

Assessment Plan Reporting Template (APRT)
Longwood University
MEASURING SCIENTIFIC REASONING COMPETENCY
(2009-10)

PART A: PLAN

1.0 Definition of Terms

1.1: Identify the core area to be assessed. How is it defined? How does it relate to the institution's mission and goals?

Longwood University is dedicated to the development of well-informed citizen leaders who are prepared to make significant contributions to the good of society. As citizen leaders it is imperative that graduates of Longwood University are well versed in all areas of liberal arts and sciences. In this current conceptualization of scientific reasoning (defined below), there are three key paths to student competency: the common General Education Goal 6 required of all students; academic majors in the sciences; and the Liberal Studies curriculum (i.e., the preparation of future elementary and middle school teachers), which is the largest academic major at Longwood. These multiple intersecting paths or "students' institutional experiences" are addressed in different ways in this assessment plan.

Scientific reasoning denotes systematic, logical thought patterns employed during the process of scientific inquiry. A citizen leader can apply the methods of science to the acquisition of knowledge and appreciate the major contributions of science to our cultural heritage and the solution of contemporary problems.

1.2: Identify the criterion or criteria that indicate competency in the core area. This could be a cutoff score, performance benchmark, or rubric that will be used to mark a competent student performance.

At the institutional level, the criteria for scientific reasoning competency (SRC) will be a statistically significant increase in scientific reasoning test scores (as described below) between the freshmen and senior year for a randomly selected group of students.

1.3: Describe the learning objectives for the defined core area.

The following outcomes, which originate directly from Longwood University's General Education Goal 6 student outcomes (Appendix 1), identify the standards of SRC. In order to elaborate on these broad outcomes, a detailed list of assessable competencies has been provided. The items on this detailed list are associated with (and reproduced here verbatim from) the Scientific Reasoning Test by Center for Assessment and Research Studies at James Madison University (hereafter CARS-SR).

Outcome 1: Longwood students will understand the major methods of natural science inquiry.

- Describe the methods of inquiry that lead to mathematical truth and scientific knowledge and be able to distinguish science from pseudoscience. (CARS-SR)
- Use theories and models as unifying principles that help us understand natural phenomena and make predictions. (CARS-SR)
- Formulate hypotheses, identify relevant variables, and design experiments to test hypotheses. (CARS-SR)

Outcome 2: Longwood students will recognize and explain major contributions of science to our cultural heritage.

- Recognize the interdependence of applied research, basic research, and technology, and how they affect society. (CARS-SR)

Outcome 3: Longwood students will understand how natural science has been used to address significant contemporary issues.

- Illustrate the interdependence between developments in science and social and ethical issues. (CARS-SR)
- Evaluate the credibility, use, and misuse of scientific and mathematical information in scientific developments and public policy issues. (CARS-SR)

2.0 Methodology

- 2.1 Describe the value added analytic approach being used, with reference to the *Guidelines* (p. 8, ff.)
- 2.2 Explain how educational experiences at the institution produce student learning and reasons for choosing the analytical approach in 2.1.

At Longwood University, we take a comprehensive approach to measuring SRC. In brief, it has two components, on-going assessment and value-added assessment, each of which are described in detail in this section.

On-going Assessment

As an on-going process, measuring aspects of SRC has been and will continue to be carried out through a range of course-embedded protocols. Our faculty members are continuously making efforts to explore better ways to assess student learning, and the examples of on-going assessment activities outlined below support that.

- Internally developed protocols embedded in all General Education Goal 6 courses were developed by faculty and approved by the campus' General Education Committee and Faculty Senate. The protocol for one such course, GNED 162 Introduction to

Environmental Science, is representative of this on-going work (Appendix 2).

- Each graduating science major in biology and physics (not including dual-degree engineering students) is required to complete the Major Field Test for his/her discipline (Appendix 3). Chemistry majors take exams developed by the American Chemical Society at the end of specific courses (i.e., general chemistry, organic chemistry, inorganic chemistry, quantitative analysis, thermochemistry, and quantum mechanics).
- Some science faculty who teach science content courses for pre-service elementary and middle school teachers have embedded additional assessment (Appendix 4) in biology and physical science courses. These pre- and post-course assessments are focused on the dispositions of these future teachers toward science.
- As part of Longwood's participation in the National Science Foundation-supported SENCER project (Science Education for New Civic Engagements and Responsibilities), the SALG (Student Assessment of Learning Gains; <http://www.wcer.wisc.edu/salgains/fac/SALGains.asp>) is used as an additional course-embedded assessment for one Goal 6 course, GNED 261 Exploring Science in Our World.

Value-Added Assessment

In response to a recent call for value-added assessment, Longwood proposes to use both direct and indirect measures to determine value-added to our students' learning by their college experience at Longwood. A combination of longitudinal design and cross-sectional design is proposed. The former is used for the purpose of directly measuring SRC, and the latter is used for the purpose of indirectly measuring SRC. In either case, proportionate sampling method will be used to ensure the representativeness of the population and the results.

- **Direct Measure:** The direct measure will be carried out by utilizing a valid, reliable, and widely available selected-response assessment instrument: the CARS-SR. The protocol for the direct measure is outlined in detail below in sections 2.3 through 2.8.
- **Indirect Measure:** The indirect measure will be used to assess the level of student engagement via the National Survey of Student Engagement (NSSE). The details of the methodologies for each of these measures are given below.

At the end of every third year since 2000, Longwood randomly selects a group of freshmen and senior students to take the National Survey of Student Engagement (NSSE) to measure the level of student engagement. The mean values for these two groups on the selected items are analyzed and compared (Appendix 5). We will continue to use the NSSE, particularly those items that are included in NSSE questions 1, 2, 11, and 13, as indicators of the two variables: "level of student engagement in analytic activities" and "self-reported learning outcomes."

Specifically, the proposed analysis procedure on NSSE data includes:

- Using NSSE items to construct two scales, “level of student engagement in analytic activities” (NSSE items Q1-d and i, Q2-b, c, d, and e) and “self-reported learning outcomes” (NSSE items Q11-a,b,c,d,e,f,g,h,i, j, k, l, m, n, o, and p, and Q13);
- Testing internal reliability of the scales by using Cronbach’s Alpha statistics;
- Calculating mean scores on two scales for the freshmen and senior students who participate in NSSE;
- Using a two-sample t test procedure to analyze the difference in group mean values on the scales to demonstrate the added value.

2.3 Elaborate upon the expected reliability and validity of the analytical approach mentioned in 2.1.

SRC will be assessed using a valid, reliable, and widely available assessment instrument, CARS-SR. It is understood that while individual exam questions are continually evaluated and upgraded by the test developer, the level of assessment of the exam does not change, making these reasonable choices for the value-added component of Longwood’s SRC assessment. The faculty who will use these assessment data to inform on-going curriculum development feel strongly that this instrument provides unique data with regard to student learning and progress.

2.4 Explain generally the student population from which samples, cohorts, or groups will be drawn. This section should include specific mention of factors relevant to assessment, such as student population size, completion rates, number of transfers that are relevant to assessment.

The segment of the student population targeted by the proposed assessment will be those students who are classified as freshmen and seniors. The strategy for sample selection and its rationale are presented in section 2.6 (see below).

2.5 Explain the technique used for data collection with reference to the *Guidelines* (p. 11, ff.), including such factors as whether the data will be collected in the classroom (course embedded) or outside the classroom (single setting).

The CARS-SR test will be administered to freshmen and seniors in a single-setting data collection as described below. The test/survey data will be collected by JMU and NSSE according the contracts.

2.6 Describe and explain measurement strategies to be applied during the pre assessment with reference to the *Guidelines* (p. 13, ff.).

Efforts to assess SRC value-added will begin in fall 2009. We will administer the CARS-SR to two groups of 60 incoming freshmen: one group randomly selected from all declared Liberal Studies freshmen and the second randomly selected from all other incoming freshmen.

Longwood has a long history of excellence in teacher education, and today the key program for preparing future teachers is the Liberal Studies major, which was specifically designed for those students seeking licensure to teach multiple subjects in Elementary, Middle, or Special Education. In any given academic year, the students declared in this major account for more than 20% of Longwood total student population. Thus, to serve this on-going emphasis at our institution and the faculty committed to the development of our future teachers, it is of great importance to specifically address value added for this group of students in addition to the rest of the student population.

2.7 Describe and explain measurement strategies to be applied during the post assessment with reference to the *Guidelines* (p. 13, ff.).

To assess the extent to which SRC value has been added to student learning, we will administer the CARS-SR to senior students. The students from the 2009 incoming-freshman class who are degree candidates in spring 2013 will be the first group of students to be re-assessed to determine changes in SRC level; this group will be the first complete longitudinal sample from which value-added in SRC can be assessed. For each class of senior degree candidates, we will randomly select 40 students from each of the two original groups. Students in each group will complete the same test they took as freshmen.

2.8 Explain the nature of value added given 2.7 and 2.8.

The proposed sample size—40 per test per group—will be large enough to yield a valid statistical analysis and to account for attrition of students from the original freshman cohort. These data will be analyzed using a repeated measures analysis of variance to determine if a statistically significant ($p < 0.05$) change in SRC has been achieved.

To insure the suitability of CARS-SR as instruments that accurately reflect SRC at Longwood University, we will conduct a pilot study beginning in Spring 2009. Similar to the longitudinal study discussed above, we will administer the CARS-SR to two groups of 40 senior degree candidates: one group randomly selected from all Liberal Studies graduating seniors and the second randomly selected from all other graduating seniors. The results from this single-setting data collection will be used to perform a cross-sectional study with data available as early as Spring 2010. This procedure will be repeated for each senior class until Spring 2013 when the first group of students from the 2009 incoming-freshman class will be re-assessed using a longitudinal study.

3.0 Process evaluation

3.1 Describe and explain how the results will be reported to institutional units, students, and external constituents.

Once the test/survey data are made available by the contractual agencies, the staff of Office of Assessment and Institutional Research at Longwood will conduct preliminary analysis, report and disseminate the findings, and coordinate further discussion among the faculty members who

participated in drafting this SRC plan, the members of the General Education Committee, and chief academic officers. The discussion will focus on:

- Summarizing the findings
- Identifying the area(s) in need of improvement
- Developing strategies for improvement
- Developing strategies for assessing improvement

3.2 Describe how the results have been and will be used to improve educational experiences and advance the mission of the college or university.

Using both direct and indirect value-added measures, findings of the data analyses will be used to support university-wide decision making on program/service improvement. Clearly the reasons for continuing the outlined on-going assessment and pursuing additional value-added procedures are significant and numerous. The true power of the data collected in these processes is in informing the teaching and learning activities on the campus. As such, the data from the on-going assessments will continue to be used to inform work in individual courses and within the majors. The new value-added results will provide new and important insights into two major areas of responsibility for the faculty on the Longwood campus: the students enrolled in our General Education courses and the future teachers in our Liberal Studies courses.

3.3 Estimate the costs of the proposed assessment. Provide a narrative of the calculation as well as pertinent statistics.

Please see Appendix 6.

PART B: STATUS REPORT

4.0 Data Presentation (leave blank until data is due)

Please leave this section blank for now – results of initial assessment due January 15, 2009.

- 4.1 Explain any challenges to data collection, and how they were addressed.
- 4.2 Describe the value-added (or competency) information/data that was collected. This information should include, but is not limited to, quantitative or qualitative summaries of the differences between pre and post assessments or any performance data
- 4.3 Describe any additional evidence of value added (or competency); this might include faculty testimony, student retention, or post graduation evidence.

Appendix 1: Longwood University General Education Goal Six

GOAL 6: The application of the methods of science to the acquisition of knowledge, and an appreciation of the major contributions of science to our cultural heritage and to the solution of contemporary problems.

Outcomes: Students will

- Understand the major methods of natural science inquiry
- Recognize and explain major contributions of science to our cultural heritage
- Understand how natural science has been used to address significant contemporary issues.

Appendix 2: Sample Goal 6 Embedded Assessment

GENERAL EDUCATION COURSE COMPONENT MATRIX

Department: Biological and Environmental Sciences
 Course Title: Introduction to Environmental Science

Course Prefix/Number: GNED 162

What General Education Goal is this course intended to address? Goal 6

Required Outcomes for this Goal (list below)	Relevant Course/Institutional Components (refer specifically to course syllabus)	Specific Assessment Method for Outcome
Students will understand the major methods of natural science inquiry.	<p>Students will learn experimental design both in lab activities and in lecture during the first unit of this course.</p> <p>Students will conduct lab activities applying scientific methods typically used to study the atmosphere, geosphere, hydrosphere, and biosphere in the second unit of this course.</p>	<p>Performance on lab exercises that require experimental design (scored with rubrics).</p> <p><i>Tracking and reporting:</i> Number of individuals and/or student teams whose responses to lab criteria rate 70% or higher.</p>
Student will recognize and explain major contributions of science to our cultural heritage.	In the second unit of this course, students will learn how different societies live within the context of their environments. The role of resource acquisition in providing energy and materials for societies will also be discussed.	<p>Essay exam question requiring students to discuss contributions of certain environmental sciences to our cultural heritage as well as the interactions between societies and environmental change (e.g., Easter Island).</p> <p><i>Tracking and reporting:</i> Mean score on essay question.</p>

Required Outcomes for this Goal (list below)	Relevant Course/Institutional Components (refer specifically to course syllabus)	Specific Assessment Method for Outcome
<p>Students will understand how the natural sciences have been used to address significant contemporary issues.</p>	<p>The final unit of this course will introduce students to current challenges resulting from human interactions with the environment. These challenges will address major issues including: global warming, deforestation, desertification, urban development, water and air pollution, and sustainable resource use.</p>	<p>Essay exam question requiring students to discuss current environmental challenges and the conclusions of the underlying science (e.g., What is the likelihood that the earth is experiencing global warming?)</p> <p><i>Tracking and reporting:</i> Mean score on this essay question.</p>

General Education Criteria	Relevant Course Components (refer specifically to course syllabus)
1. Teach a disciplinary mode of inquiry and provide students with practice in applying inquiry, critical thinking, problem solving.	During the first course unit, students will study the scientific method of inquiry. Students will practice applying this method to research problems in specific environmental sciences during the second unit such as oceanography, climatology, geology, and ecology. Students will also critically examine current environmental challenges from a scientific perspective in the third component of the course.
2. Provide examples of how disciplinary knowledge changes through creative applications of the chosen mode of inquiry.	Students will explore how specific individuals advanced the knowledge of environmental science disciplines using scientific reasoning. For example, when discussing atmospheric pollution, students would learn how Susan Solomon's discovery of chemical reactions above Antarctica involving chlorofluorocarbons and ozone explained the appearance of the 'ozone hole'.
3. Consider questions of ethical values.	Since environmental science focuses on human interactions with the environment, questions of ethical values are often encountered. The questions incorporated in this course will range from fundamental concerns over sharing environmental resources (e.g., the tragedy of the commons) to specific case studies (e.g., the environmental costs of gold mining). The general role of ethics in science will also be addressed including topics such as error reporting, interpretation of results, the use of human subjects, etc.

General Education Criteria	Relevant Course Components (refer specifically to course syllabus)
4. Explore past, current, and future implications of disciplinary knowledge.	Each unit of this course will focus on the implications of knowledge gained from the disciplines comprising environmental science. In the first unit, students will learn about prior insights into the biological and physical components of the earth system. In the second unit, the course will emphasize the scientific implications of current environmental management and resource utilization. The course will conclude with a discussion of future environmental challenges for societies as projected from knowledge obtained by the various disciplines of environmental science.
5. Encourage consideration of course content from diverse perspectives.	This course will focus on scientific understanding of the environment; however, the course will also address how different cultural and societal perspectives influence people's relationship with the environment. The valuation of environmental resources and services will provide opportunity for classroom discussion on environmental policies and management.
6. Provide opportunities for students to increase information literacy through contemporary techniques of gathering, manipulating, and analyzing information and data.	<p>Students will conduct experiments and exercises in laboratory that will reinforce principles of experimental design and data analysis.</p> <p>Students will conduct research using library resources to write a research paper on a current environmental challenge. This paper will present current environmental trends, summarized quantitatively and discuss cultural and societal attitudes to this challenge.</p>

General Education Criteria	Relevant Course Components (refer specifically to course syllabus)
7. Require at least one substantive written paper, oral report, or course journal and also require students to articulate information or ideas in their own words on tests and exams.	<p>Written research paper discussing a case study of a current environmental resource or challenge and the underlying scientific processes involved. Case studies will address this environmental challenge in a specific geographic region.</p> <p>Additionally, this course will include laboratory reports and essays within the final exam.</p>
8. Foster awareness of the common elements among disciplines and the interconnectedness of disciplines.	<p>Environmental science is inherently an interdisciplinary approach to scientific study that synthesizes knowledge from disciplines including biology, ecology, climatology, hydrology, geology, and geography. Accordingly, environmental science is predicated on the idea that the environment functions as an interacting system. The interconnected nature of the environment will serve as the central, consistent theme for this course.</p>
9. Provide a rationale as to why knowledge of this discipline is important to the development of an educated citizen.	<p>The final unit of the course highlights current environmental challenges that are both regional and global in scope. By focusing on the scientific understanding of these challenges, the course also endeavors to provide well-educated citizen leaders who are capable of making informed decisions on issues pertaining to human interactions with the environment.</p>

Appendix 3: Assessment Indicators for Praxis and MFT

Each year, Longwood requires those students who are interested in Teacher Preparation Program to have a passing score on the Praxis I (which covers reading, writing, and mathematics) to be accepted to the program, and graduation seniors to take MFT tests in their major fields of study prior to the graduation.

The following list presents the assessment indicators used by MFT for various major fields. Among them, the items in **bold/italic** suggest SR portions of the MFT tests.

- ***Biology***
 - ***Biochemistry and Cell Energetics***
 - ***Cellular Structure, Organization, Function***
 - ***Molecular Biology & Molecular Genetics***
 - ***Diversity of Organisms***
 - ***Organismal – Animals***
 - ***Organismal – Plants***
 - ***Population Genetics and Evolution***
 - ***Ecology***
 - ***Analytical Skills***
- Business
 - Accounting
 - Economics
 - Management
 - ***Quantitative Business Analysis***
 - Finance
 - Marketing
 - ***Legal and Social Environment***
 - ***Information Systems***
 - ***International Issues***
- ***Chemistry***
 - ***Biochemistry***
 - ***Critical Thinking and REAS ability***
- Computer Science
 - Programming
 - Discrete Structures & Algorithms
 - ***Systems (Architecture, Operating systems, Networking, Databases)***
- Criminal Justice
 - ***Theories of Criminal Behavior***
 - The Law
 - Law Enforcement
 - Corrections
 - The Court System
 - ***Critical Thinking***

- *Research Methodology and Statistics*
 - Mathematics
 - Calculus
 - Algebra
 - Routine
 - Nonroutine
 - *Applied*
 - Political Science
 - *Analytical & Critical Thinking*
 - *Methodology*
 - Political Thought
 - Psychology
 - *Memory & Thinking*
 - *Sensory & Physiology*
 - *Developmental*
 - *Clinical & Abnormal*
 - *Social*
 - *Measurement & Methodology*
 - Sociology
 - *General Theory*
 - *Methodology & Statistics*
 - *Deviance & Social Problems*
 - *Demography & Urban /Rural/Community*
 - *Multiculturalism*
 - *Social Institutions*
 - *Social Psychology*
 - *Gender*
 - *Globalization*
-

Appendix 4: Disposition Assessment Instrument for Pre-Service Teachers

Part I: Background information.

I am currently enrolled in the Liberal Studies program at Longwood University. (yes / no)

I plan to teach/am currently teaching at the K-6 level. (yes / no)

I plan to teach/am currently teaching at the middle school level. (yes / no)

I plan to teach/am currently teaching *science* at the middle school level. (yes / no)

I have already completed these science courses
(check all that apply):

- Biology 114 (Life Science)
- Earth Science 101 (Physical Science)
- Earth Science 300 (Dynamic Planet)
- Chemistry 101 (Gen. Ed. Chemistry)
- Biology 101 (Gen. Ed. Biology)
- Physics 101 (Gen. Ed. Physics)
- Earth Science 210 (Gen. Ed. Geology)
- GNED 261 (Gen. Ed. Power of Water)
- Sci. Ed. 330 (Science and Math Methods)

I am taking this survey (check one):

- at the outset of Biology 114
- upon completion of Biology 114
- at the outset of Earth Science 101
- upon completion of Earth Science 101
- upon completion of my Partnership semester
- upon completion of my student teaching semester
- upon completion of my first in-service (teaching) year

Part II: Science disposition survey.

As a result of my science training in the Liberal Studies program at Longwood University...

- 1. I feel confident about my knowledge of the content areas in the Life Sciences and Physical Sciences (NSTA 1, NSES A, LU 4).
- 2. I feel confident about my ability to work in a laboratory setting with students doing hands-on science activities (NSTA 3, NSES A, LU 2).
- 3. I feel confident about my ability to perform in-class science demonstrations for my students (NSTA 3, NSES A, LU 2).
- 4. I feel confident about my ability to use effective teaching practices as demonstrated in my science classes (NSTA 5, NSES B, LU 1).

- _____ 5. I feel confident about my ability to create teaching lesson plans, that promote student understanding in the sciences (NSTA 5, NSES B, LU 1).
- _____ 6. I am aware of the interrelationships that exist between science and other disciplines such as mathematics, history, economics, literature (NSTA 2, NSES A, LU 4).
- _____ 7. I am aware of the influence science has on our daily living (NSTA 4, NSES A, LU 4).
- _____ 8. I am aware of current developments and trends in science through a variety of media sources e.g. newspaper, science magazines, television (NSTA 4, NSES A, LU 4).
- _____ 9. I am aware of the need for my students to develop a sense of value for the many science connections around them (NSTA 2, NSES A, LU 4).
- _____ 10. I am aware of the importance of developing the science process skills of my students in addition to science content knowledge (NSTA 2, NSES B, LU 4).
- _____ 11. I have an appreciation for the discoveries and contributions of science throughout history (NSTA 2, NSES A, LU 4).
- _____ 12. I have an appreciation for the applications of these discoveries as they relate to contemporary use (NSTA 7, NSES A, LU 4).
- _____ 13. I have an appreciation for the importance of continued scientific research (NSTA 10, NSES C, LU 7).
- _____ 14. I have an appreciation for the ways in which scientific research benefits humanity on a daily basis (NSTA 2, NSES A, LU 4).
- _____ 15. I have an appreciation for the need to communicate the advances of science to my students (NSTA 2, NSES A, LU 4).
- _____ 16. I have a feeling of achievement because of my students' success on the SOL assessments in science (NSTA 8, NSES B, LU 3).
- _____ 17. I have a feeling of achievement because of a positive change in my way of thinking about the teaching of science (NSTA 5, NSES D, LU 7).
- _____ 18. I have a feeling of achievement because of greater sense of personal accomplishment (NSTA 10, NSTA D, LU 7).
- _____ 19. I have a feeling of achievement because of a personal realization of the

need for continued training and professional growth in science teaching (NSTA 10, NSES D, LU 7).

- _____ 20. I have a sense of achievement that comes with the knowledge that I am helping my students develop into contributing, scientifically literate citizens (NSTA 7, NSES B, LU 7).

Please provide any comments regarding your feelings or attitudes about science in general or regarding the training you have received to teach science content.

**SCIENCE DISPOSITION SURVEY:
ASSESSING THE EFFECTIVENESS OF LONGWOOD’S LIBERAL STUDIES SCIENCE COURSES ON
FUTURE TEACHERS’ ATTITUDES
TOWARD SCIENCE AND SCIENCE TEACHING**

Before completing the 20-question survey, please read the following description of this study and the instructions that follow.

Rationale –

This study is being conducted to assess the development of dispositions and attitudes toward science. It is being administered to future K-8 teachers currently enrolled in the Liberal Studies program at Longwood University as well as to current teachers, all of whom received their training through the Liberal Studies program at Longwood. The aim of this survey is to determine the influence of selected science courses in the Liberal Studies program on the development of dispositions and attitudes toward science. The survey will be administered at the following regular intervals: 1) prior to the start of the semester in Biology 114 and Earth Science 101, 2) following completion of Biology 114 and Earth Science 101, 3) following completion of the Partnership semester, 4) following completion of the student teaching semester, and 5) following completion of the first in-service (i.e., teaching) year.

Participation in this survey is voluntary and all responses are confidential. Responses given in this survey will in no way influence your grade in this course. Do not put your name on this survey. The results will be used in aggregate to assess the effectiveness of Longwood’s science program as it contributes to the development of dispositions and attitudes toward science and science teaching.

Instructions for completing the survey –

Part I: Complete the background information at the top of the first page of the survey.

Part II: Consider each of the twenty statements as they relate to the science training you are in the process of completing or have completed through the Liberal Studies program at Longwood University. Notations following each statement apply to relevant National Science Teacher Association Standards, National Science Education Standards, and Longwood University Conceptual Framework Goals, respectively.

Indicate your level of agreement with each statement using the following scale. Record your response in the blank preceding each statement.

- 0 = not applicable**
- 1 = strongly disagree**
- 2 = disagree**
- 3 = neutral**
- 4 = agree**
- 5 = strongly agree**

Thank you for your participation in this research. Your input will help guide the development of Longwood's teacher education program as we strive to provide the best in science education.

Appendix 5: National Survey of Student Engagement (NSSE)

Every third year, Longwood commissions NSSE to conduct the student engagement survey among a randomly selected sample of freshmen and seniors. The results, particularly the results from the following 23 items will be used as indicators of the “level of student engagement in analytic activities” and “self-reported learning outcomes.” Thus, the results of a comparison of the group mean values will be used for two purposes: as an indirect value-added measure, and as support evidence to the results of direct value-added measures. Specifically,

Measured on a 4-point scale, the indicators for “level of student engagement in analytic activities” include:

- Q1-d. Work on a paper or project that required integrating ideas or information from various sources (4=very often, and 1= never)
- Q1-i Put together ideas or concepts from different courses when completing assignment or during class discussions (4=very often, and 1= never)
- Q2-b. Analyzing the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components (4=very much, and 1=very little)
- Q2-c. Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships (4=very much, and 1=very little)
- Q2-d. Making judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and assessing the soundness of their conclusions (4=very much, and 1=very little)
- Q2-e. Applying theories or concepts to practical problems or in new situations (4=very much, and 1=very little).

Measured on a 4-point scale (4=very much, and 1=very little), the indicators for “self-reported learning outcomes” include:

- Q11-a. Acquiring a broad general education
- Q11-b. Acquiring job or work-related knowledge and skills
- Q11-c. Writing clearly and effectively
- Q11-d. Speaking clearly and effectively
- Q11-e. Thinking critically and analytically
- Q11-f. Analyzing quantitative problems
- Q11-g. Using computing and information technology
- Q11-h. Working effectively with others
- Q11-i. Voting in local, state, or national elections
- Q11-j. Learning effectively on your own
- Q11-k. Understanding yourself
- Q11-l. Understanding people of other racial and ethnic backgrounds
- Q11-m. Solving complex real-world problems
- Q11-n. Developing a personal code of values and ethics

- Q11-o. Contributing to the welfare of your community
- Q11-p. Developing a deepened sense of spirituality
- Q13. Overall rating of the entire educational experience at this institution
(4=excellent and 1=poor).

Appendix 6: Estimated Costs for Value-Added Assessment

To conduct the value-added assessment, additional costs are estimated as the following:

1. Purchasing software
 - **\$16,000** for WEAVEonline program (2007)
 - **\$5,000/per year** maintenance fee for WEAVEonline (2008 and after)
 - **\$13,000** for purchasing Maple TA software (2007)
 - **\$5200/per year** maintenance fee for Maple TA (2008 and after)
2. Purchasing test instruments,
 - For QRC, **\$4,000** Math placement test per year (all incoming freshmen)
 - For SRC, **\$900 JMU-SR** (\$9/per student, for sample of 100)
 - For CTC (plan is pending)
 - Option I: **\$2400** CAAP-CT (\$12/per student, for a sample of 200)
 - Option II: **\$7,000** CLA (for a sample of 200)
3. Operational costs
 - **\$40,000/per year** for a new position: Assessment Activity Manager

Annually, Longwood conducts assessment on student learning, programs, and services. The components of the assessment include, but not limited to, the tests for six competency areas, the Major Field Tests for graduating seniors, the Praxis I & II for teacher education programs, surveys such as CSI, CIRP, NSSE, FSSE, and many other internally as well as externally developed surveys that specifically target the quality of support services. Decentralized operation without proper coordination has been proved to be inefficient in terms of controlling the total costs, reducing over-surveyed” burden on students/faculty/staff, sharing the information for “closing the loop,” and using the data to support the executive administration’s decision making.

To make the assessment more effective, this position is needed to coordinate all the assessment activities that are currently taking place on the campus and operated by various division and/or units. The major responsibilities for the manager include: (1) scheduling and preparing for campus-wide assessment activities, (2) maintaining the assessment data collection and report database, and (3) disseminating the results of the assessment to corresponding constituents for the purpose of demonstration of the program as well as the institution’s accountability.

- **\$6,000/per year** for the items, such as incentives/rewards, to be given to the selected students for participating in the assessment activities.

- ***\$15,000/per year*** as stipend for additional work by regular faculty/staff members for performing the following function:
 - a. Administering tests, grading tests, collecting data, conducting analysis, and writing the report
 - b. Developing the test instruments for two competency areas: WCC and ILC
 - c. Training faculty members for conducting and reporting value-added assessment in six required competency areas
 - d. Training department chairs/program directors for using WEAVEonline to report the value-added assessment results.

In conclusion, assuming that Longwood will conduct the value-added assessment on six competency areas in a 3-year rotation cycle, assess two competency areas per year, we will need, approximately, additional fund of \$77.000/per year.