Student Learning in Natural Science with a Laboratory Experience Courses
Self-Study Report
18 January 2018

Based on the NSLE assessment report of August, 2016

Respectfully Submitted 18 January 2018
Jeff Hughes, Professor, Department of Biology

I. Executive Summary

The departments of Biology, Chemistry, and Physics have developed the following learning goals for courses students take to satisfy the MPSL Natural Science with Lab Experience (NSLE) non-sequential requirement:

1. Develop an understanding of how to use logic and the scientific method to analyze the natural world and solve problems.

2. Learn about issues in science that are important both personally and globally.

3. Utilize technology in laboratory and field environments in order to connect theories and descriptions found in lectures and textbooks with real-world phenomena.

Accomplishing the NSLE goals will simultaneously address the core goals expressed in the mission statement of Millikin University. The first and third NSLE goals will help students achieve *professional success* through their practice of the scientific method as a mode of critical inquiry demanded by many careers. All three goals will contribute to Millikin graduates' working knowledge of issues, processes, and advances in science and technology around the globe, thus helping them contribute as *democratic citizens in a global environment*. By acquainting students with the nature of scientific investigation, how advances impact daily life, and the potential for future advances and changes, the NSLE second and third goals help *prepare students for a personal life of meaning and value*.

The courses that students take to satisfy these learning goals come from the three departments in the natural sciences and are taught by nearly the entire faculty in each department. Prior to 2011, the evaluations were limited to one course per department. From 2011-13, the assessments included evaluations of several courses per department, and assessments were based upon syllabi, assignments and rubrics, and student artifacts. Assessment reports since then reflect a broken but improving assessment system and have relied on the assumption that conclusions reached on previous years remain valid in the absence of any significant changes in the staffing, courses, or goals of the program.

From 2011-13 our status on all three learning goals was awarded a "**green light**" (acceptable) according to results seen in assessment rubrics. An unanswered call for a new faculty assessor in 2013-14 prevented review of the learning goals and artifacts, but minimal changes to the courses and faculty who taught in science MPSL courses for AY 2013-14 supported a conclusion that the efforts to meet NSLE goals remained at a "**green light**" status. Because no new faculty assessor was named until early May, 2015 learning goals were not actively assessed nor were artifacts collected again in 2014-15. The stability in the faculty and courses over that time again justify an assumption that the program is at a "**green light**" level. Late requests and poor follow-through by the current assessor produced a somewhat updated but still incomplete report for the past couple years, but again lack of change or concerns suggests an at least acceptable program. Furthermore, this year's report includes data collected from student course evaluations (SIRs) that clearly reflect satisfaction for the NSLE class experience. The assessment mechanism needs to be improved in one major way: inclusion of artifacts that demonstrate learning and achievement of the NSLE learning goals. So, while the assessment mechanism itself has been improved to provide needed data-based evidence of an effective and well-received program, it lacks assessment of actual student artifacts. Consequently, the major assessment goal for 2017-18 is to complete and implement suggestions in this report—most notably an evaluation of artifacts—to recover from a "yellow **light**" performance in assessment itself. Bottom line: we have a successful science learning program and an improved but still flawed assessment program owing to the single significant omission of student artifact evaluation.

II. Goals

The faculty in the Departments of Biology, Chemistry, and Physics design courses that satisfy the MPSL NSLE requirement to leave students with the ability to:

1. use logic and the scientific method to analyze the natural world and solve problems,

2. analyze issues in science which are important both personally and globally, and

3. connect theories and descriptions found in lectures and textbooks with real-world phenomena utilizing appropriate technology in laboratory and field environments.

Students who achieve these goals will simultaneously satisfy the core goals expressed in the mission statement of Millikin University. Specifically, a Millikin education aims to help students

1. *achieve professional success*, a goal helped by learning how the nature, application, and practice of the scientific method as a mode of inquiry is valuable as a way to approach questions found in any career,

2. *become a democratic citizen in a global environment*, a goal facilitated by learning about, contributing to, and forming opinions on issues that challenge people either in particular regions or across the globe, and

3. *prepare students for a personal life of meaning and value*, a goal supported by helping student connect the theory in texts to the practical applications of science in their lives will help the students be life-long learners and continue to integrate future developments in science into their understanding of and participation in world events.

With a new faculty assessor now in place and suggestions made to improve the program provided in this report, these goals will be reviewed in detail during and at the conclusion of the 2016-17 academic year.

III. Snapshot

The departments of Biology, Chemistry, and Physics at Millikin University were staffed in 2016-17 by 18 full-time faculty (15 tenured/tenure-track faculty, two visiting asst. professors, one full-time instructor), seven part-time adjunct faculty, and 1.5 academic staff support personnel. A tenured biologist, C. Handler, teaches half-time while directing the Pre-Professional Program. Similarly, the instructor, R. O'Conner, divides her duties between teaching and lab support (lab set-ups, inventory, ordering, etc.) in the biology department. Both visiting asst. professors temporarily occupy positions normally filled by tenure/tenure-track appointments. The science departments are housed in the Leighty-Tabor Science Center (LTSC). Opened in 2002, it meets all teaching and research needs. Full-time faculty teach a variety of courses designed for non-majors, service courses required by other programs (e.g., Nursing, Exercise Science), and entry- and upper-level science major courses. Adjunct instructors usually lead introductory course laboratory sections in classes for non-majors. Course sizes vary from as few as eight students—typically upper-level classes limited to no more than 20 students—to 60 or more students in a single lecture section divided into multiple smaller lab sections of up to 20 students each. The few larger classes typically serve non-majors and include BI206/207 (*Human Anatomy and Physiology I/II*), CH203/205 (*Essentials of Organic and Biochemistry*), and PY100/104 (*The Planets*) and PY101/105 (*Stars and Galaxies*). Labs are capped at 12-24 students depending on demand and course level.

This review covers NSLE courses offered in AY 2016-17 focusing either on topics of interest to non-science majors, service courses required by non-science majors, or introductory science courses for science majors. They include courses offered for PACE students, all of whom must satisfy the NSLE requirement. Note that 16 of 18 (88.9%) full-time science faculty members and 22 of 25 total science faculty (88.0%) participated in NSLE course instruction.

Table 1. "Natural Science with Laboratory Experience" courses with enrollments

Course Number	Course Title or Section Name	# Sect. '16-'17	Sem(s) Offered	Seats	Enrolled	Instructor(s)
BI102	*Biochem. of Food**	3	F,S,P	66	65	Galewsky
	Biology of Birds	2	F,S	40	40	Horn
	Biology Inf. Disease	3	F, S P	60	52	Hughes, Zimmerman
	Curr. Issues in Biol.	1	S	20	20	O'Conner
	Human Biology	2	F,P	40	38	Handler, Schroeder
BI105/155	*Ecol. & Evol'n. & Lab*	3/6	F	75	64	Parrish, Robertson, Horn, Wilcoxen, Smith, O'Conner
BI108/158	*Diversity of Life & Lab*	2/3	S	60	50	Schroeder, Parrish, Smith
BI130	*Environ. Biology*	1	F	19	17	O'Conner
BI220	*Field Ecology*	1	Su	6	4	Parrish, Zimmerman
BI204	*Ess. of Anat. & Phys.*	2	F,S	40	39	Handler, Smith
BI206	*Human Anat./Phys. I*	2	F,S	97	67	Smith, Zimmerman
BI207	*Human Anat./Phys. II*	2	F,S	90	74	Smith, Wilcoxen
BI230	*Princ. of Microbiology*	2	F,S	60	49	Hughes
CH121/151	*Gen. Chemistry* (all)	6/10	F,S	179	180	Barnes, Day, Guasco, Hadsall, Higgins, Knust, E. Stensrud, K. Stensrud,
IN204	*Biology of Spiders*	2	S	20	19	Robertson
PY100/104	*The Planets*	1/3	S	89	83	Watson, Werner
PY101/105	*Stars and Galaxies*	1/2	F,P	48	49	Watson
PY111/171#	*College Physics I*	1	F	36	28	Chamberlain
PY112/172#	*College Physics II*	1	S	28	25	Chamberlain
PY151/171#	*University Physics I*	1	F	36	14	Watson
PY152/172#	*University Physics II*	1	S	25	7	Watson

TOTALS: 21 courses, 41 classes, 1134 available seats, 984 students enrolled (86.8% of capacity).

F = Fall, S = Spring, Su = Summer, P = PACE (fall or spring)

Courses listed as a single number have labs integrated with lectures, courses listed as ###/### have the lecture course listed before the obligatory laboratory course. Every course carries four credit hours.

**Biochemistry of Food* is listed under CH102 for PACE sections.

#PY171/172 enroll students from College and University Physics; there were two sections of each lab.

IV. Learning Story

NSLE students typically fall into three groups: 1) science majors who take many science courses; 2) those needing required service courses (e.g., Nursing, Exercise Science), and 3) students fulfilling the NSLE requirement who often take only one science course. Courses for science majors also have learning goals specified by the major, courses for the third group must meet NSLE learning goals, and courses serving the second group often serve multiple needs and must be designed with objectives aimed at satisfying professional needs defined by their major while also satisfying the NSLE learning goals. The combination of these three groups produces a highly diverse clientele for science courses, as noted in Table 2.

The many NSLE courses forbid any story that describes a "typical" experience. Instructors use content delivery and inquiry-based pedagogical methods and integrate lectures and labs to emphasize critical thinking, application, and problem solving skills that reflect current understanding of effective teaching.

Table 2. Distribution of NSLE course enrollments by major

Major	'11-'12	'12-'13	'13-'14	'14-'15	'15-'16	'16-'17	Major	'11-'12	'12-'13	'13-'14	'14-'15	'15-'16	'16-'17
Accounting	21	12	12	12	10	4	Interdepartmental	6	2	0	2	3	1
Art	2	2	4	2	0	0	Intern'l Business	3	1	0	1	2	2
Art Education	1	1	0	0	0	2	Intern'l Studies	2	0	2	0	0	0
Art Therapy	7	2	2	4	4	2	Management	0	0	0	6	8	7
Athletic Training	26	27	47	61	56	65	Marketing	6	9	7	7	2	3
Biology (all tracks)	123	173	253	166	217	167	Math/App. Math	4	9	4	3	7	5
Biology, Sec. Tch.	10	4	9	9	9	4	Math, Sec. Teach	5	2	3	4	7	10
Bus. & Bus. Und..	18	15	11	7	9	3	Math, Act. Sci.	3	3	0	2	3	4
Chemistry	27	39	75	38	31	29	Music	4	13	2	7	3	5
Chem., Sec. Tch.	3	0	0	1	5	2	Music Business	8	14	10	11	10	14
Commercial Art	1	13	0	0	0	0	Music Ed Inst.	2	6	3	2	1	3
Commercial Music	18	49	7	10	13	11	Music Ed Vocal	11	12	10	10	8	9
Communication	25	15	43	41	41	36	Music Perf. Inst.	3	6	5	2	1	4
Digital Media Mktg.	NA	NA	NA	0	1	5	Music Perf. Vocal	11	2	4	4	4	3
Early Child. Ed.	19	25	16	7	7	7	Musical Theatre	11	4	6	11	8	11
Elementary Ed.	25	1	29	19	14	15	Non-Deg./No Mjr	2	0	6	2	3	3
English - Literature	1	4	1	1	2	1	Nursing/Pre-Nrsng	49	81	182	143	142	169
English, Sec. Tch.	6	11	5	3	4	3	Org. Leadership	0	0	0	0	0	26
English - Writing	7	6	4	1	2	5	Philosophy	4	5	5	6	4	2
Env. Studies	0	0	0	0	0	2	Phys Ed (K-12)	27	25	13	9	8	8
Entrepreneurship	2	36	1	7	5	1	Physics	10	16	32	10	11	7
Expl. Stud./Undec.	23	6	39	30	41	49	Political Science	0	4	6	5	3	1
Finance	3	28	7	1	0	0	Psychology	20	35	42	17	26	28
Graphic Design	1	20	2	3	3	3	Soc Sci. Sec. Tch	0	3	13	1	3	4
H.F.R (& F.S.)	57	1	37	29	31	42	Sociology	13	16	5	12	11	15
History	5	8	1	1	0	0	Spanish	3	1	0	4	5	6
Human Services	23	26	33	17	24	20	Sport Managem't	1	22	22	29	34	32
Info. Systems	3	1	11	3	3	3	Studio Art	6	9	5	3	3	1
Information Tech.	0	0	0	1	1	0	Theatre	29	23	14	33	34	24
Instruct. Devel.	0	0	0	0	0	1	**SUM**	**700**	**848**	**1050**	**820**	**887**	**889**

Includes BI102, BI105/155, BI108/158, BI125, BI130, BI204, BI206, BI207, BI230, BI280, CH121/151, CH131, IN204, PY100/104, PY101/105, PY111/171, PY112/172, PY151/171, PY152/172. PACE classes were included in 2014-16.

V. Assessment Method History

Prior to 2011, one faculty member was selected from each of the Biology, Chemistry, and Physics departments to represent the diversity of NSLE courses. These instructors assessed one of their own courses, and their individual evaluations were combined to produce the overall NSLE assessment.

This method underrepresented the breadth of NSLE courses and missed much of the variety of science courses. As listed in Table 1, 21 courses (five as BI102) meet the NSLE requirement and many are offered more than once each year; evaluating a single course from three instructors seemed insufficient. Also, a rigorous and impartial assessment cannot be conducted only by instructors of their own courses; an impartial evaluator seemed necessary.

To ensure a more in-depth assessment, a larger subset of courses was assessed annually for **AY 2011-13**, with the goal of having 60-70% faculty contribute course assessments from biology and chemistry and 100% participation from physics. Table 3 lists the results of these three assessment years, where the "score" represents success in meeting the goal of increased faculty participation.

Table 3. Evaluation results of faculty participation in NSLE assessment activities, 2011-13. Data summarize results presented in the 2014-15 NSLE assessment report.

Acad. Year	Biology NSLE Courses			Chemistry NSLE Courses			Physics NSLE Courses		
	Courses Assessed	Faculty Particip'n	Score	Courses Assessed	Faculty Particip'n	Score	Courses Assessed	Faculty Particip'n	Score
11-12	7/21=33%	5/11=46%	**red**	4/8=50%	3/5=60%	**yellow**	4/6=67%	2/2=100%	**green**
12-13	14/26=54%	6/12=50%	**yellow**	5/8=63%	3/6=50%	**green**	2/9=22%	1/2=50%	**red**
13-14	11/31=36%	5/12=54%	**green**	5/12=42%	4/9=44%	**yellow**	4/9=44%	2/2=100%	**green**

SIR scores, a syllabus audit, and rubric-guided evaluation of faculty and student artifacts were used to determine success in meeting the NSLE assessment goals as described in 2011-13 NSLE assessment reports. The SIR data were not specific to NSLE courses and instead rated all courses taught in the three departments, and while illustrating the satisfaction of students with science classes in general, they didn't speak to NSLE goals, are of questionable relevance, and were omitted in subsequent reports. Faculty syllabi for NSLE courses contained information explicitly required by the University but were very weak in expressing NSLE goals. Rubric-guided evaluations of artifacts submitted by faculty (e.g., tests, assignments) and students (e.g., papers, worksheets) showed improvement in faculty efforts to evaluate success in reaching NSLE goals and in student work directed to the goals. The evaluation process was time-consuming and did not involve all NSLE faculty or courses, but did document success in meeting the goals of expanding faculty participation and including a larger variety of NSLE courses.

The NSLE assessment system broke down in **2013-15**. The NSLE assessment coordinator was not replaced after AY 2012-13; consequently, data were collected. The 2013-14 report is based on a meta-analysis of available information and concluded that, with little change in classes and faculty that year, NSLE courses merited "**green light**" status in meeting all three NSLE goals. Failure to secure an NSLE assessment coordinator until May 2015 meant that again no data were requested or collected during AY 2014-15. There was too little time to obtain course enrollment data, NSLE-specific SIR data evaluations, artifacts, and audit syllabi for NSLE goals statements. Example: requests for SIR and enrollment information at the end of the spring semester were not answered. Again, analysis of available data and lack of substantial change to the NSLE program warranted a "**green light**" conclusion regarding program goals and suggestions for improving assessment in the coming year.

Minor changes were made for the 2014-15 and 2015-16 reports. All syllabi for NSLE courses were required to include specific language including the learning goals statement, Information Technology now provided more reliable enrollment figures for Table 2 to allow it to be updated for all previous years, and an informal survey of faculty affirmed broad satisfaction with the NSLE requirement. Requests to Information Technology for NSLE-focused SIR data were again unanswered and no student artifacts were gathered or even requested for direct evidence of student learning or appreciation for the role of science and scientific investigation in society.

VI. <u>Current practice and results</u>. A complete NSLE assessment report should have five elements.

1. A list of all courses, faculty, and enrollments summarizing the previous year's offerings. *Conclusion: The information provided in Table 1 and illustrates a wide diversity of offerings, broad participation by Natural Science faculty, efficient use of resources, and exposure of all Millikin students to science education.*

2. Evidence of the diversity of student exposure to NSLE courses. *Conclusion: Table 2 shows enrollments from a large number of majors every year, with science majors taking the most NSLE classes, non-science majors with science pre/co-requisites heavily represented, and students majoring in disciplines not directly related to science taking NSLE classes at a lower rate. This is as expected given student interests and curricular requirements.*

3. Verification of attention to NSLE learning goals in every class that meets this MPSL requirement. This is done by an audit of NSLE class syllabi. *Conclusion: 100% of NSLE syllabi have the required statement of the learning goals and all but two classes explained how these goals would be achieved during the class.*

4. Indication of student satisfaction with the NSLE offerings. This can be done by comparing student evaluations for NSLE courses with those of courses offered by the Division of Natural Science and Mathematics, College of Arts and Sciences, and the university as a whole. *Conclusion: Table 4 details the SIR score averages for NSLE, all science, Natural Science and Math Division, College of Arts and Sciences, and Millikin University courses in the fall and spring semesters of 2016-17. As explained on the table, detailed comparisons were not attempted because lack of access to individual SIR replies from all courses made it impossible to produce needed statistical values. NSLE course students agreed with every SIR statement; none were rated below 4.00 and most were considerably higher. NSLE averages were very similar to those of the other science class comparisons and trivially lower that the larger comparison groups except that NSLE scores were a consistently lower in spring vs. fall courses in comparison with other University Studies classes; again, no detailed comparisons can be made without statistics not available (and, given the similarity of the scores, not necessary) for this report.*

5. Evaluation of the results of student work with regard to the learning goals. This requires collection and evaluation of artifacts, ideally as a short assignment or test administered both at the beginning and end of the course. Discussions this coming year should result in a tool to evaluate examples of student work in the spring, 2018 semester.

This 2016-17 report now includes most of the agreed upon assessment methods. Given what's now in place, it is reasonable to conclude that

1. All Millikin students are exposed to formal science education in classes that claim to demonstrate the scientific method while addressing issues of personal and societal importance using hands-on, experiential methods. Table 1 shows the variety of courses offered to meet the requirement while Table 2 illustrates the diversity of students who enroll in the classes as described by their major.
2. As verified by a syllabus audit, all of the NSLE classes include in their syllabi descriptions of how their class meets the MPSL requirements for satisfying the science graduation requirement.
3. Students appreciate the quality and lessons of these courses to a similar degree as all other university classes as verified by their positive responses on SIR surveys.

What this report lacks is support for the claim that students can articulate and use the lessons from their classes to address concerns with a scientific basis in their personal lives. This is best done by evaluating artifacts of student learning. Plans to develop tool that will allow instructors to access student learning with respect to the NSLE learning goals are being developed.

Table 4. SIR Average Comparisons

Fall 2016

SIR Questions	NSLE	Univ. Studies	vs. Univ. Studies	Science Only	Nat. Sci. & Math	Arts & Sci.	Millikin U.. (all)
Total Enrollment	**699**	1470	n/a	1058	1407	5186	12274
# SIRs	**348**	504	n/a	491	729	1796	3868
% response	**50**	34	+16	46	52	35	32
Q1: Reasonable?	**4.37**	4.39	-0.02	4.38	4.42	4.42	4.43
Q2: Prepared?	**4.52**	4.48	+0.04	4.54	4.58	4.5	4.50
Q3: Organized?	**4.31**	4.29	+0.02	4.37	4.41	4.35	4.36
Q4: Time used well?	**4.42**	4.28	+0.14	4.44	4.47	4.36	4.36
Q5: Grades?	**4.01**	4.18	-0.17	4.05	4.12	4.18	4.23
Q6: Command?	**4.47**	4.43	+0.04	4.51	4.54	4.54	4.58
Q7: Clear?	**4.17**	4.27	-0.10	4.25	4.29	4.32	4.36
Q8: Important Points?	**4.18**	4.35	-0.17	4.24	4.30	4.36	4.41
Q9: Examples?	**4.32**	4.38	-0.06	4.36	4.40	4.42	4.46
Q10: Questions?	**4.51**	4.33	+0.18	4.56	4.55	4.46	4.49
Q11: Enthusiasm?	**4.52**	4.52	0	4.52	4.56	4.56	4.60
Q12: Available?	**4.47**	4.40	+0.07	4.52	4.55	4.49	4.51
Q13: Instructor Excellent?	**4.27**	4.29	-0.02	4.31	4.35	4.37	4.42
Q14: Course Excellent?	**4.11**	4.05	+0.06	4.13	4.19	4.17	4.25
AVG. SIR SCORE	**4.33**	4.33	0	4.37	4.4	4.39	4.42

Does not include values from any section of CH121.

Spring 2017

SIR Questions	NSLE	Univ. Studies	vs. Univ. Studies	Science Only	Nat. Sci. & Math	Arts & Sci.	Millikin U.. (all)
Total Enrollment	**461**	854	n/a	1007	1335	4413	10953
# SIRs	**140**	288	n/a	325	419	1335	3062
% response	**30**	34	-4	32	31	30	28
Q1: Reasonable?	**4.15**	4.44	-0.29	4.36	4.42	4.47	4.46
Q2: Prepared?	**4.38**	4.61	-0.23	4.64	4.66	4.57	4.55
Q3: Organized?	**4.30**	4.39	-0.09	4.48	4.49	4.41	4.42
Q4: Time used well?	**4.34**	4.37	-0.03	4.58	4.58	4.45	4.40
Q5: Grades?	**4.02**	4.26	-0.24	4.25	4.24	4.28	4.30
Q6: Command?	**4.35**	4.58	-0.23	4.61	4.63	4.60	4.62
Q7: Clear?	**4.31**	4.42	-0.11	4.35	4.36	4.42	4.42
Q8: Important Points?	**4.25**	4.48	-0.23	4.46	4.44	4.47	4.47
Q9: Examples?	**4.28**	4.50	-0.22	4.44	4.44	4.51	4.52
Q10: Questions?	**4.38**	4.40	-0.02	4.66	4.62	4.50	4.50
Q11: Enthusiasm?	**4.36**	4.62	-0.26	4.60	4.61	4.64	4.66
Q12: Available?	**4.30**	4.47	-0.17	4.52	4.54	4.54	4.53
Q13: Instructor Excellent?	**4.27**	4.34	-0.07	4.45	4.46	4.45	4.45
Q14: Course Excellent?	**4.14**	4.24	-0.10	4.30	4.30	4.30	4.32
AVG. SIR SCORE	**4.27**	4.44	-0.13	4.48	4.48	4.47	4.47

Notes:

- Numbers for NSLE scores were not adjusted for course credits, so reviews of a one credit class carried the same weight as reviews of a 4 credit class.
- Reviews from uncredited lab sections were not included.
- NSLE values were hand-tallied from individual class SIR summaries provided by the CAS Dean's office; other scores were tallied by the University and distributed by various Dean's offices.
- Other than noting differences in NSLE vs. Univ. Studies scores, no attempt was made at a detailed comparative analysis since the methodology for NSLE and other averages may be different and lack of individual student SIR scores for all classes precluded statistical analysis.

VI. Trends and Improvement Plans

Changes in the NSLE assessment effort at the beginning of AY 2011-12 improved faculty participation and expanded the diversity of courses included in the final NSLE assessment report. An appreciation of the stability in faculty and curriculum and lack of audible calls for change during 2013-17 support the conclusion that these goals have been well met during the absence of an active assessment effort. Assessment efforts have improved the review of the impact of these classes on students but must be further enhanced to include tangible evidence of student learning.

Current State and Future Prospects. The NSLE element of the MPSL has not been significantly altered in recent history primarily because, given the University faculty's decision to restrict science education to a minimum of a single course, students and teachers appear to be happy with what's being offered. There have been no calls to change the program, most likely because it allows each department to contribute as it sees fit and permits faculty to design courses for non-majors with topics that capture the expertise and enthusiasm of the instructor. Given the overall satisfaction and success of NSLE offerings and barring a significant revision of the MPSL program, there is little reason or need to change our approach to meeting the NSLE requirement.

That is not to assume that programs goals are being met, so the assessment mechanism must be designed to include broad faculty participation, reliable reliable annual data, and most especially evidence of student learning. This need was addressed at the end of the 2014-15 NSLE assessment report and included suggestions to increase involvement of NSLE instructors in assessment with the goal of 100% participation, develop an assessment-focused assignment in each NSLE class (e.g., a quantifiable pre/post survey or skills-based activity) that might also serve as artifacts, re-evaluate NSLE learning goals, and include student course evaluations in assessments.

Changes must also ease all faculty into the assessment process by building it into day-to-day class operations. Many faculty balk at contributing hours to filling out novel rubrics or to volunteering for committee work that appears to have ill-defined, apparently endless and unrewarded time requirements. This may be done by better providing guidance in meeting current expectations and simple evaluation tools with easily analyzed objective data that can be completed during the course of each class. The aim would be to minimize "assessment phobia", especially among prospective assessment coordinators.

Assessment during AY2017-18 must include one element not in this report: we need to evaluate evidence of student learning with respect to the three NSLE learning goals. This would require artifacts that encourage students to reflect on the NSLE goals and provide a written response to a question or questions at the beginning and end of their class. It must be short and contain objective questions focused on the NSLE goals and also ask a question that would allow reflection on the specific subject of the class. If made a requirement of all NSLE classes and scored by the instructors for each class, this tool would provide before/after data, NSLE-specific information on student learning and understanding, and a durable artifact with a burden shared by all of the science division faculty.

VII. Conclusion

Based on the assumption that little change in faculty or curriculum since the completed 2012-13 NSLE report means it seems reasonable once again to award the same assessment scores to efforts to meet NSLE goals; i.e., all three goals merit a "**green light**" score. While supported by evidence of faculty participation, student enrollment, explicit attempts to address NSLE learning goals, and student impressions, an assessment of actual student products is still required to ground this conclusion solely in the activities of the past year..

Respectfully submitted by Jeff Hughes, Professor, Department of Biology and NSLE Assessment Coordinator, 1/18/18.