



Stony Brook University

Professional Education Program

Science Teacher Candidate Work Sample

Introduction

Educators today place a high premium on knowledge of standards and assessment and the ability to design instruction which links them together to enhance student learning. The work sample is designed to help teacher candidates grow professionally by focusing on the complex relationship between standards, assessment and instruction and helping them learn how to systematically link pedagogy and classroom practice. The work sample also provides the Science Education Program with important evidence that candidates have met our graduation standards and that they are capable of effectively applying the knowledge and skills learned at the University to promote student learning in an authentic classroom setting.

Core Elements

The basic principles underlying the work sample are that students learn best when:

- the teacher fully understands the teaching-learning context,
- the teacher sets significant and challenging learning goals that address national standards as delineated in the New York State standards and New York State core curricula,
- the teacher uses pre-assessment and multiple assessment modes aligned with learning goals at key points in the instructional sequence to monitor student learning and modify instruction according to student needs,
- the teacher plans lessons and selects instructional strategies that take into account pre-assessment findings, learning goals and the different abilities and needs of the students,
- the teacher uses ongoing analysis of student learning to make instructional decisions and modify lesson plans,
- the teacher uses assessment data to profile student learning and communicate information about student progress and achievement, and
- the teacher reflects upon his/her own teaching and use insights gleaned through the process to improve student learning and promote professional growth.

Each of these core elements will be addressed in a different section of the work sample.

I. The Contextual Factors – Setting for Learning

While schools may be similar with respect to the basic science courses they offer, the setting for learning varies greatly from district to district, from school to school within a particular district, and from classroom to classroom within a particular school. The more teachers know about all of these elements, the better equipped they will be to successfully address the needs of the school and its students.

A. Community

Describe how the characteristics of the community may affect teaching and learning. Include:

- description of the school district (where it is located, number of schools, communities covered by the district, etc.)
- range of home prices in each of the communities served by the school district
- total number of students enrolled in the district
- percentage of students classified as Special Education
- percentage of ESL students and their level of English proficiency
- the resources of the district and its support of education (include expenditure per pupil for general education and special education)
- the socio-economic and linguistic profile of the community
- the racial and/or ethnic make up of the community
- the performance of the school on state assessments, including:
 - a) percent of high school students earning a diploma
 - b) percent of students scoring above 65 on each of the science Regents exams
 - c) percent of students scoring 3 or 4 on the 8th grade science assessment

Much of this information can be found on the State Report Cards issued yearly for each school. These are available on the Internet from the New York State Education Department web site, <http://www.emsc.nysed.gov/reprcrd2005/>. More detailed information about community demographics and school funding, including information on high needs districts, can be found at <http://www.emsc.nysed.gov/stateaidworkgroup>

B. School, Classroom, and Individual Students

- Describe the school (size, organization plan, ability groupings, scheduling patterns, discipline and attendance policies, etc.)
- Describe the physical layout of the classroom in which these lessons will be taught, whether the classroom is shared with other teachers, and describe the technology and other resources available in the classroom.
- Describe the location of the safety features in the room (include a room map with these features identified, if present in the room: fire extinguisher, fire blanket, eye wash station, safety shower, gas shut-off valve, fume hood)
- Describe the classroom climate and any issues relating to student behavior.
- Within your classes, indicate the number of students with individual education plan (IEP) modifications, students with limited English proficiency, and other relevant student characteristics.

C. Describe how the data and characteristics presented in subsections A and B above will constrain or support instructional design and assessment within the school district.

II. Learning Goals

The work sample is a plan for the implementation of a 2 week unit of standards-based instruction. The plan itself should be based on one of the New York State science core curricula (intermediate, chemistry, earth science, living environment, or physics). It should consist of a sequence of interrelated lessons organized around one or more Key Ideas and a limited number of Performance Indicators, Major Understandings, and related Process Skills. Topic questions, factual information, concepts, and the process skills necessary to address these Performance Indicators should be included.

In addition, indicate the unifying concepts of science as described by the National Science Education Standards that are addressed in the unit.

A. Details about the Unit of Instruction

1. Core Curriculum being addressed
2. Topic to be taught
3. Targeted grade level and subject
4. Length of the unit
5. Learning Outcomes for the unit (Students will be able to ...)

B. Connections to the Core

Using the selected core curriculum, prepare a chart that correlates the following:

1. *Concepts* and the *content* to be taught in the unit
2. Standard 4 Key Ideas that are to be addressed in the work sample
3. Performance Indicators and Major Understandings that will be addressed in the unit
4. Process Skills and connections to Standards 1, 2, 6, and 7 that will be addressed in the unit (If using the LE Core Document, include items on the Laboratory Check List as Standard 4 Process Skills, and process skills from the Intermediate Core Document for Standards 1, 2, 6, and 7)
5. the *unifying concepts* of science that are addressed in the unit, as described by the National Science Education Standards
(<http://www.nap.edu/readingroom/books/nses/>)

Lesson # ____ ; Topic Question(s)

Concepts and content	Standard 4 Key Idea	Major Understanding	Process Skills and/or items in Standards 1, 2, 6, and 7	National Science Education Standards

Create a separate table for each lesson.

III. Assessment

Well-designed formative assessments can improve instruction in several ways. They will guide instruction by keeping teaching focused on the learning goals of the unit and standards to be addressed. Formative assessments are also important because they enable the teacher to see what students have and have not learned, to understand why students did or did not learn, and on the basis of this knowledge, to modify instruction accordingly. Formative assessments may be informal, such as student answers to teacher questions, student questions, feedback from games, and observation of students as they work on a class activity.

The first component of the assessment plan should be a pre-assessment. Teachers need to determine what students do and do not know about the learning goals of a unit before preparing a unit plan. The instructional design portion of the unit plan should then take into account misconceptions that the pre-assessment might reveal, as well as the subject matter found to be previously mastered by students.

The remaining components of the assessment plan for the unit should correlate with the learning goals of the unit. The plan should include formative assessments, as well as some traditional assessments such as quizzes, tests, reports and laboratory practical examinations. It should employ multiple forms of assessment placed throughout the unit.

The primary goal of this section is to determine if students have met the learning objectives that were included when you planned your unit.

Specifically, the assessment component of the plan should:

- A. Include a copy of the pre-assessment designed to determine what students do and do not know about the learning goals of the unit. A pre-assessment might include asking students to write down what they know about the topic, or it might involve a set of carefully structured questions. The important thing is that the pre-assessment provides a baseline of prior student knowledge as it relates to the learning goals. It will also give insight into students' misconceptions with respect to the topic.

In the pre-assessment that you design for this unit, include items that will assess the students' prior knowledge. When you write Work Sample Section 5 you will need information from this section as a base line in order to better assess how much students have learned as a result of your instruction.

- B. Provide a description of the assessment plan that will be used to assess student learning for the unit that you are teaching. This will explain how the assessments will, in fact, measure what is taught.

- C. Include a copy of the final assessment to be used for this unit. As you design this assessment, include items that will give information about student learning with respect to the Learning Goals listed in Work Sample, Part II. You will be looking for evidence that student learning has occurred as a result of your instruction.
- D. Indicate how one of your assessments can be adapted to meet the needs of students with different learning styles. That is, describe how the assessment can be modified for an auditory learner, a kinesthetic learner, or some other qualifier that might appear on an IEP for students in your classes.
- E. Include a rubric or scoring guide for the final assessment. Be sure to establish clear criteria for various performance levels.

IV. Instructional Design

Design a unit of instruction (10 lessons) which will teach students the standards-based learning goals identified in Section II.

This section of the work sample should include:

- all lessons taught in this unit
 - a grid that makes the connection between lessons and the required lesson plan components as described below. (See sample grid on next page.)
- A. The plan should form a coherent, connected instructional sequence from the first day until the last day of the unit. This plan should:
1. contain a minimum of five varieties of instructional strategies
 2. include a minimum of two laboratory investigations, one of which involves inquiry that develops concepts and relationships from student observations, data, and inferences
 3. include a minimum of one lesson that incorporates use of Internet, PowerPoint, or other form of technology, e.g., data sensing probes
 4. include a minimum of one lesson that incorporates cooperative learning (not just group work!)
 5. include at least one lesson in which students are required to use mathematics in some fashion, and students are required to produce a graph
 6. include nature of science/history of science in at least one lesson
 7. include at least one literacy component
 8. include at least one connection between the subject matter and an important personal or technological application of science that relates to the unit
 9. include at least one connection between the subject matter and community resources/concerns and societal issues (e.g., current events)
 10. include a minimum of two homework assignments, other than those drawn from a text book
- B. Individual lessons should:
- be sequentially numbered
 - have guided-inquiry based learning as a prominent component
 - be written in a structured lesson plan format
 - demonstrate awareness of different learning styles
 - open with an anticipatory set (discrepant activity, current event, or "do now")
 - include an activity
 - include some form of assessment
 - include a concise closure component
 - contain all supplementary materials needed for the lesson (e.g., copy of any activity, PowerPoint, overheads, graphic organizers)

Sample Grid

1.	Instructional strategy: 1. Demonstration 2. Discussion 3. Worksheet 4. Media presentation 5. Historical debate	Lesson 1 Lesson 3 Lesson 2 Lesson 5 Lesson 9
2.	Laboratory investigation 1 (inquiry based) Laboratory investigation 2	Lesson 4 Lesson 8
3.	Technology lesson (PowerPoint, probes, etc.)	Lesson 5
4.	Cooperative learning	Lesson 9
5.	Students use math and produce graph	Lesson 8
6.	Historical development of an idea	Lesson 6
7.	Literacy component	Lesson 5
8.	Personal or technological application	Lesson 3
9.	Connection to a societal issue, community concerns, or current event	Lesson 3
10.	Homework assignments for:	Lessons 2, 3, 5 ...

V. Analysis

The purpose of this section is to show that teacher candidates are able to analyze their own teaching. This section should be written in the context of an implemented unit plan, *however, if this is not possible, speak to your instructor for alternate instructions.*

- A. Select 3-5 students of different ability levels on the basis of a characteristic which is relevant to student achievement (language proficiency, ability level, learning style, etc.) and monitor their learning during this time period.
 - For each student indicate their grade (in school), gender, and the characteristic that was used to select this student. Do not identify students by name.
 - Explain which instructional strategies were most effective and least effective for these individual students, and hypothesize regarding possible explanations for these observations.
 - Describe how these students could use the results of the assessments in this unit to analyze their own learning, identifying relevant strengths and weaknesses.

- B. Using the inquiry laboratory activity in this unit, or other inquiry lab, analyze student learning that did/did not result as a result of performing the lab. Support your conclusions with evidence wherever possible.

- C. Using test papers from one class perform an item analysis on the test that was administered at the end of the unit. Include the following information: average grade, range, mode, % of students who correctly answer each question. (Include a copy of the test and its scoring guide in this section.)

- D. Reflect on the data gathered in Section C and discuss the implications of the data with respect to student learning and the way the unit was taught.

Compare the student performance on the pre-assessment and post-assessment and discuss the effectiveness of your instruction with respect to the following items:

- a. acquisition of content knowledge and understanding the unifying concepts of science
 - b. select one or two misconceptions that were identified in the pre-assessment and analyze whether or not the students changed their perceptions upon completion of the unit.
 - c. learning about personal and technological applications of science
 - d. understanding more about the nature of science/history of science
 - e. learning about societal and community issues/problems related to the unit
- E. Thorough unit and lesson planning is essential if a teacher is to deliver effective instruction. However, few plans work perfectly. There often are occasions requiring modification of some aspect of the original plan or plans, even after adjustments resulting from pre-assessment have been made and actual instruction has begun. Recall **two** different times during the unit (or group of lessons) when a

student's response or reaction caused you to modify your original design for instruction. Using specific examples for each instance:

- describe the learning indicators or student responses that caused a rethinking of plans. The indicators or responses may come from a planned formative assessment or other source (but not a pre-assessment).
- describe the plan modifications that were made to improve student learning. Also explain why these modifications were expected to improve student learning.

VI. Self Evaluation and Reflection

- A.** Evaluate the success of the lessons taught during the unit or time period. Things to be considered include:
- alignment between the learning goals, instruction, and assessments
 - evaluation of anticipatory sets
 - identification of strengths in lessons
 - identification of weaknesses in lessons
 - evaluation of student engagement during the lessons
 - identification of unanticipated event(s) that affected presentation of any lessons and the student teacher response to the event(s)
 - discussion of classroom management issues and the effectiveness of the student teacher responses to these issues
 - evaluation of closure components in the lessons
- B.** Reflecting on the analysis done in Part V, describe how teaching this sequence of lessons has promoted professional growth. Identify specific areas (learning goals, assessment, individualization of instruction, content knowledge, teaching strategies, time management, questioning technique, etc.) where:
- improvement is needed in order to become a more accomplished classroom teacher.
 - a) Explain how identified weaknesses affected instruction.
 - b) Identify specific professional development activities that could remediate these weaknesses.
 - teaching was particularly strong. Provide evidence to support these assertions.

**Science Education Program
Scoring Rubric for the Teacher Candidate Work Sample**

Does not meet standards (0)	Minimally meets standards (1)	Meets standards (2)	Exceeds standards (3)
Demonstrates lack of mastery in writing skills (grammar and spelling). <i>Poorly organized</i>	Demonstrates minimally acceptable writing skills (grammar and spelling) Some difficulty in organization	Demonstrates competent use of standard writing skills (grammar and spelling). Organized	Demonstrates effective use of writing skills (grammar and spelling) <i>Well organized</i>
Response to prompt in this section is superficial. Paragraphs do not contain details that address the prompt	Response to prompt in this section shows little analysis of required components. Paragraphs contain some detail that addresses the prompts	Response to prompt in this section shows some analysis of the required components. Paragraphs contain adequate detail that addresses the prompts	Response to prompt in this section is clear, with extensive analysis of the required components. Paragraphs contain detail that addresses the prompts and is supported with evidence.
Response does not demonstrate insight into the material covered. Shows poor understanding of concepts	Response demonstrates some insights into the material covered. Shows inadequate understanding of concepts	Response demonstrates significant insight into the material covered. Shows understanding of concepts.	Response demonstrates significant insight into the material covered. Shows sophisticated understanding of concepts.
Narrative displays misconceptions of pedagogical theory	Narrative displays little knowledge of pedagogical theory	Narrative displays adequate knowledge of pedagogical theory	Narrative displays detailed or extensive knowledge of pedagogical theory

A score of “Does Not Meet Standards” on any element of the TCWS requires that the work be revised.
See Scoring Rubric for description of each performance level.

Name _____

Date _____

Instructor _____

Section I – Contextual Factors, the Setting for Learning

A. Community	(0)	(1)	(2)	(3)
the description of the school district				
range of home prices				
total number of students enrolled in the district				
the percentage of students classified as Special Education				
the percentage of ESL students and their level of English proficiency				
the resources of the district and its support of education (include expenditure per pupil for general education and special education)				
the socio-economic and linguistic profile of the community				
the racial and/or ethnic make up of the community				
the performance of the school on state assessments including: a. percent of high school students earning a diploma b. percent of students scoring above 65 on each of the science Regents exams c. percent of students scoring 3 or 4 on the 8 th grade assessment				
B. School, Classroom, and Individual Students	(0)	(1)	(2)	(3)
Describe the school (size, organization plan, ability grouping, scheduling patterns, discipline and attendance policies, etc.)				
Describe the physical layout of the classroom in which these lessons will be taught, whether the classroom is shared with other teachers, and describe the technology and other resources available in the classroom				
Describe the location of the safety features in the room (include a room map with these features identified, if present in the room: fire extinguisher, fire blanket, eye wash station, safety shower, gas- shut off valve, fume hood				
Describe the classroom climate and any issues relating to student behavior.				
Within your classes, indicate the number of students with individual education plan (IEP) modifications, students with limited English proficiency, and other relevant student characteristics.				
C. Data’s Influence on Instructional Design and Assessment	(0)	(1)	(2)	(3)
Describe how the data and characteristics presented in subsections A and B above will influence instructional design and assessment				
Overall Score				

Exceeds Standards 33 – 45; Meets Standards 27 – 32; Minimally Meets Standards 15 – 26; Does Not Meet Standards <15

A score of “Does Not Meet Standards” on any element of the TCWS requires that the work be revised.
 See Scoring Rubric for description of each performance level.

Name _____ Date _____ Instructor _____

Section II – Learning Goals

A. Details about the Unit of Instruction	(0)	(1)	(2)	(3)
Core Curriculum being addressed				
Topic to be taught				
Targeted grade level and subject				
Length of the unit				
Learning Outcomes for the unit				
B. Connections to the Core: prepare a chart for each lesson that correlates to the following:	(0)	(1)	(2)	(3)
Topic questions				
Concepts and content taught in the unit				
Standard 4 Key Ideas that are to be addressed in the work sample				
Performance Indicators and Major Understandings that will be addressed in the unit.				
Process Skills from Standards 1,2,,6 and 7 that will be addressed in the unit				
The unifying concepts of science addressed by the National Science Education Standards				
Topic Questions				
Overall score				

Lesson number	Comment	Lesson number	Comment
1		6	
2		7	
3		8	
4		9	
5		10	

Exceeds Standards 28 – 36; Meets Standards 21 – 27; Minimally Meets Standards 13 – 20; Does Not Meet Standards <13

A score of “Does Not Meet Standards” on any element of the TCWS requires that the work be revised.
See Scoring Rubric for description of each performance level.

Name _____

Date _____

Instructor _____

Section III – Assessment

A. Pre-assessment	(0)	(1)	(2)	(3)
Include a copy of the pre-assessment				
B. Description of Assessment Plan	(0)	(1)	(2)	(3)
Provide a brief description of the assessment plan which explains how the assessments will measure what is taught				
C. Final Assessment	(0)	(1)	(2)	(3)
Include a copy of the final assessment for this unit that will measure the students' learning				
D. Assessments and Learning Styles	(0)	(1)	(2)	(3)
Description of how the assessments can be adapted to meet the needs of students with different learning styles				
E. Rubric	(0)	(1)	(2)	(3)
Include a rubric or scoring guide for the final assessment				
Overall Score				

Exceeds Standards 12 – 15; Meets Standards 8 – 11; Minimally Meets Standards 5 – 7; Does Not Meet Standards <5

A score of “Does Not Meet Standards” on any element of the TCWS requires that the work be revised.
See Scoring Rubric for description of each performance level.

Name _____

Date _____

Instructor _____

Section IV – Instructional Design

A. The 10 day unit plan should:	(0)	(1)	(2)	(3)
Contains a minimum of five varieties of instructional strategies				
Includes a minimum of two laboratory investigations, one of which involves inquiry				
Includes a minimum of one lesson that incorporates use of Internet, Power Point, or some other form of technology				
Includes a minimum of one lesson that incorporates cooperative learning				
Includes at least one lesson in which students are required to use mathematics in some fashion, and are required to produce a graph				
Includes at least one lesson addressing the nature of science/history of science				
Includes at least one literacy component				
Include at least one connection between the subject matter and an important personal or technological application of science				
Includes a connection between the subject matter and a societal issue				
Includes a minimum of two homework assignments, other than those drawn from a textbook				
B. Individual lessons should:				
Be sequentially numbered				
Have guided- inquiry based learning as a prominent component				
Be written in a structured lesson plan format				
Demonstrate awareness of different learning styles				
Open with an anticipatory set				
Include an activity				
Include some sort of assessment				
Include a concise closure component				
Contain all supplementary material needed for the lesson				
C. This sample of the work sample should also include	(0)	(1)	(2)	(3)
All lessons taught in this unit				
Grid that makes the connection between lessons and the required components as describe in part A above				
Overall score				

Exceeds Standards 58 – 66; Meets Standards 42 – 57; Minimally Meets Standards 22 – 41; Does Not Meet Standards <22.

A score of “Does Not Meet Standards” on any element of the TCWS requires that the work be revised.
See Scoring Rubric for description of each performance level.

Name _____

Date _____

Instructor _____

Section V – Analysis

A. For the 3 – 5 students selected for this analysis identify:	(0)	(1)	(2)	(3)
Description of each student: language proficiency, ability level, learning style etc.				
Characteristics used to select students, include grade in school ,gender and characteristics used to select the student				
Effective instructional strategies are identified for each student				
Ineffective instructional strategies are identified for each student				
Hypotheses regarding possible explanations of observations for each student				
Reflect on how students could use the assessment results to identify strengths and weaknesses in their own learning				
B. Laboratory activity analysis	(0)	(1)	(2)	(3)
Analysis of student learning that resulted after performing the lab				
Analysis of things that students did not learn, or performance objectives that were not met, after performing the lab				
C. Item Analysis	(0)	(1)	(2)	(3)
Average grade, range, mode, % students who correctly answer each question				
Include a copy of the test used for this analysis and the scoring rubric				
D. Implications of Item Analysis	(0)	(1)	(2)	(3)
Acquisition of content knowledge and understanding of unifying concepts of science				
Analysis of misconceptions and how students did or did not change their perceptions				
Learning about personal and technological applications in science				
Understandings about the nature of science/history of science				
Learning about societal and community issues/problems				
E. Modification of lesson plans	(0)	(1)	(2)	(3)
describe two situations that required rethinking of plans for a lesson				
describe two plan modifications that were made to improve student learning				
explanation of why the modifications were expected to result in improved student learning				
Overall Score				

Exceeds Standards 40 – 54; Meets Standards 29 – 39; Minimally Meets Standards 18 – 28; Does Not Meet Standards <18

A score of “Does Not Meet Standards” on any element of the TCWS requires that the work be revised.
See Scoring Rubric for description of each performance level.

Name _____

Date _____

Instructor _____

Section VI – Self Evaluation and Reflection

A. Evaluation of success of the lessons with respect to:	(0)	(1)	(2)	(3)
Alignment between learning goals, instruction, and assessments				
Evaluation of anticipatory sets				
Identification of strengths in lessons				
Identification of weaknesses in lessons				
Evaluation of student engagement during lessons				
Description of unanticipated event(s) and response to the event(s)				
Discussion of classroom management issues and effectiveness of response to these issues				
Evaluation of closure components of lessons				
B. Reflection on Analysis in Part V	(0)	(1)	(2)	(3)
Identification of areas where improvement is needed				
Reflection on how identified weaknesses affected instruction				
Identify specific professional development activities that could remediate these weaknesses				
Give example of when teaching was particularly strong; provide evidence				
Overall Score				

Exceeds Standards 27 – 36; Meets Standards 21 – 26; Minimally Meets Standards 12 – 20; Does Not Meet Standards <12

A score of “Does Not Meet Standards” on any element of the TCWS requires that the work be revised.
See Scoring Rubric for description of each performance level.