Physics courses are meeting the Objective 5 competencies. PHYS 1100 had 61-67% success in competency 1, 90% in competency 2, and >80% in competencies 3 and 5. PHYS 1102/1101L had 75% for competencies 1 and 3 and >90% for competencies 2 and 5. PHYS 1111/1113 had 77% satisfactory levels in competency 1, with 2, 3, and 5 all above 90%. In PHYS 1112/1114, competencies 1-3 and 5 all reported >90% successful achievement. Students in PHYS 2211/2213 demonstrated 63% achievement of competency 1, and >80% in 2, 3, and 5. PHYS 2212/2214 had >80% achievement of all measured competencies. No data was available for the pending PHYS 1152/1153 assessment plan.

The Committee notes that the Department of Physics is working to develop new assessment plan proposals for submission to GERC. Given the lack of approved plans, we are impressed by the efforts to assess the Objective 5 learning outcomes.

General notes on implementation

The Committee noted that different departments appear to use different approaches when selecting materials for evaluation. For example, some programs appear to have considered all non-zero grades (submissions) while others used a random selection of assignments or some other criteria. The differences in approach do not represent a problem. However, the lack of information regarding how materials were selected for review makes it difficult for an outside entity to evaluate widely varying self-reported outcomes. The Committee recommends that GERC either a) include a question about this on future report forms, or b) provide guidance for a preferred practice.

The Committee also notes that some courses had the same percent success recorded in every category for a single year. We speculate that these values may come from estimated, rather than calculated, outcome measures, or that they may be the byproduct of the assessment approach used by that reviewer.

In general, the Committee noted that many of our programs would benefit from greater clarity around GERC assessment expectations and simplified assessment plans. Clarity from GERC could include answers to the following: How many students should be reviewed for a given class?; How many, and what kinds, of student artifacts should be archived?; Is there an example template of a good assessment plan to guide programs less familiar with this style of assessment?; What should the success threshold be? Is it a passing grade? Exemplary/Adequate/Insufficient? The Committee also recommends that each program communicate clearly about General Education competency expectations with each section instructor, including providing standard exercises, labs, or exam questions that correspond to each Objective 5 learning competency.

C. Evaluate the list of courses currently approved to satisfy the objective. To what extent does the current list contribute to a strong, coherent system of general education? Would a reduction or increase in the number or variety of courses in this objective strengthen the overall system? Provide a brief summary of the Committee's findings, Describe any recommended changes.

The current list of courses currently approved to satisfy Objective 5 successfully contributes to a strong, coherent system of general education by following national guidelines for science education that attend to not only what we know (disciplinary

content) but how we know and why we accept certain explanations for scientific phenomena in light of plausible competing alternatives (scientific practices).

No changes are recommended by the Committee.

D. Evaluate the stated learning outcomes of this general education objective. Are there any problems with the learning outcomes as currently described, or ways in which they might be improved? Provide a brief summary of the Committee's findings in this area. Describe any recommended changes.

The learning outcomes for Objective 5 are:
Upon completion of a course in this category, a student is able to demonstrate at least four (4) of the following competencies.

1. Apply foundational knowledge and models of a natural or physical science to analyze and/or predict phenomena.
2. Understand the scientific method and apply scientific reasoning to critically evaluate arguments.
3. Interpret and communicate scientific information via written, spoken, and/or visual representations.
4. Describe the relevance of specific scientific principles to the human experience.
5. Form and test a hypothesis in the laboratory or field using discipline-specific tools and techniques for data collection and/or analysis.

The Committee recommends that competency 1 be revised to state "Apply foundational knowledge and models of a natural or physical science to **recognize,** analyze, and/or predict phenomena." We further recommend that competency 2 clearly include "scientific methods" as general processes and approaches in addition to the traditional Scientific Method.

E. Evaluate the objective itself and its place within the system of general education. To what extent does the objective, in its current form, contribute to a strong overall system of general education? Are there ways in which the objective could be modified to improve it? Could the system be improved with its elimination of replacement? Provide a brief summary of the Committee's findings in this area. Describe any recommended changes.

Objective 5, Scientific Ways of Knowing, provides an important contribution to the general education system at ISU. This objective helps students to develop critical thinking and analytical skills through the application of scientific principles, enabling students to collect, analyze, and interpret data in order to better understand the world around them. The Committee does not recommend any changes to Scientific Ways of Knowing within the general education system.

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