**GE IB PHYSICAL UNIVERSE & ITS LIFE FORMS:**

**SLO Evaluation Report July 2023:**

**Background/Description of GE Program ePortfolio:**

Prior to the 2017-2018 AY, departments/programs were responsible for assessing GE student learning outcomes and submitting a report every year for the GE Committee to review. This system had several weaknesses. Departments and programs were responsible for deciding which of the two to four outcomes designated for a specific GE Area to assess; thus, some outcomes were evaluated multiple times within a year and others were not evaluated at all in certain years. It was also not possible for departments to access and evaluate a representative sample of student work, nor was it possible to compare the results from GE courses in the same GE Area taught by different departments/programs, because each department/program used its own criteria/rubrics. Finally, the GE Committee was not able to review and analyze the GE assessment reports in a comprehensive fashion, since the committee was also tasked with reviewing all GE curriculum proposals, as well as with discussing and updating GE policies and procedures.

Therefore, Fresno State developed a proposal for a new system of evaluating GE student learning outcomes during the 2014-2015 AY. The proposal was approved by Fresno State’s Academic Senate in May 2017 and by the President in August of 2017. Essentially, all freshmen and transfer students admitted to Fresno State beginning in Fall 2018 will submit one designated assignment aligned to one GE student outcome from lower-division (for freshmen) and upper-division (for freshmen and transfer students) GE courses to a GE Program ePortfolio. Students will also write 300-word reflections (freshmen write three and transfer students write one) about their learning and submit these to the GE Program ePortfolio. The GE Program ePortfolio was set up by the Director of Assessment and students were automatically enrolled. Handouts, videos, and other resources that were posted previously to Blackboard were uploaded to Canvas when the campus transitioned from Blackboard to Canvas.

During the first year of implementation (2017-2018 AY), efforts focused on electing members to the new GE Assessment Subcommittee and on approving common rubrics to be used to evaluate GE student learning outcomes. Fresno State’s GE student learning outcomes were approved by the Academic Senate in 2010. These forty outcomes were originally to be evaluated on a five-year rotating schedule. With the addition of Area F to the GE curriculum, the outcomes are now evaluated on a six-year schedule.

The ePortfolio submission process will change in Fall 2023. The university contracted with Canvas to develop an assignment LTI that eliminates the need for students to submit the designated assignments to their ePortfolio. When GE faculty set up their course in Canvas, they designate which assignment is the ePortfolio assignment. When students submit the designated assignment to their professor, the LTI duplicates the assignment and seamlessly routes that copy to their ePortfolio.

In the 2022-2023 AY, the Director of Assessment selected a random sample of student submissions for the two learning outcomes in Area IC, Arts and Humanities.. The Chair of the GE Assessment Subcommittee selected two faculty members from the subcommittee to assess each learning outcome. The Director of Assessment collaborated with each team of subcommittee members to determine which assignments aligned well with the relevant learning outcome. The Director of Assessment then provided a random sample of assignments to the team, and they applied the appropriate rubric to assess the assignments and determine student proficiency in each learning outcome.

**GE Assessment Subcommittee: Evaluation and Norming Process:**

The GE Assessment Subcommittee had previously reviewed and approved common rubrics for evaluating each of the three GE learning outcomes designated for GE Area IB. Prior to conducting the assessment, the Director of Assessment met with each faculty team for the purpose of norming. Each team member had independently reviewed a sample of student work and used the rubric to evaluate the work. Where there were discrepancies in the team members’ ratings of proficiency or questions about the rubric criteria, the Director of Assessment and team members discussed the reasons for the differences and reached a consensus on how to apply the rubric going forward. The faculty teams then independently scored all the selected assignments. After scoring the work, faculty teams met to identify common strengths and weaknesses. A third reviewer scored all assignments on which the two reviewers did not agree about proficiency.

**Student Learning Outcomes and measures (assignments) used to evaluate proficiency.**

***Student Learning Outcomes for Area IB:***

1. Describe the inextricable connections between the physical universe, the life forms which inhabit it, and the mathematical models we use to describe it.
2. From the perspective of a particular scientific discipline, explain the ways in which science shapes our lives.
3. From the perspective of a particular scientific discipline, assess scientific issues including the value systems and ethics associated with them.

***Assignments:***

Multiple courses satisfy area IB requirements and were a source of assignments for this assessment. For learning outcome 1, these included Anthropology, Chemistry, Civil Engineering, Earth and Environmental Sciences, Natural Sciences, Physics, Plant Science, and Public Health. For learning outcome 2, these included courses in Anthropology, Civil Engineering, Earth and Environmental Sciences, Geography, Natural Sciences, Plant Science, Public Health, and Sociology. For learning outcome 3, these included courses in Anthropology, Geography, Natural Sciences, Plant Science, Public Health, and Sociology.

For learning outcome 1, topics included PCBs, earthquakes, origins of humanity, organic and conventional farming, light, teaching science, radon, and wildfires. For learning outcome 2, topics included earthquakes, hurricanes, pesticides, deforestation, global warming, air pollution, transportation, unsafe water supplies, and drought. For learning outcome 3, topics included renewable energy sources, algae blooms, rice growing, workplace safety, sustainable farming practices, stem cells, orangutans, and fast fashion.

**RESULTS**

**Results for Area IB, Learning Outcome 1**

The evaluation of IB learning outcome 1 resulted in the following ratings:

* Proficient 31 (93.9%)
* Developing 2 ( 6.1%)

Inter-rater reliability was 93.9%, exceeding Fresno State’s benchmark of 90%.

Students were rated proficient if they scored 3 (advanced) or 2 (proficient) on the rubric. Students were rated developing if they scored a 1.

The students did very well on this assessment. Faculty reviewers are not asked to reconcile ratings when they agree as to proficiency but disagree about rating a paper a 3 (advanced) or 2 (proficient). It is noteworthy that sixteen students earned scores of 3 from both reviewers. Some distinctions can be made based on the comments reviewers made for papers that each reviewer rated 3 (advanced) or 2 (proficient).

For assignments rated advanced, reviewers made comments such as these:

* Multiple connections made
* Explained multiple examples well
* Used multiple sources to support argument
* Excellent explanation of research studies used
* Conclusions well supported by the data

For assignments rated proficient (but not advanced), reviewers noted that the papers discussed sufficient connections, but could have strengthened their analysis. For example:

* Needed more explanation of the mathematical model
* Needed stronger connections
* More explanation of computations would be desirable

For assignments rated developing, reviewers made comments such as these:

* Too brief
* Analysis seemed confused
* Only one connection, not really explained.

In summary, papers rated advanced did a good job making multiple connections between the universe, its life forms, and mathematical models. The examples were explained well, with multiple sources cited. The conclusions were supported by the data. Papers rated proficient made sufficient connections but needed to expand their analysis. Papers rated developing needed more detail and clarity.

**Results for Area IB, Learning Outcome 2**

The evaluation of IB learning outcome 2 resulted in the following ratings:

* Proficient 30 (88.2%)
* Developing 4 (11.8%)

Students were rated proficient if they scored 3 (advanced) or 2 (proficient) on the rubric. Students were rated developing if they scored a 1. The students did very well on this learning outcome overall. It is noteworthy that twenty-one papers received a score of advanced from both reviewers.

Inter-rater reliability was 88.2%, slightly below Fresno State’s benchmark of 90%.

For assignments rated proficient, reviewers made comments such as these:

* Multiple effects of science on our lives presented
* Strong explanation of scientific concepts
* Strong explanation of research studies
* Used multiple scholarly sources to support analysis
* Very well researched paper
* Effective use of scientific data
* Good explanation of methodology
* Good discussion of advantages and disadvantages (anti-depressants)

For assignments rated developing, reviewers made comments such as these:

* Limited explanation of examples
* Minimal links to a scientific discipline
* Not sure what scientific principle is being discussed

**Results for Area IB, Learning Outcome 3**

The evaluation of IB learning outcome 3 resulted in the following ratings:

* Proficient 28 (93.3%)
* Developing 2 (6.7%)

Students were rated proficient if they scored 3 (advanced) or 2 (proficient) on the rubric. Students were rated developing if they scored a 1. The students did very well on this learning outcome overall. It is noteworthy that nineteen papers received a score of advanced from both reviewers.

Inter-rater reliability was 100%, exceeding Fresno State’s benchmark of 90%.

For assignments rated proficient, reviewers made comments such as these:

* Good choice of timely scientific issues; for example, agricultural sustainability, air quality, biodiversity, drought, fast fashion, global warming, ocean dumping, and stem cells. Important historical works, such as *Silent Spring* and the works of Alice Hamilton on industrial safety were also analyzed.
* Excellent, current, scholarly sources
* Conclusion well supported by the analysis
* Good discussion of the reasoning underlying the student’s value judgment
* Good use of multiple supporting examples
* Strong literature review
* Good development of ethical perspective to be used
* Very good consideration of value systems in a non-Western culture
* Good, extended analysis of the issue
* Analysis structured very well

For arguments rated developing, reviewers made comments like these:

* Student provided their personal reaction, not a scientific perspective
* Specific scientific issue unclear
* No sources cited
* Insufficient development of analysis

**Disaggregated Assessment Data for Upper Division GE**

Disaggregated assessment data is an important element of the university’s diversity, justice, equity, and inclusion efforts.[[1]](#footnote-1) The assessment results for upper division GE assignments were analyzed by the Office of Institutional Effectiveness to determine whether there were equity gaps in the results. For first generation students, 92.6% of assignments were rated proficient, compared to 90.7% of continuing generation students. For historically underrepresented students, 93.8% of the assignments were rated proficient, compared to 94% of students who were not part of that group. For females, 95.7% of the assignments were rated proficient, compared to 86.7% of men.[[2]](#footnote-2)

The disaggregated data are shown in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| **Upper Division GE Assessment Proficiency** **AY 2022-23** | |  |  |
|  |  |  |  |
| **Column1** | **Column2** | **Column3** | **Column4** |
|  |  | **Percentage Proficient** | **Significant Difference (.05)** |
|  |  |  |  |
| **All Students (n = 216)** |  | 92.7% | N/A |
|  |  |  |  |
| **First Generation** |  |  |  |
|  | Yes | 92.6% | No |
|  | No | 90.7% |  |
| **Sex** |  |  |  |
|  | Female | 95.7% | Yes |
|  | Male | 86.7% |  |
|  |  |  |  |
| **Historically Underrepresented Students** | |  |  |
|  | Yes | 93.8% | No |
|  | No | 94% |  |

The disaggregated data are noteworthy because there was not an equity gap in the results for first generation students or historically underrepresented groups. Furthermore, all these student groups exceeded Fresno State’s 90% benchmark for proficiency. There was a statistically significant difference in results for male and female students. Women exceeded Fresno State’s benchmark, with 95.7% demonstrating proficiency. For men, 86.7% of the assignments were proficient, slightly below Fresno State’s benchmark.

**Conclusions**

The results of the assessment of Area IB (Physical Universe and its Life Forms) were very good. For Learning Outcome 1 (connections between physical universe and its life forms), 93.9% of submissions were rated proficient. For Learning Outcome 2 (how science shapes our lives), 88.2% of the submissions were rated proficient. For Learning Outcome 3 (primary and secondary sources), 93.3% of the submissions were rated proficient. For Learning Outcomes 1 and 3, Fresno State’s benchmark of 90% proficiency was exceeded and for Learning Outcome 2, the results were just short of the benchmark.

For Upper Division GE assignments, the disaggregated data showed that students with first generation status and historically underrepresented status had nearly identical proficiency ratings to students who were not in these groups. And all these group’s proficiency ratings exceeded Fresno State’s 90% benchmark. Women had a higher percentage of papers rated proficient when compared to men and these results were statistically significant. These results are consistent with the disaggregated data for the 2021-22 assessment of GE Area D.

Faculty reviewers noted several common themes in assignments rated proficient. These students explained examples well, used multiple research sources, explained scientific concepts effectively, and focused on significant scientific issues. Assignments that were not rated proficient needed to explain their ideas in more detail, link their ideas to a scientific discipline (rather than providing their opinion), or provide more examples. In addition to discipline-specific strategies for helping students achieve proficiency, students could be encouraged to take advantage of campus resources such as the Writing Center or the Learning Center to develop these skills. Students also need to be able to decode the prompt and understand what is required on the assignment. Students could be assisted in this skill in a variety of ways, such as decoding activities in class, reviewing examples of proficient student work, or taking advantage of campus learning resources.

Another issue that has often arisen during GE Assessment is the question of whether the prompt aligns well with one or more GE Learning Outcomes for that area. There were more papers that aligned with GE Learning Outcomes in the upper division GE assignments than in the lower division GE Areas assessed in 2020-21 and 2021-22. To assist GE faculty with alignment and other GE Assessment policies, a new site has been created in Canvas for all GE Faculty. This site has modules explaining how to implement the new assignment designation tool, the GE Learning Outcomes and Rubrics, guidelines on alignment with learning outcomes, results of previous GE assessments, and a suggestion box. All GE faculty are included on this site and the participants can be updated by the Office of IDEAS as new GE faculty are added. This will hopefully make it easier to inform new GE faculty about GE assessment. Many lower division GE courses are taught by lecturers who may be less connected to campus communications than tenured/tenure track faculty. Some part time lecturers are hired near the start of a semester because openings in the schedule have suddenly occurred.

A challenge noted during previous lower division GE assessments is the workability of assessing proficiency for each GE Learning Outcome in a single assignment. Upper division GE courses require at least 2,000 words of writing, with one assignment of at least 1,000 words. The upper division papers assessed in 2022-23 were significantly longer than the typical papers assessed in lower division GE courses, which may have made it easier for students to demonstrate proficiency on learning outcomes. The minimum writing requirement for lower division GE courses is 1,000 words total. The GE Learning Outcomes for some areas (such as A3 Critical Thinking) are discrete and can be assessed in a single assignment in a course where students are writing about 1,000 words in a term. Other Learning Outcomes include substantial content, and it is difficult for an assignment of 1,000 words or less to cover the totality of a learning outcome.

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1. . Ruth Williams, “Culturally Responsive Assessment, What to Tackle First,” NIOLA, December 2018. [↑](#footnote-ref-1)
2. . The difference between first generation students and students who were not part of that group were not statistically significant (.05 level), nor was the difference between historically underrepresented students and students who were not part of that group. The difference between men and women was statistically significant. [↑](#footnote-ref-2)