Institutional Student Learning Outcome (ISLO) Assessment Summary Report Academic Year: 2019-2020 ISLO6: Critical Analysis and Reasoning

Critical Analysis and Reasoning

Students will formulate or evaluate arguments, problems or opinions and arrive at a solution, position or hypothesis based on carefully considered evidence.

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and Susan Rogers, in consultation with participating faculty.

Report submitted on October 1, 2020

Executive Summary

***SCOPE**:*

Courses from which assessment data was gathered (# of students): BHS103 (744); BIO105 (82); COM140 (57); MLT106 (15); PAR201 (11)

Participating faculty and academic department:

- AHBS: Katherine Espinosa, Sandra Fraley, Karen Ingham, Kelly Kohler, Erich Markert
- BHS: Sara Alpert, Rita Banner, Jason Bishop, Thomas Conroy, Brynie Cooper, Katherine Frishmuth, Linda Gaines, Ted Goehring, Jeffrey Grunberg, Peter Helion, Sarah Hudak, Mehmet Kucukozer, Carol Matthews, Suzanne Phipps, Stephanie Roberg-Lopez, Camille Sola
- PVAC: Michael Adams

Total # of Sections: 44

Total # of Students: Valid data collected for 907 out of 1298 possible assessments (11 in Summer 2019; 896 in Fall 2019)

RESULTS:

- Of 907 valid student assessments collected and rated using a 1-4 scale, 53.8% met or exceeded standards for Formulate/Evaluate, 54.2% met or exceeded standards for Arrive Solution, and 49.6 met or exceeded standards for Use Evidence. The average score for Formulate/Evaluate was 2.54; for Arrive Solution, 2.54; and for Use Evidence, 2.45.
- Results indicate an excellent inter-item reliability, meaning items could be combined to form a single score representing critical reasoning and analysis competency.
- Students who enrolled at DCC with previous college credits (n=424) and those who had completed 15+ college credits prior to the assessment (n=321) outperformed those who without those attributes in all ISLO items.
- Students who had successfully completed (a grade of C or better) ENG101 (n=320) and ENG102 (n=263) received higher scores than those who did not for all ISLO items.
- Comparisons between this assessment cycle and the last one (2016-2017) show a decline in the number of students meeting expected standards in each ISLO item.
- A statistical correlation exists between ISLO6 item Use Evidence and ISLO5 items Identify and Evaluate, which along with the faculty's perception of student weakness in that ISLO6 area, may suggest a greater concern about how students find, assess, and use evidence as part of their critical reasoning and analysis.

- In narrative data, faculty raised concerns about when in a student's typical program pathway the assessment occurred. The vast majority of students were assessed in BHS103, usually taken in the first semester of college work. Further, faculty noted the importance of providing students opportunities to practice the skills prior to the assessment.

CONCLUSIONS AND RECOMMENDATIONS:

The assessment team proffered the following conclusions and recommendations.

Result/Conclusion	**Recommendation for Action**
The outcomes from this current cycle (AY19/20) underperformed those from the previous cycle (AY16/17) in all items.	AY16/17 collected data from far more 200-level courses than AY19/20, especially since the Spring 2020 200-level courses that were planned to be used were not due to the pandemic. Therefore, the sample may be skewed. The next cycle should be sure to include more 200-level courses. In the meantime, program chairs should reconsider the designations of where the skills are *introduced*, *reinforced*, and *assessed* within programs. Finally, continue work to norm the ISLO6 standards among faculty to improve inter-rater reliability.
Providing avenues for students to practice ISLO6 skills, as well as scaffolding assignments throughout a semester so that students progressively build to the desired outcome and can receive feedback and assessment along the way, led to greater success in the ISLO skill development.	The Committee on Student Learning and Assessment (CSLA) and the Professional Staff Development Committee (PSDC) might coordinate on workshops or other professional development focused on pedagogical best practices in critical analysis and reasoning. Consider holding departmental meetings that focus on how best to teach ISLO6 skills in relevant courses. Program chairs could be asked to review the EXOs for the courses in their programs and determine if the recommendations from these workshops have clear placements.
Students with college-level reading and writing skills outperform those who struggle in those areas.	Reinforce reading and writing skill development. Encourage students to enroll in ENG 101 and 102 early in their programs. Work with faculty and student support services to continue to provide opportunities for students to work on those skills in and out of the classroom, recognizing that programs

	are constrained by the SUNY 64 requirements. Follow up with Writing Center staff regarding ways to enhance the services, possibly to include reading-skill development along with writing pedagogy.
Weaker outcomes in ISLO6 assessment appear connected to similar outcomes in ISLO5 Information Literacy assessment.	Broader cross-disciplinary and cross-service discussions about strengthening students' abilities in locating, assessing, and using strong evidence. Furthermore, the courses held by the Library staff that focus on critical analysis and reasoning should be considered as part of future assessments to better determine the impact they might have on ISLO6 development in students' college experience.

ACTION PLAN

Recommendation/Action Item	**Potential Resources**
Be sure the AY22-23 assessment cycle includes more 200-level courses. In the meantime, program chairs should reconsider the designations of where the skills are *introduced*, *reinforced*, and *assessed* within programs. Finally, continue work to norm the ISLO6 standards among faculty to improve inter-rater reliability.	FAL and Associate Dean of AA meet with Program Chairs Council and department chairs to discuss appropriate course selection for next assessment cycle. Program chairs review courses to determine most appropriate designations for ISLO6 assessment, and revise curriculum maps, as needed. FAL and Associate Dean of AA hold norming sessions prior to next ISLO6 assessment.
The Committee on Student Learning and Assessment (CSLA) and the Professional Staff Development Committee (PSDC) might coordinate on workshops or other professional development focused on pedagogical best practices in critical analysis and reasoning. Consider holding departmental meetings that focus on how best to teach ISLO6 skills in relevant courses. Program chairs could be asked to review the EXOs for the courses in their programs and determine if the	FAL report to CSLA on ISLO6 outcomes. Discuss ways the committee would like to participate in the dissemination of recommendations from the assessment. FAL meet with Departmental Affairs Council and/or specific departments to assist in creation of departmental discussions on best practices. Program chairs review EXOs of program courses.

recommendations from these workshops have clear placements.	
Reinforce reading and writing skill development. Encourage students to enroll in ENG 101 and 102 early in their programs. Work with faculty and student support services to continue to provide opportunities for students to work on those skills in and out of the classroom, recognizing that programs are constrained by the SUNY 64 requirements. Follow up with Writing Center staff regarding ways to enhance the services, possibly to include reading-skill development along with writing pedagogy.	FAL and/or appropriate representatives of OAA meet with staff of the ACT Center to emphasize the importance of enrolling in ENG 101 and ENG 102 early in programs. FAL meet with Writing Center staff.
Broader cross-disciplinary and cross-service discussions about strengthening students' abilities in locating, assessing, and using strong evidence. Furthermore, the courses held by the Library staff that focus on critical analysis and reasoning should be considered as part of future assessments to better determine the impact they might have on ISLO6 development in students' college experience.	FAL meet with the Library staff and possibly the Associate Director of the Teaching and Learning Center to discuss ways to collect data on students who have attended Library courses and workshops.

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1 State the specific question(s) asked

The last assessment of ISLO6-Critical Analysis and Reasoning occurred during the 2016-2017 academic year. One main finding from that cycle involved faculty's belief that the data collected remained rather unreliable to be able to draw substantial conclusions. However, the other main finding did focus on the students' lack of skill in using evidence to draw their own conclusions. Therefore, a few important recommendations were made. To improve the reliability of the data collected, faculty suggested further discussions among participating instructors to improve inter-rater reliability, to norm the use of the rubric and to set potential assignment/tool parameters and standards to ensure scores could be correlated and compared, and to emphasize that an assessment did not need to rely on a single assignment, but could consider multiple ones. In looking at ways to improve students' skills in the use of evidence, recommendations revolved in part on the ways ISLO6 is actually tied to ISLO5-Information Literacy and Technological Competency, which had been newly redefined at that time. For instance, faculty believed improving students' skills in information literacy would help improve the use of evidence, and so they provided recommendations focused on student services, such as the library and writing center, which could be utilized to build those skills. Further, they found that students assessed in classes with fewer students, prior success in ENG 101, as well as successful completion of 15+ credits in ENG, HIS, GOV, ECO, and BHS courses, all led to stronger outcomes in this particular assessment; therefore, they recommended that OAA invest resources in these courses, in part by potentially reducing class sizes in them.

As discussions ensued in this assessment cycle, faculty continued to be concerned about the use of evidence, about inter-rater reliability, and whether students' skills in this particular ISLO would have improved. They decided to keep the same rubric used in the previous cycle to allow for clearer comparisons between the outcomes, and the following research questions were considered.

Research Questions:

1. Have we maintained, improved, or declined in student outcomes as compared to the prior institutional assessment of ISLO6 conducted in 2016-2017?
   a. Are there statistically-significant differences between years (2016-2017 v. 2019-2020)?
   b. How do outcomes vary within the same program between years (2016-2017 v. 2019-2020)?

2. What pedagogical innovations or strategies are currently being used to support student achievement in ISLO6, and with what results?
   a. Is there a correlation between course grades and performance in the ISLO outcomes?

b. Is there a relationship between outcomes from the 2018-2019 ISLO5 assessment and the outcomes from this particular one? (Did our new focus on ISLO5 seem related to performance on ISLO6?)

3. How do student academic experiences, including current and prior coursework and course success, impact ISLO6 outcomes?
   a. How do students who enter the institution with college-credits perform on the assessment?
   b. How do students who have completed 15+ college credits perform compared to those with fewer than 15 credits?
   c. Has the student successfully completed (earned grade of C or better) ENG 101?
   d. Has the student successfully completed ENG 102?
   e. Has the student successfully completed BHS 103?
   f. Has the student successfully completed HIS 103?
   g. Has the student successfully completed HIS 104?
   h. Has the student successfully completed GOV 121?
   i. Has the student successfully completed a college-level mathematics course?
   j. Has the student successfully completed a REA course?

4. Do students value these skills?

2 Describe the methods used to answer the question(s)

An outline of the methodology is provided below:

- In January 2019, a workshop was held, led by the Faculty Assessment Leader and the Associate Dean of Academic Affairs, to review the 2016-2017 assessment of ISLO6 and begin to prepare for the 2019-2020 assessment. Participants reviewed the definition of the ISLO and the rubric used in the previous assessment. They also discussed the Valid Assessment of Learning in Undergraduate Education (VALUE) rubric for Critical Analysis and Reasoning and considered its use for this cycle. Further, they reviewed the recommendations from the previous cycle, discussed designating courses as *introducing*, *reinforcing*, or *assessing* the skills within the ISLO, and began to consider potential research questions.

- In May 2019, a second workshop was held to finalize plans for the 2019-2020 assessment cycle. Faculty decided upon the research questions, reviewed the concepts discussed in the January meeting, and were provided training on using TracDat to gather data.

- In consultation with department and program chairs, the following courses were selected to participate in the 2019-2020 assessment of ISLO6: ARC240, BHS103, BIO105, BUS107, COM140, CNS240, ESW101, GOV121, MLT106, PAR201, PSY203, and PSY204. A number of these courses were not used due to the change in approach during the Spring 2020 semester caused by the novel coronavirus (as explained below).

- Using the agreed upon rubric, the faculty teaching these courses used a variety of instruments to collect data on the ISLO6 skills (see Appendix B for examples), including:
    - Standard course assignments, such as homework
    - Major course assignments, such as significant projects

- Faculty in the Department of Allied Health and Biological Sciences and the Department of Behavioral Sciences were awarded four assessment grants to assist in the assessment process, totaling 154.5 hours.

- During the academic year, faculty input the data gathered in TracDat/Nuventive (allowing assessment results to be associated with a student and student information in Banner). At the end of the academic year, the data was downloaded and tabulated by the Associate Director of Institutional Research, Planning, and Assessment (IR), who performed further statistical analysis.

- Using the information provided by IR, the Faculty Assessment Leader prepared a draft report of the assessment and provided it to participating faculty for their review. Faculty provided continued feedback for revision of the draft via an August 2020 workshop and through email and conversation with the Faculty Assessment Leader through September 2020.

- The final report was submitted on October 1, 2020.

The COVID-19 novel coronavirus outbreak of 2020 had a serious impact on the methodology of this assessment cycle. Following guidelines set by the State of New York, the College first delayed reopening after Spring Break in March 2020 by two weeks and asked faculty to prepare for the potential of remote learning. By the end of March, the College decided to close the campus for the remainder of the semester and continue remote learning. The Faculty Assessment Leader and the Associate Dean of Academic Affairs decided by early April to stop the collection of data for the assessment of ISLO6 unless a) a particular program chair deemed it necessary for his/her program review or to satisfy outside accreditors, or b) the data had been collected prior to the shutdown and simply had not been entered into TracDat. The decision stemmed from a belief that any data collected during remote learning, which had necessarily been done quickly and without substantial training for faculty (as is done traditionally for online

education), would be so impacted by that change that it would be incomparable to the data collected in the fall or in the spring semester prior to the change. The Faculty Assessment Leader and the Associate Dean of Academic Affairs also believed enough data had been collected prior to that point to allow for useful conclusions. Therefore, this report includes no data collected during the remote learning that occurred in the latter half of the Spring 2020 semester.

3 Summarize the results

3.1 Total Tabulated Data and Comments

There were 1298 possible assessments across 44 sections. Valid data was collected for 907 assessments (11 in Summer 2019, 896 in Fall 2019), a rate of 69.9%. Statistics exclude sections where no data was collected.

The rubric shared by all faculty assessing this ISLO (see Appendix A) included three (3) assessment items as provided in the table below. Each item is referred to in the results using the identifier indicated in the table.

Table 1 Assessment Items/Categories for ISLO6

Item	Identifier	Abbreviated Description
1	Formulate/Evaluate	Student formulates or evaluates arguments, problems, or opinions accurately so that understanding is not seriously impeded by omissions
2	Arrive Solution	Identifies or presents specific solution, position, or hypothesis and/or recognizes the different sides of an issue without further development. Conclusions and related outcomes are logical and accurate, with minor flaws
3	Use Evidence	Evidence is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.

Overall average ratings using the shared rubric were: 2.54 for Formulate/Evaluate, 2.54 for Arrive Solution, and 2.45 for Use Evidence, where 4.0 represents the highest rating. Table 2 provides the percentage of students scoring each individual rating for each category.

Table 2 Percentage of Students Earning Individual Rating for ISLO6 Items

	Formulate/Evaluate	Arrive Solution	Use Evidence
% earn 4 (exceeds expectations)	21.1	21.3	18.0
% earn 3 (meets expectations)	32.7	33.0	31.6
% earn 2 (approaches expectations)	25.2	24.6	28.1
% earn 1 (does not meet expectations)	20.9	21.2	22.3

Table 3 provides the percentage of students who have either met or exceeded expectations in each category, as well as the percentage of those who did not meet college expectations.

Table 3 Percentage of students meeting or exceeding expectations as opposed to not meeting expectations

	Formulate/Evaluate	Arrive Solution	Use Evidence
3/4=met expectations	53.8	54.2	49.6
1/2=did not meet expectations	46.2	45.8	50.4

Inter-item reliability was assessed using Pearson correlations and Cronbach's alpha. All ISLO items were positively correlated with one another ($rs > .8$, $ps < .001$). Reliability was excellent ($\alpha = .93$). This result implies that the items could be combined to form a single score representing critical analysis and reasoning competency.

Furthermore, the means (provided in Table 4, along with standard deviations) for each item were compared using a repeated-measures ANOVA. The results indicate an overall significant difference between items [$F(2,1812) = 12.32$, $p < .001$]. Bonferroni-corrected pairwise comparisons indicate that Use Evidence was lower than the other ISLO items ($ps < .001$), but there were no other significant differences.

Table 4 Overall Ratings (Mean Scores and Standard Deviations)

	Formulate/Evaluate	Arrive Solution	Use Evidence
Overall Ratings (n=907)	2.54 (1.04)	2.54 (1.05)	2.45 (1.03)

3.2 Types of Assignment Data and Comments

Faculty were asked to describe the type of assignment(s) used for the assessment. Assignment types varied from standard course work, such as homework, to major projects. The majority of students (mostly in BHS103) were assessed using a standard assignment. Table 5 summarizes the assignment information and provides a rough estimate of the percentage of assessments that used each assignment type.

Table 5 Types of Assignments Used for Assessment

Assignment Type	**Students (% of Total)**
Major Course Assignment	16.7%
Standard Course Assignment (i.e., homework)	83.3%

3.3 Student Academic Experiences

Research question #3, and its sub-questions, focused on students' previous academic experiences. In order to answer those questions, student characteristics that might impact their experience (such as full-time versus part-time, or previous course work) were examined in relation to performance on the assessment criteria.

3.3.1 Student Characteristics

The students' higher education history, whether they were new/continuing/transfer/high-school concurrent, was analyzed. The numbers of students in each group were as follows: New First-Time (n=555), Continuing (n=270), Transfer (n=74), and High-School Concurrent (n=8). Given the small sample size for Concurrent students, those results were ignored. Using one-way ANOVAs, the results for New, Continuing, and Transfer students were compared. As Table 6 reveals, there were no significant differences between the outcomes for these students [Fs (2,896) < 2.77, ps = ns].

Table 6 Higher Education History

	Formulate/Evaluate	Arrive Solution	Use Evidence
New First-time (n=555)	2.50 (1.03)	2.49 (1.05)	2.40 (1.01)
Transfer (n=74)	2.69 (0.98)	2.76 (0.98)	2.65 (1.00)
Continuing (n=270)	2.60 (1.07)	2.60 (1.06)	2.51 (1.07)

Students were also grouped into full-time (FT; n=756) and part-time (PT; n=151). Independent t-tests revealed no significant group differences for any ISLO item [ts (905) < 0.58, ps = ns].

Data was collected on the number of credits a student completed prior to the assessment. This data focused on two separate points: whether a student enrolled at DCC with previous college-credits, and whether a student had completed 15+ college credits before the assessment. As Tables 7 and 8 reveal, in both instances, students with prior college coursework outperformed those who did not.

Table 7 Students Entering DCC with College Credits

	Formulate/Evaluate	Arrive Solution	Use Evidence
Entered with credits (n=424)	2.74 (1.00)	2.75 (0.99)	2.65 (0.98)
Did not (n=460)	2.34 (1.05)	2.35 (1.05)	2.27 (1.03)

ts (882) > 5.61, ps < .001

Table 8 Students Completed 15+ Credits Prior to Assessment

	Formulate/Evaluate	Arrive Solution	Use Evidence
Had 15+ credits (n=321)	2.70 (1.05)	2.69 (1.04)	2.60 (1.04)
Did not (n=586)	2.45 (1.03)	2.46 (1.04)	2.38 (1.01)

ts (905) > 3.09, ps < .01

Statistical analyses were also performed on the data to test for differences between students who had passed the course in which the ISLO skills were assessed (n=775, grades of A, B, C, or PA) and those who did not pass (n=132, grades of D, F, W, NC, or ZF). Independent t-tests revealed that students who passed the course had higher ratings for all ISLO items than students who did not pass [ts (905) > 6.56, ps < .001]. The results for each item were: Formulate/Evaluate (2.63 v. 2.00), Arrive Solution (2.64 v. 1.96), and Use Evidence (2.55 v. 1.87).. Further analyses were performed to test correlations between course grades and the outcomes of the assessment. Grades were transformed to the 4.0 GPA scale (NOTE: withdrawals and other grades not included in GPA calculations were excluded). All ISLO items were positively correlated with course grades [rs (897) > .41, ps < .001], meaning that higher ISLO ratings were associated with higher grades in the course.

Data was also collected on the type of degree the student was pursuing (associate, certificate, or non-degree); however, the sample sizes for certificate (n=3) and non-degree (n=21) were insufficient to conduct inferential analyses.

Finally, data on students' previous success with particular courses was collected and analyzed. Independent t-tests were used to compare students who had passed specific courses with a C or better before the semester of assessment and students without those courses (because they received grades of D, F, I, W, did not attempt the course, or did not have transfer credits). The following tables (9 through 16) provide those results.

Table 9 BHS 103 Social Problems in Today's World

There were no significant group differences for any ISLO item, ts (905) < 1.93, ps = ns.

	Formulate/Evaluate	Arrive Solution	Use Evidence
Passed (n=90)	2.40 (1.01)	2.48 (1.07)	2.26 (0.98)
Did not pass/attempt (n=817)	2.55 (1.05)	2.55 (1.05)	2.47 (1.03)

Table 10 ENG 101 Composition I

Students who passed ENG 101 received higher scores than those who did not for all ISLO items, ts (905) > 3.41, ps < .001.

	Formulate/Evaluate	Arrive Solution	Use Evidence
Passed (n=320)	2.70 (1.06)	2.70 (1.05)	2.62 (1.04)
Did not pass/attempt (n=587)	2.45 (1.03)	2.46 (1.04)	2.36 (1.01)

Table 11 ENG 102 Composition II

Students who passed ENG 102 received higher scores than those who did not for all ISLO items, ts (905) > 3.45, ps < .001.

	Formulate/Evaluate	Arrive Solution	Use Evidence
Passed (n=263)	2.76 (1.04)	2.73 (1.05)	2.66 (1.03)
Did not pass/attempt (n=644)	2.45 (1.03)	2.47 (1.04)	2.37 (1.01)

Table 12 GOV 121 American National Experience

There were no significant group differences for any ISLO item, ts (905) < 1.44, ps = ns.

	Formulate/Evaluate	Arrive Solution	Use Evidence
Passed (n=154)	2.65 (1.06)	2.65 (1.08)	2.54 (1.02)
Did not pass/attempt (n=753)	2.52 (1.04)	2.52 (1.04)	2.44 (1.03)

Table 13 HIS 103 History of the United States I

Given the disparate/small N for students who passed HIS 103, no inferential statistics are reported.

	Formulate/Evaluate	Arrive Solution	Use Evidence
Passed (n=17)	2.76 (1.09)	2.65 (1.06)	2.71 (1.05)
Did not pass/attempt (n=890)	2.53 (1.04)	2.54 (1.05)	2.45 (1.03)

Table 14 HIS 104 History of the United States II

There were no significant group differences for any ISLO item, ts (905) < 0.82, ps = ns.

	Formulate/Evaluate	Arrive Solution	Use Evidence
Passed (n=75)	2.60 (1.08)	2.56 (1.11)	2.55 (1.11)
Did not pass/attempt (n=832)	2.53 (1.04)	2.54 (1.04)	2.44 (1.02)

Table 15 College-Level Mathematics: MAT 1XX and Above

There were no significant group differences for any ISLO item, ts (905) < 1.50, ps = ns.

	Formulate/Evaluate	Arrive Solution	Use Evidence
Passed (n=190)	2.63 (1.07)	2.63 (1.04)	2.55 (1.05)
Did not pass/attempt (n=717)	2.51 (1.04)	2.52 (1.05)	2.43 (1.02)

Table 16 REA Courses: Any Reading Course

Given the disparate/small N for students who passed a REA course, no inferential statistics are reported.

	Formulate/Evaluate	Arrive Solution	Use Evidence
Passed (n=25)	2.24 (1.13)	2.08 (1.00)	2.08 (1.12)
Did not pass/attempt (n=882)	2.55 (1.04)	2.56 (1.05)	2.46 (1.02)

3.3.2 Course Characteristics Data and Comments

Statistical analyses were performed to test differences based on the course type in which the ISLO items were assessed: 100-level courses without prerequisites (n=744), 100-level courses with prerequisites (n=152), and 200-level courses (n=11).

Given the small sample size for 200-level courses, no inferences could be made regarding the differences between 100-level and 200-level courses. However, independent t-tests comparing the outcomes for students in 100-level courses without prerequisites and 100-level courses with prerequisites revealed that the students in the former category outperformed those in the latter. Table 17 provides those results [ts (894) > 2.68, ps < .01].

Table 17 100-level courses with and without prerequisites

	Formulate/Evaluate	Arrive Solution	Use Evidence
100-level no prereqs (n=744)	2.58 (1.03)	2.57 (1.03)	2.50 (1.03)
100-level with prereqs (n=152)	2.32 (1.09)	2.32 (1.08)	2.18 (1.02)

3.4 Current Assessment Cycle Compared to Last Cycle

ISLO6 Critical Analysis and Reasoning was last assessed in 2016-2017 (AY16/17). For both AY16/17 and the current cycle, AY19/20, a 1-4 scale was used, where ratings of 3 or 4 indicated students meeting expectations for the ISLO, while ratings of 1 or 2 indicated them not meeting those expectations. Please note that the dataset only included students who had ratings for all items.

For these analyses, item ratings were re-coded to 1 or 0 (did meet vs. did not meet expectations), and then independent t-tests (and chi-square statistics) were used to compare the ratings in AY16/17 and AY19/20. Numbers in the table below represent the percentage of students meeting expectations by academic year. A greater percentage of students met expectations in AY16/17 than in AY19/20 for all ISLO items, ts (2324) >4.86, ps < .001.

Table 18 Current Cycle v. Previous Cycle

	Formulate/Evaluate	Arrive Solution	Use Evidence
AY 16/17 (n=1419)	65.2%	70.6%	59.8%
AY 19/20 (n=907)	53.8%	54.2%	49.6%

3.5 Assessment Results Disaggregated by Program

ISLO6 Critical Analysis and Reasoning outcomes were disaggregated by program (see Appendix C). Table 19 provides an accounting of which courses students were assessed in for each program and how many students were in each of those courses. Program chairs can use the data to provide insight into whether students in their programs were assessed in this cycle, as well as to see if the major-specific data is generalizable to the program as a whole.

Table 19 Accounting of Students Assessed by Course and Program

Program	Total Students*	Total # Students Assessed	Total # Assessments	Course ID (# of Students)
ACC	53	3	3	BHS 103 (3)
ARC	59	8	8	BHS 103 (7), COM 140 (1)
AVI	39	3	3	BHS 103 (3)
BAT	600	70	70	BHS 103 (70)
BUS	183	16	16	BHS 103 (16)
CDC	14	2	2	BHS 103 (2)
CHC	6	1	1	BHS 103 (1)
CIS	94	10	10	BHS 103 (9), COM 140 (1)
CMH	23	3	3	BHS 103 (3)
CNS	32	2	2	BHS 103 (2)
COM	189	33	35	BHS 103 (15), BIO 105 (1), COM 140 (19)
CPS	124	22	22	BHS 103 (21), BIO 105 (1)
CRJ	74	11	11	BHS 103 (11)
CRT	331	73	73	BHS 103 (73)
ECH	45	5	5	BHS 103 (5)
EDH	72	8	8	BHS 103 (8)
EDL	34	4	4	BHS 103 (4)
EDM	9	1	1	BHS 103 (1)
EED	184	29	30	BHS 103 (28), BIO 105 (2)
ELT	57	9	9	BHS 103 (9)
ENR	127	13	13	BHS 103 (11), BIO 105 (2)
ESW	116	25	28	BHS 103 (17), BIO 105 (9), COM 140 (1), MLT 106 (1)

FPT	23	3	3	BHS 103 (3)
GSP	1,521	241	243	BHS 103 (211), BIO 105 (15), COM 140 (17)
HMS	399	33	33	BHS 103 (33)
INM	29	1	1	COM 140 (1)
LAH	619	101	103	BHS 103 (91), BIO 105 (2), COM 140 (10)
LAM	16	2	2	BHS 103 (1), BIO 105 (1)
LAX	322	71	80	BHS 103 (37), BIO 105 (39), COM 140 (4)
MLT	59	21	22	BHS 103 (5), BIO 105 (4), MLT 106 (13)
PAL	35	3	3	BHS 103 (3)
PAR	36	10	10	PAR 201 (10)
PBH	16	4	6	BHS 103 (3), BIO 105 (3)
PFA	93	3	3	BHS 103 (3)
PRR	9	1	1	PAR 201 (1)
UND	595	21	21	BHS 103 (16), BIO 105 (3), COM 140 (2)
VAT	203	19	19	BHS 103 (19)

*total number of students data extracted from SUNY BI and reflects the unduplicated headcount for the academic year for each program.

3.6 Faculty Perspectives (Narrative Results by Course)

Faculty were asked to provide comments on the results of the assessment as they entered that quantitative data into the TracDat system. A full reporting of that commentary is in Appendix D. Below is a summary of the key points from that qualitative data.

- **College-Level Skill Deficiencies**: The majority of students assessed in this cycle were first-semester students, which some faculty believed may have led to weaker outcomes in critical analysis and reasoning. Further, the faculty perceived connections between students who struggled with both hard and soft skills and weaker outcomes. For instance, poor reading and writing skills often were seen as indicative of weaker critical reasoning skills. Also, behavioral attributes, such as attendance, consistency in handing in work on time, open-mindedness, and an ability to look beyond personal biases or preconceptions were often viewed as tied to more success on the assessment; students lacking in those skills struggled in their critical analysis and reasoning. The main course used for the assessment was BHS 103, which for most programs is recommended for students to take in their first semester of college. This point and the faculty's perceptions described here indicate that students will perform differently in courses in which a skill is *introduced* than they would in courses further along within their programs, in which the skill would be *reinforced* and then could be *assessed* more definitively (such as 200-level courses). When and where we assess the skills remains an important factor in the nature of the results.

- **Explaining Conclusions**: While faculty felt many students could state a conclusion or opinion, they also found those students lacked the ability to clearly and thoroughly explain or describe how they reached those conclusions. Faculty further felt students struggled to integrate the theories, concepts, or major ideas of the course into their own

thinking. One faculty noted that students often simply regurgitated information rather than synthesize it, which seemed to speak to the concerns other faculty addressed.

- **Methodology Concerns**: BHS 103 faculty expressed a few specific concerns about the methodology by which they conducted the assessment. The tool was not tied to the student's grade, and faculty who notified students of that fact found that they did not necessarily take it as seriously as those who did not know the tool would not be graded. Further, the week of the semester in which the faculty member chose to provide the tool led to perceived concerns. Some faculty provided the assessment during Thanksgiving week or the last week of classes, at times when they admitted the students were a bit "cognitively checked out," which likely impacted the results.

- **"We Talkin' About Practice?"**: Many faculty noted how scaffolding assignments to allow for emphasis on the particular skills being assessed leads students to stronger outcomes. In turn, they recommend allowing for further practice of critical analysis and reasoning skills, such as with lab notebooks in science courses, group work that provides opportunities to work through problems and discuss different ideas, or flipped classrooms that provide typical lecture material online or via homework, and then using class time for those group discussions. They also recommend using some class time to refresh students' knowledge on points such as strong argumentation or the components of an effective analysis essay. Finally, faculty who provided a specific rubric prior to the assessment indicated stronger results.

4 Summarize Conclusions Drawn and Action Plan for Improvement

Given that the bulk of the data collection for this assessment cycle of ISLO6 were planned for the Fall 2019 semester, and that in the end 907 valid assessments were collected, the disruption of the Spring 2020 semester by the novel coronavirus pandemic, the subsequent short shutdown of the college, and the eventual shift to remote instruction only had a minor impact on this particular process. Therefore, a number of findings and recommendations can be made.

Conclusions are presented below relative to the specific research question asked:

Have we maintained, improved, or declined in student outcomes as compared to the prior institutional assessment of ISLO6 conducted in 2016-2017?

As reported above in section 3.4, the outcomes from this current cycle underperformed those from the previous cycle (AY16/17) in all items. Faculty narrative data reveals that their perception of student ability in these areas is consistent with that decline, particularly in the area of Use Evidence. These outcomes are likely impacted by the differences in course level and type assessed in each cycle, as the AY16/17 assessment collected far more data in 200-level courses, which could speak to decline in outcomes, especially since the vast majority of students assessed

this cycle were enrolled in 100-level courses often taken in the first semester of a program. Furthermore, the assessment tool used in BHS 103, the course with the most student assessments for this assessment cycle, changed from AY16/17. The faculty who developed that tool believe it was a more challenging one, asking students to analyze data provided in tables and graphs and to draw conclusions based on that data. That change likely impacted the overall outcomes in this cycle. Regardless, continued emphasis across programs on the ISLO6 skills, in particular the use of strong evidence in student reasoning, could lead to more success for students in these assessments.

The results of the current cycle by program are included in Appendix C, but only descriptive statistics can be generated to compare this cycle to the last as the sample sizes are too small in most programs for between-group comparisons.

What pedagogical innovations or strategies are currently being used to support student achievement in ISLO6, and with what results?

Faculty narratives and discussions with those involved with the assessment reveal a few pedagogical approaches that they believe support student achievement in this particular ISLO, namely:

- The use of lab notebooks in science courses provides students an avenue by which to practice critical analysis and reasoning skills, and for the faculty to respond to that work to reinforce particular skill development.
- A number of faculty noted how group work or other approaches that teamed students together helped to facilitate the skills. Similarly, flipping the classroom (using class time for group work or discussion and homework to provide typical lecture material) provides practice space for more critical analysis and reasoning.
- Faculty recommend scaffolding assignments throughout a semester so that students progressively build to the desired outcome and can receive feedback and assessment along the way.
- BHS 103 faculty met regularly to exchange ideas for the course and discuss best practices in pedagogy.

However, faculty also noted areas for pedagogical improvement:

- Students who struggle with reading and writing at the college-level also often struggle with this particular ISLO skill development. This perception is reinforced by the data above, that indicates successful completion of ENG 101 and ENG 102 led to stronger outcomes. Further attention to the development of reading and writing skills throughout programs might improve outcomes.

- An inability to clearly explain or describe their reasoning or conclusions often leads students to weaker outcomes, so approaches that emphasize that skill in courses would help.
- Using clear rubrics and clarifying expectations helped students reach desired ISLO outcomes, so developing those in courses should be considered a best practice.

Data analysis reveals a correlation between course grades and ISLO outcomes, indicating that the success in the courses being assessed could serve as a mark of students gaining the requisite ISLO6 skills, but those results are not strong enough to suggest that course grades be used to measure ISLO skill development.

Another sub-question in this area was, "Is there a relationship between outcomes from the 2018-2019 ISLO5 assessment and the outcomes from this particular one? (Did our new focus on ISLO5 seem related to performance on ISLO6?)" Institutional Research computed Pearson correlations between the ISLO6 and ISLO5 items for 37 students. Statistically, ISLO6 Formulate/Evaluate was positively correlated with ISLO5 Identify, Locate, and Evaluate[1]. ISLO6 Arrive Solution was positively correlated with ISLO5 Evaluate. ISLO6 Use Evidence was positively correlated with ISLO5 Identify, Evaluate, and Proper Citation. The effect sizes were moderate, accounting for 10% to 15% of variance. See Table 20 for the full results.

Table 20 Correlations between ISLO6 (AY19/20) and ISLO5 (AY18/19)

ISLO 5 ↓ ISLO 6 →	Formulate/Evaluate	Arrive Solution	Use Evidence
Identify	.349*	.279	.348*
Locate	.353*	.241	.322
Evaluate	.385*	.337*	.378*
Use Information	.213	.216	.254
Proper Citation	.318	.286	.328*

While difficult to draw concrete conclusions regarding any of these correlations, the faculty narrative data did indicate a perceived weakness in Use Evidence, and given that there is a statistical correlation between that ISLO6 item and certain ISLO5 items, such as Identify and Evaluate, perhaps these outcomes speak to a greater concern faculty have about how well students find, assess, and eventually use evidence as part of their critical thinking and analysis. More emphasis on teaching these skills throughout programs should be considered.

[1] ISLO5 Information Literacy and Technological Competency items defined as follows – *Identify*: Identify the need for information; *Locate*: Locate electronic media using appropriate technology; *Evaluate*: Evaluate the credibility of information published on the internet; *Use Information*: Use information effectively to accomplish specific purpose; and *Proper Citation*: Properly uses and cites sources of information.

How do student academic experiences, including current and prior coursework and course success, impact ISLO6 outcomes?

A number of points stand out regarding the data on this question (and its related sub-questions), namely:

- Students who entered DCC with college-credits outperformed those who did not; the same is true of students who were assessed after earning at least 15 college credits. These results indicate that more college-level course experience is related to stronger critical analysis and reasoning skills. The initial plan for the ISLO6 assessment included gathering data in more 200-level courses, but the COVID-19 pandemic and subsequent closing and then remote reopening of the school impeded those plans. The lack of data from those courses may have therefore impacted the outcomes as this data and faculty perceptions indicate that students in those courses would likely perform more successfully in assessment activities than students in 100-level courses.
- Students who had completed ENG 101 outperformed those who had not (an outcome consistent with what was found in the AY16/17 assessment of ISLO6). Students who had completed ENG 102 also outperformed those who had not. These results indicate that those two courses, listed on the Curriculum Map as *introducing* ISLO6 skills, serve an appropriate purpose within programs, providing students an avenue to hone the skills. The other courses analyzed (BHS 103, HIS 104, GOV 121, and college-level Mathematics courses) did not indicate similar improved outcomes; the sample size for HIS 103 was too small to make any inferences. These courses are listed on most programs as the place in which ISLO6 skills are *assessed*. Increased focus on pedagogical approaches in these particular courses before the next assessment cycle could lead to stronger outcomes overall. However, further discussions among program chairs about the expectations for the outcomes in these courses would also be worthwhile. Perhaps a re-designation of these course, to ones that *introduce* the skills, would be appropriate, as would looking closer at upper-level or late-program courses that might *reinforce* the skills or be a better place within a program to actually *assess* the skills. While some programs have clear capstone courses or other 200-level courses that could fit that bill, other programs, such as LAH and GSP, might be harder pressed to locate appropriate courses and may need to find a different approach to truly assessing the skill; therefore, any discussion regarding these designations should be considered program by program.
- Students enrolled in 100-level courses without prerequisites outperformed those in 100-level courses with prerequisites. This fact could be a result of sample size discrepancies (as the latter outweighed the former, n=744 to 152), or could potentially indicate more information about BHS 103, as that was the 100-level course without prerequisites making up the lion's share of those assessments.

Do students value these skills?

Faculty narratives indicate that not all students value these skills, as a number of them noted students' inability to look beyond their own personal biases or preconceptions. However, faculty discussed a desire to hold a student survey in the Spring 2020 semester to gain further insight from students themselves about their valuing of the ISLO6 skills. That planned survey had to be abandoned due to the disruption in assessment methodologies after the outbreak of the coronavirus and the subsequent shuttering of the College. Future assessments should look to take up that approach to gather more input from students themselves.

The table below looks to summarize the main conclusions from this report and offer potential actions for moving forward:

Result/Conclusion	Recommendation for Action
The outcomes from this current cycle (AY19/20) underperformed those from the previous cycle (AY16/17) in all items.	AY16/17 collected data from far more 200-level courses than AY19/20, especially since the Spring 2020 200-level courses that were planned to be used were not due to the pandemic. Therefore, the sample may be skewed. The next cycle should be sure to include more 200-level courses. In the meantime, program chairs should reconsider the designations of where the skills are *introduced*, *reinforced*, and *assessed* within programs. Finally, continue work to norm the ISLO6 standards among faculty to improve inter-rater reliability.
Providing avenues for students to practice ISLO6 skills, as well as scaffolding assignments throughout a semester so that students progressively build to the desired outcome and can receive feedback and assessment along the way, led to greater success in the ISLO skill development.	The Committee on Student Learning and Assessment (CSLA) and the Professional Staff Development Committee (PSDC) might coordinate on workshops or other professional development focused on pedagogical best practices in critical analysis and reasoning. Consider holding departmental meetings that focus on how best to teach ISLO6 skills in relevant courses. Program chairs could be asked to review the EXOs for the courses in their programs and determine if the recommendations from these workshops have clear placements.

Students with college-level reading and writing skills outperform those who struggle in those areas.	Reinforce reading and writing skill development. Encourage students to enroll in ENG 101 and 102 early in their programs. Work with faculty and student support services to continue to provide opportunities for students to work on those skills in and out of the classroom, recognizing that programs are constrained by the SUNY 64 requirements. Follow up with Writing Center staff regarding ways to enhance the services, possibly to include reading-skill development along with writing pedagogy.
Weaker outcomes in ISLO6 assessment appear connected to similar outcomes in ISLO5 Information Literacy assessment.	Broader cross-disciplinary and cross-service discussions about strengthening students' abilities in locating, assessing, and using strong evidence. Furthermore, the courses held by the Library staff that focus on critical analysis and reasoning should be considered as part of future assessments to better determine the impact they might have on ISLO6 development in students' college experience.

5 Recommendations for Resources Needed to Implement Action Plan

Recommendation/Action Item	**Potential Resources**
Be sure the AY22-23 assessment cycle includes more 200-level courses. In the meantime, program chairs should reconsider how the programs are structured to support the development of the ISLO6, clearly determining where the skills are *introduced*, *reinforced*, and *assessed* within programs. Finally, continue work to norm the ISLO6 standards among faculty to improve inter-rater reliability.	FAL and Associate Dean of AA meet with Program Chairs Council and department chairs to discuss appropriate course selection for next assessment cycle. Program chairs review courses to determine most appropriate designations for ISLO6 assessment, and revise curriculum maps, as needed. FAL and Associate Dean of AA hold norming sessions prior to next ISLO6 assessment.
The Committee on Student Learning and Assessment (CSLA) and the Professional Staff Development Committee (PSDC) might coordinate on workshops or other professional	FAL report to CSLA on ISLO6 outcomes. Discuss ways the committee would like to participate in the dissemination of recommendations from the assessment. FAL

development focused on pedagogical best practices in critical analysis and reasoning. Consider holding departmental meetings that focus on how best to teach ISLO6 skills in relevant courses. Program chairs could be asked to review the EXOs for the courses in their programs and determine if the recommendations from these workshops have clear placements.	meet with Departmental Affairs Council and/or specific departments to assist in creation of departmental discussions on best practices. Program chairs review EXOs of program courses.
Reinforce reading and writing skill development. Encourage students to enroll in ENG 101 and 102 early in their programs. Work with faculty and student support services to continue to provide opportunities for students to work on those skills in and out of the classroom, recognizing that programs are constrained by the SUNY 64 requirements. Follow up with Writing Center staff regarding ways to enhance the services, possibly to include reading-skill development along with writing pedagogy.	FAL and/or appropriate representatives of OAA meet with staff of the ACT Center to emphasize the importance of enrolling in ENG 101 and ENG 102 early in programs. FAL meet with Writing Center staff.
Broader cross-disciplinary and cross-service discussions about strengthening students' abilities in locating, assessing, and using strong evidence. Furthermore, the courses held by the Library staff that focus on critical analysis and reasoning should be considered as part of future assessments to better determine the impact they might have on ISLO6 development in students' college experience.	FAL meet with the Library staff and possibly the Associate Director of the Teaching and Learning Center to discuss ways to collect data on students who have attended Library courses and workshops.

Appendix A: ISLO 6 Critical Reasoning and Analysis Rubric

	4 = Exceeds	3 = Meets	2 = Developing	1 = Does Not Meet Standard
Key Words:	Comprehensively	Accurately	Partially/Inconsistent/ Attempts To	Does Not
1. Can the student formulate or evaluate arguments, problems, or opinions?	Student formulates or evaluates an argument, program, or opinion comprehensively. Issue/ problem is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Student formulates or evaluates arguments, problems, or opinions accurately so that understanding is not seriously impeded by omissions.	Student formulates or evaluates an argument, problem, or opinion only partially. Description leaves key concepts undefined and ambiguous.	Student does not identify, formulate, or evaluate appropriate arguments, problems, or opinions.
2. Can the student arrive at a solution, position, or hypothesis?	Specific solution, position, or hypothesis takes into account the complexities of an issue. Limits of the solution, position or hypothesis are acknowledged. Others' points of view are synthesized. Conclusions and related outcomes are logical and accurate.	Identifies or presents specific solution, position, or hypothesis and/or recognizes the different sides of an issue without further development. Conclusions and related outcomes are logical and accurate, with minor flaws.	Identifies or describes a specific solution, position, or hypothesis without sound reasoning or demonstration of proficiency. There are inconsistencies in reasoning or interpretation. Student demonstrates limited understanding.	Student does not accurately arrive at an appropriate solution, position, or hypothesis.
3. Does the student use carefully considered evidence?	Appropriate evidence is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Evidence is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Evidence is taken from source(s) with some interpretation/evaluation but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Student does not consider or present evidence, or student misinterprets evidence.

Appendix B: Samples of Instruments Used to Gather Data

BHS103 – Social Problems in Today's World

1. Using the 2010 census data below, evaluate the statement that people in poverty are disinclined to work or are lazy.

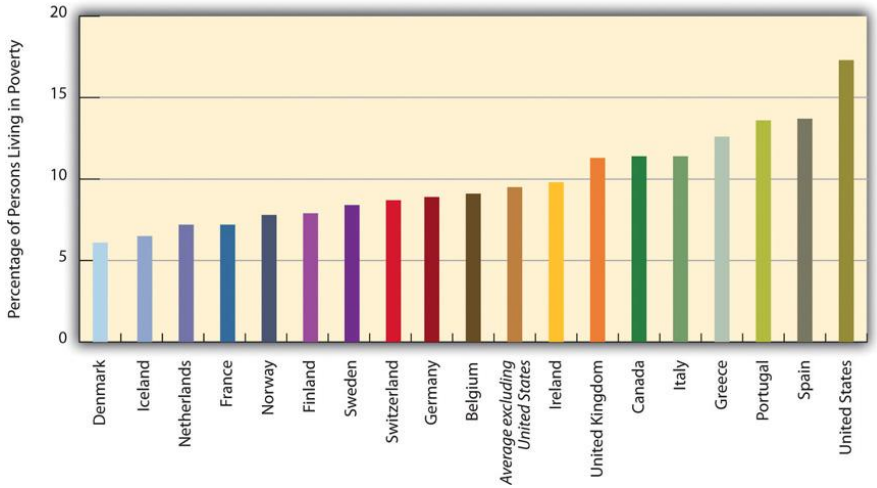
Table: Poverty and Labor Force Participation, 2010

Total number of poor people: **46,180,000**

Number of poor people under age 18: 16,401,000
Number of poor people ages 65 and older: 3,521,000
Number of poor people ages 18–64: 26,258,000

Number of poor people ages 18–64 who were:
Working full- or part-time: 9,053,000
Unemployed but looking for work: 3,616,000
Disabled: 4,247,000
In the armed forces: 77,000
Able-bodied but not in the labor force: 9,254,000

2. Considering the graph below we can see that the U.S. has the highest rate of poverty in comparison to other high-income countries. Using the sociological perspective provide a logical explanation as to why?



3. From our textbook we learned that "[a] recent study used government data to follow children born between 1968 and 1975 until they were ages 30 to37 (Duncan & Magnuson, 2011). The researchers compared individuals who lived in poverty in early childhood to those whose families had incomes at least twice the poverty line in early childhood. Compared to the latter group, adults who were poor in early childhood"

• had completed two fewer years of schooling on the average;
• had incomes that were less than half of those earned by adults who had wealthier childhoods;
• received $826 more annually in food stamps on the average;
• were almost three times more likely to report being in poor health;
• were twice as likely to have been arrested (males only); and
• were five times as likely to have borne a child (females only).

According to the results of the above study what conclusion can we draw about poverty?

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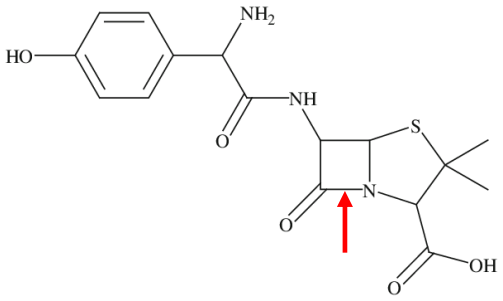
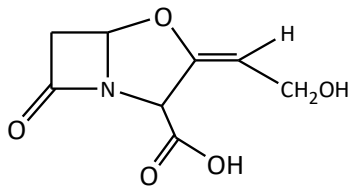
Macromolecules (Enzyme Regulation)

- The drug ***Augmentin*** is used to treat some bacterial infections.
- Augmentin is a combination of the antibiotic ***amoxicillin*** and the chemical ***clavulanic acid***.
- Often, strains of a bacterium that are normally sensitive to (*i.e.*, are killed by) amoxicillin develop resistance to amoxicillin (the amoxicillin will not kill them). They achieve this by producing an enzyme called ***beta-lactamase***, which destroys the amoxicillin (specifically, by breaking the bond indicated by the arrow in the structure below).
- The addition of clavulanic acid to the treatment regimen can circumvent amoxicillin resistance. In other words, some strains of bacteria that are resistant to amoxicillin are sensitive to (*i.e.*, killed by) the combination of amoxicillin and clavulanic acid. Note that the clavulanic acid is not capable of killing bacteria.

Explain the mechanism of how clavulanic acid "assists" in killing amoxicillin-resistant bacteria.



Amoxicillin



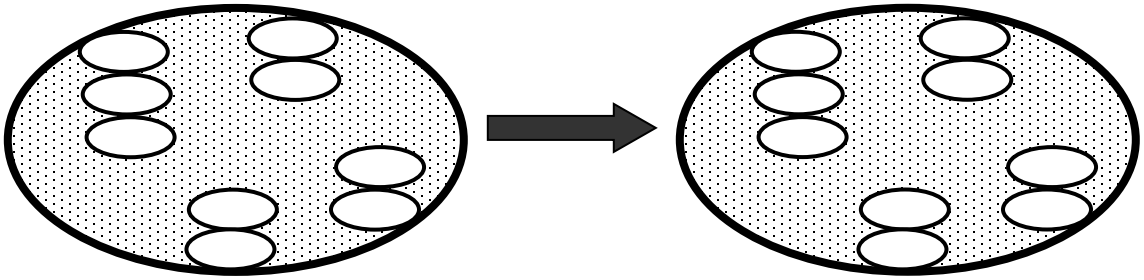
Clavulanic acid

Energy Flow (Photosynthesis & ATP Production)

- Chloroplasts are isolated and soaked in a solution of pH 4 (high H^+ concentration).

- Next, they are removed from this solution and placed in a pH8 (lower H^+ concentration) solution which also contains ADP and free phosphate groups (P_i). Immediately, ATP begins to be produced.
- All of these steps occur in the *absence* of light.

Normally, ATP is produced during the light-dependent reactions of photosynthesis which, obviously, require light). How is it possible that, in this experiment, ATP is produced *without* any light? Give the biochemical explanation of how this can happen. Use the diagrams below (cross-section of a chloroplast, with thylakoids shown) as a guide.



Soak in pH4 Move to pH8

Energy Flow (Photosynthesis)

Below is a photograph of a leaf from a *Coleus* plant. Like a typical plant, it can perform photosynthesis in order to produce glucose, and some of the glucose is converted to starch for storage.

- It is easy to test this leaf for the presence of starch. To do so, the leaf is boiled in alcohol to remove all of the pigments, rendering it colorless. Then, the leaf is soaked in an iodine solution. When iodine and starch react, a dark purple color results.
- You perform the experiment described above, testing for the presence of starch in this leaf.
    - The area that was originally green turns purple.

- The area that was originally white remains colorless.
- The area that was originally pink remains colorless.

[I have a photo of the leaf after bleaching and after iodine; I will try to locate it for inclusion here.]

For each of the three areas, give a biochemical explanation of why you observed the reaction that you did.

Green area (turned purple):

White area (remained colorless):

Pink area (remained colorless):

Biodiversity (Prokaryotes)

A new recombinant species has formed from the coinhabitation (living together in same space) of two of the prokaryotic species below. This new pathogen has left several people hospitalized with an intestinal infection. The common "go to" antibiotics are not working, and the hospital pathology lab is trying hard to identify the origins of this new species. The lab pathologists are certain that one of the two original species is species D.

Explain why the pathologists are certain that one of the species is species D and predict which other species, if living with species D in a human intestine, could lead to this new recombinant species that is pathogenic and resistant to some antibiotics. Explain your predictions.

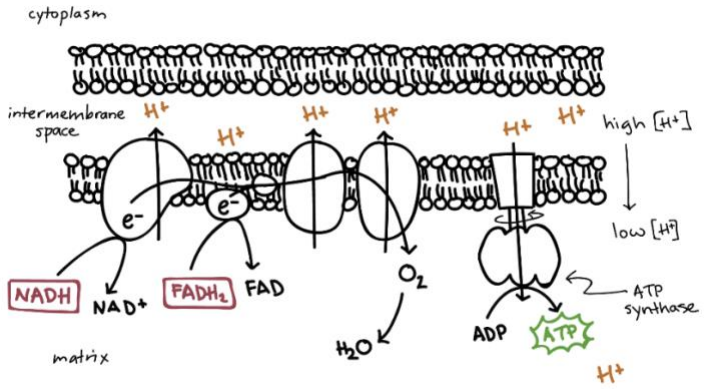
Trait	Species A	Species B	Species C	Species D	Species E
Plasmid	R	None	R	F	None
Gram Staining Results	Positive	Variable	Negative	Negative	Negative
Nutritional Mode	Photohetero-troph	Chemoauto-troph	Chemohetero-troph	Chemohetero-troph	Photoautotroph
Metabolic Pathways	Aerobic	Anaerobic	Anaerobic fermentation	Anaerobic fermentation	Anaerobic photosystems
Other Features	Fimbriae	Internal membranes	Flagellum	Pili	Thylakoids

Energy Flow (Cellular Respiration)

The following passage is a summary of an article found in the journal of the American College of Medical Toxicology titled "*2,4-Dinitrophenol (DNP): A Weight Loss Agent with Significant Acute Toxicity and Risk of Death"* (Grundlingh, Dargan, El-Zanfaly & Wood, 2011).

DNP **(**2,4-Dinitrophenol) is a compound that is freely sold over the internet as a weight loss drug. Research shows that the drug does cause quick weight loss, but not without some very concerning side effects. Exposure to DNP causes an alarming change in body temperature, heart rate, and breathing rate, that has resulted in death. The compound works by causing a H^+ leak through the inner membranes of the mitochondria, breaking the connection between the electron transport chain and ATP-synthase. As of the publication of this article, 62 deaths have been attributed to DNP exposure.

Use the above the passage, your knowledge of oxidative phosphorylation and the figure below to explain, on a cellular level, how DNP causes weight loss and predict how DNP changes body temperature, heart rate and breathing rate. Explain your predictions.



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Appendix C: Student Performance Disaggregated by Program

	6.1 Formulate/Evaluate				6.2 Arrive Solution				6.3 Use Evidence			
	AY1617		AY1920		AY1617		AY1920		AY1617		AY1920	
MAJ	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
ACC	1	100.0%	3	33.3%	1	100.0%	3	33.3%	1	0.0%	3	66.7%
ARC	5	80.0%	8	75.0%	5	100.0%	8	75.0%	5	60.0%	8	62.5%
ASP	3	66.7%			3	66.7%			3	33.3%		
AVI	11	72.7%	3	100.0%	11	81.8%	3	100.0%	11	54.5%	3	100.0%
AVM	7	85.7%			7	100.0%			7	85.7%		
BAT	164	61.0%	70	75.7%	164	66.5%	70	75.7%	164	56.1%	70	77.1%
BUS	29	41.4%	16	75.0%	29	55.2%	16	75.0%	29	51.7%	16	68.8%
CDC			2	50.0%			2	50.0%			2	50.0%
CHC	1	0.0%	1	100.0%	1	100.0%	1	100.0%	1	100.0%	1	100.0%
CIS	10	40.0%	10	80.0%	10	70.0%	10	80.0%	10	50.0%	10	60.0%
CJC	1	100.0%			1	100.0%			1	100.0%		
CMH	3	66.7%	3	100.0%	3	66.7%	3	100.0%	3	66.7%	3	100.0%
CNS	1	0.0%	2	100.0%	1	0.0%	2	100.0%	1	0.0%	2	100.0%
COM	42	57.1%	35	68.6%	42	69.0%	35	74.3%	42	64.3%	35	68.6%
CPS	40	85.0%	22	77.3%	40	77.5%	22	72.7%	40	65.0%	22	77.3%
CRJ	20	50.0%	11	72.7%	20	70.0%	11	72.7%	20	45.0%	11	54.5%
CRT	156	57.1%	73	75.3%	156	63.5%	73	71.2%	156	51.9%	73	79.5%
ECH	17	52.9%	5	60.0%	17	76.5%	5	60.0%	17	47.1%	5	60.0%
EDB	2	50.0%			2	100.0%			2	100.0%		
EDH	7	71.4%	8	87.5%	7	71.4%	8	87.5%	7	28.6%	8	87.5%
EDL	5	60.0%	4	50.0%	5	100.0%	4	100.0%	5	60.0%	4	100.0%
EDM	2	100.0%	1	100.0%	2	100.0%	1	100.0%	2	100.0%	1	100.0%
EDP	2	50.0%			2	50.0%			2	50.0%		
EED	23	56.5%	30	83.3%	23	69.6%	30	80.0%	23	52.2%	30	80.0%
ELT	19	52.6%	9	55.6%	19	36.8%	9	44.4%	19	26.3%	9	44.4%
ENR	59	79.7%	13	84.6%	59	81.4%	13	84.6%	59	86.4%	13	84.6%
ESW	29	51.7%	28	78.6%	29	58.6%	28	75.0%	29	65.5%	28	75.0%
FIR	2	50.0%			2	50.0%			2	0.0%		
FPT	3	66.7%	3	33.3%	3	33.3%	3	33.3%	3	33.3%	3	0.0%
GSP	220	66.4%	243	80.7%	220	68.6%	243	79.0%	220	60.5%	243	77.4%
HMS	84	71.4%	33	78.8%	84	78.6%	33	84.8%	84	61.9%	33	78.8%
INM	6	50.0%	1	0.0%	6	50.0%	1	0.0%	6	33.3%	1	0.0%
LAH	204	65.7%	103	79.6%	204	72.5%	103	78.6%	204	53.4%	103	78.6%
LAM	6	50.0%	2	100.0%	6	50.0%	2	100.0%	6	66.7%	2	100.0%
LAX	83	80.7%	80	77.5%	83	80.7%	80	85.0%	83	75.9%	80	82.5%
MLT	16	87.5%	22	100.0%	16	81.3%	22	90.9%	16	81.3%	22	86.4%
MPC	5	80.0%			5	60.0%			5	80.0%		
NUR	3	100.0%			3	100.0%			3	100.0%		
PAL	14	50.0%	3	100.0%	14	64.3%	3	100.0%	14	50.0%	3	100.0%
PAR	3	66.7%	10	100.0%	3	66.7%	10	100.0%	3	66.7%	10	100.0%
PBH			6	100.0%			6	100.0%			6	83.3%
PDC	2	50.0%			2	50.0%			2	50.0%		
PFA	25	76.0%	3	100.0%	25	80.0%	3	100.0%	25	72.0%	3	66.7%
PRR			1	100.0%			1	100.0%			1	100.0%
UND	50	74.0%	21	81.0%	50	74.0%	21	81.0%	50	68.0%	21	81.0%
VAT	34	55.9%	19	84.2%	34	73.5%	19	84.2%	34	67.6%	19	89.5%
Total	###	65.2%	907	79.1%	1419	70.6%	907	78.8%	###	59.8%	907	77.7%

Appendix D: Faculty Narrative Data

The course is listed in the left column. Individual faculty narratives are listed in the left column, with each box representing a different faculty perspective.

Course	Narrative Data
BIO105	I'm not entirely sure how useful this data is. The determination/notification to use this course for ISLO 6 evaluation happened very late in the semester. How students were to be assessed had already been published in our respective syllabi, and our students informed. IF this is to be produce more useful, meaningful data, I would suggest that the determination for which course is to be used is made the semester prior and plans implemented the semester before. This would allow all of the instructors to develop a common assessment framework to ensure that the data is an accurate measure across all courses.
	All students that attempted the ISLO6 assessment where at benchmark level (BL) 1 or above, which is expected given that General Biology I (BIO 105) is an introduction to biology course usually taken by incoming freshmen in their first semester. Over 80% of these students scored above BL 1 which is also expected given that this assessment was completed at the end of the fall semester after students had been exposed to activities meant to introduce and reinforce ISLO6 competency. These findings suggest that most of the students in BIO105 sections 020 & 030 met expected levels for critical analysis and reasoning competency items assessed. Although these findings suggest that over 80% of these students met or exceeded milestone levels (ML) for all competency items on rubric, further analysis reveals that most students scored at ML 2 and ML 3 with an average score between 2.3 – 2.5 and the mode being at ML 2 for modest competency. Again, this is expected as this is usually a first semester freshmen course. The major difference between a ML 2 and ML 3 score is whether the student can demonstrate understanding through an accurate and thorough description of the reasoning and logic that led to their conclusions. In more than one case, students formulated an argument, selected an accurate solution and supported their selection by citing correct evidence from the passage, but without a thorough or complete description of the analysis and rationale supporting their argument and/or solution. Failing to do so resulted in a lower score (ML 2). The lack of a proper description negatively affected all items, but mostly items I and III, in which about 50% of the students scored at ML 2 due to ambiguous, inconsistent and incomplete descriptions of their thinking and analysis. As students continue in their programs with sequential and upper level courses, they will be exposed to more activities reinforcing ISLO6 which will help them progress in their level of competency. It would be of interest to see how students do with ISLO6 competency in these sequential and upper level biology courses. As all assessed students met expected (benchmark) competency levels for ISLO6 and over 80% were

	at or above milestone levels, this supports that the teaching methods used in the course successfully introduced and reinforced ISLO6 competency. Some of the methods used to introduce and reinforce ISLO6 in this course are the use of a laboratory notebook in which critical analysis and reasoning is used throughout the semester. There are also various opportunities throughout the semester for practice with these types of questions on assignments and exams. **Action/Modification:** Because students did not write it down, does not mean that they did not use sound reasoning and logic to come up with their arguments, solutions, and use of evidence. Perhaps the wording of the assessment question could be modified to encourage students to describe their reasoning and/or logic in writing more thoroughly. As their instructor for 16+ weeks, I believe that with more thorough descriptions, several of my students would have scored at a ML3 rather than at a ML2. The same type of wording could also be used throughout the semester through the laboratory notebook, assignments and exams to get students accustomed to it and to help them understand why thorough and complete descriptions are important. This will also serve to help the 16% of students that scored at BL 1.
	15 of 22 students (68%) responded to the scientific problem presented by writing an essay in class. Students not responding were either absent or one student failed to submit the essay. Only 20-27% were able to exceed standards on all three criteria. These students were able to discern and explain in an organized manner the crucial points relating to each rubric category. They clearly identified 1) the relation between drug action and consequent physiological response to ; 2) accurately outlined the rationale for the compensatory responses to the drug; 3) adequately explained the drug's effect at at the cellular level 40-46% of the students adequately explained the drug's effects as stated in the essay problem but often brought in material learned int he course but that were extraneous to the problem as stated int he essay. In general, they failed to make meaningful connections between the given physiological symptoms and the underlying biology. Approximately 30% of the answers simply repeated the information and wording of the essay problem without giving any additional information. They failed to make any connection between the given drug effects and underlying biological processes. There was not attempt to explain the cellular processes nor symptoms as compensatory responses. Conclusion: Students need more practice in reading specific problems in science, discerning the primary problem and making connections. Increase in the number of Laboratory assignments would approach this aim. To avoid the common problem of student waiting till the last minute and either copying or cutting and pasting, group work might be beneficial with group oral discussion in the typical fashion of proseminar classes (now called 'the flipped classroom')

MLT106	All students who regularly attended and actively participated in this third-semester core course met or exceeded the critical thinking competency. In addition, those students who worked with classmates on this outside assignment seemed to be able to brainstorm , debate and draw accurate conclusions.
PAR201	The students are able to assess patients, identify proper treatments, decide how to properly and safely move patients, and have the psychomotor skills to perform procedures and treatments needed. The assessment and treatments are at a paramedic level.
BHS103	The assignment asked for an assessment of three areas: 1. students ability to formulate or evaluate arguments, problems or opinions, 2. students ability to arrive at a solution, position or hypothesis and 3. students use of carefully considered evidence. My course objectives, written in consultation with the behavioral science department, focus on applying sociological concepts to specific social problems, examining the underlying theoretical and conceptual foundations of different theoretical perspectives, focusing on how best to evaluate sources of information, and considering the real world sources of social constructs. My course is also structured around lectures, discussion, formal and informal writing, and student research presentations. I believe that while the students demonstrated a range of proficiency levels, my course assignments did generally allow me to assess students in these three categories.
	Many of the high and mid level achieving students demonstrated average to above average critical thinking skills. The students who struggled during the semester (in terms of coming to class, handing in assignments on time, being open minded about the topics presented) did poorly in demonstrating critical thinking skills. It should also be noted that this assessment was conducted the Tuesday before Thanksgiving break and the students had all handed in the biggest assignment of the semester the Sunday prior (so many may have been cognitively exhausted and somewhat checked out).
	Students who paid attention in class and completed homework assignments had no difficulty completing the task.
	The students were aware that the results of this assessment are not calculated in the course grade. The results of this assessment reflect the fact that in some cases students did not put much thought or effort into coming up with answers to the assessment questions. Many students in the course were in their first semester and several seem unprepared for college level work.
	I assessed four sections of BHS 103. Over all, the majority who completed the assessment were able to meet or exceed expectations for all three criteria of critical thinking. The best results were achieved with criteria #2 (Can the student arrive at a solution, position, or hypothesis?). The best results unsurprisingly came in the honors course (BHS103-01H). The students in my non-honors BHS 103-100, however, did out perform the honors students on criteria #1 (Can the student formulate or evaluate arguments, problems, or opinions?). It could be because the students in the non-honors section did not know the assessment did not count towards a grade, whereas the honors students did (they asked).
	In reviewing results, it was noted that all of the students were able to look at the facts and seemingly understand the questions but only a few could actually use the facts when writing or rely on them when formulating a conclusion. Some were able to start off with a hypothetical question, but would get lost as they were writing not concluding anything so much as running out of points to make.

	Most seemed able to understand their reading, but digesting the material and logically using it was more difficult. Perhaps this was because most of their previous course work required them to report information, not to analyze it. They couldn't show their work. They could arrive at opinions but couldn't explain why. In high school, they were likely performing tasks about material they did not know so well but could "see" the correct answer or remember it from classwork or during test preparation. There, it was enough to have an opinion they could defend on its own merits, but not by contrasting it with other possible answers. I think that as students starting off in college, they have yet to develop a lot of knowledge about any one thing, and when they do, are not asked often enough to entertain multiple perspectives. As they become more learned, and are repeatedly asked to consider different perspectives, they will begin to do so, from habit more than from being "taught" to critically think.
	On the assessment, the students displayed the same lack of initiative they displayed during the semester. Only a small handful are confident enough to risk interpreting data. Many do not take the time to carefully read materials that are presented to them. They are reluctant to attempt to evaluate materials that do not provide black and white answers. They tend to look for a lead from someone else before they comment. Poor or limited reading skills may be influencing their responses. A majority of the class displayed very elementary writing skills. While some may have formed opinions about the material, limited writing skills may have contributed to stunted responses.
	This assessment was given on the last class of the semester on a day when attendance was affected due to inclement weather. The students had just completed another class assessment, were visibly tired and just wanted the class to end. Several of the students who received grades of "does not meet standards" are very good students, with good writing and critical thinking skills. I believe the timing of the assessment had major ramifications on the outcomes. I will give future assessments earlier in the semester.
	The results indicated that the majority of the students fell within the 2 Milestone category which indicates modest competency.
	I administered the assessment tool on the Tuesday and Wednesday of Thanksgiving week that fell on the second to last week of the semester. The students were told ahead oftime that I would be administering the assessment tool on those days and that students who participate and give an earnest effort can receive extra-credit with the caveat that how much of the extra-credit they earn is based on the effort. I do this to encourage participation and create an incentive to put forth an effort. In actuality, all participants will receive the full extra-credit. The results reflect what I observe in class based on student participation and written assessments. That said, one particular section happens to be more curious and questioning as well as more engaged in the material. How they present in class was not reflected in the results, but is in keeping with the results of their quizzes and exams.

	The following are a list of comments and observations: It appeared to me that many students did not read the questions. I found this to be especially true for question #1. Some students were not able to look beyond their own preconceptions and personal bias and as a result were not able to use the provided data effectively. Many students jumped to identifying theoretical perspectives that could be applied to frame the material without addressing the data provided, something akin to not showing your work in math. This type of response is reflected in the written assessments (quizzes and exams) I administer as part of the course. It demonstrates that they are beginning to see how the theories can be used as frameworks to explain social phenomena, but are not yet able to coherently explain the relationship between the data/information and the theoretical perspective. In the course I emphasize using these social perspectives to frame our understanding, that emphasis was reflected in their responses to this assessment tool. The majority of the students demonstrated "developing" skills, which, again, are in keeping with quiz and exam results. As a survey course for primarily first year students transitioning from the expectations of K-12 education model to the expectations of college students, I create tests that are equally balanced for objective and subjective responses. The students tend to do extremely well on the objective half, which demonstrates their skills for memorizing discrete ideas, concepts and terms. The written response half requires that they think about what the ideas, concepts and terms mean and how they can be applied or generalized. Typically, only a handful of students in each section is able to do this successfully. Most of the others demonstrate that they have memorized ideas, concepts and facts, but are not able to integrate them into their understanding. So for those few that demonstrate the requisite skills display academic readiness. Most others demonstrate a newly emerged raw skill or emerging skill, in other words are transitioning. The remaining few demonstrate a lack of readiness for the time being.
	Most of the students met basic requirements for successful completion of the instrument. Those that did not had either evidenced similar issues with other instruments (such as routine class testing) or had additional mitigating factors. For example two of the students in this sample were recent immigrants where English was a second language and they struggled somewhat with reading comprehension. They had done well with other class instruments and in discussion certainly demonstrated orally that they basically understood topics and theories under discussion. From this I could conclude that most students in the class, at least in the aggregate, understood the content of this instrument sufficiently that they were able to articulate reasonably accurate conclusions from it.
	The majority of the class demonstrated a mastery of the concepts, method and theory presented in the Social Problems curriculum. Several were outstanding, and several failed to demonstrate a mastery of the material, however the overwhelming majority demonstrated proficiency on this test.

	Students did very well across 3 in class sections and 1 online course section.
	Most students perform at level 3. Only two met the standard of level 4
	The results were based on the tool provided to instructors for this assessment.
	There are 63 students registered for the two sections being assessed. Of those 63 students, 41 students were assessed (completed the assessment) against the critical thinking rubric. Of those 63 students, 13 students are either Never Attended class or Stopped Attending. Of those 63 students, 9 students were absent on the day that the assessment was given. Of the 41 students who completed the assessment, 14 students scored a 4 = exceeds. Of the 41 students who completed the assessment, 13 students scored a 3=meets. Of the 41 students who completed the assessment, 9 students scored a 2=developing. Of the 41 students who completed the assessment, 5 students scored a 1=does not meet standard.
COM140	Overall, most students lack the ability to " formulate or evaluate arguments, problems or opinions and arrive at a solution, position, or hypothesis based on carefully considered evidence." In fact, most students lack basic writing skills. Students did not understand how to formulate thesis statements, utilize outside evidence, and provide in-text citations. Furthermore, most students regurgitated the opinions of news and political pundits and/or "rewrote" previously published articles. **Action/Modification:** Adding a unit of the course that provides a refresher on analytical paper structure and the foundations of argumentation