



**Stony Brook University**

## **Professional Education Program**

### **Mathematics Teacher Candidate Work Sample**

#### **Introduction**

Educators today place a high premium on knowledge of standards and assessment, and on the ability to design instruction which links the two to enhance student learning. The work sample is designed to help teacher candidates grow professionally by focusing on the complex relationship among standards, assessment and instruction, and to help learn how to systematically apply pedagogical theory to classroom practice. The work sample also provides the Mathematics Education Program with an important source of 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 classroom settings.

#### **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 by the New York State Standards and New York State Core Curriculum
- the teacher uses pre-assessments 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 understanding and knowledge to make instructional decisions and modify lessons and lesson plans,
- the teacher uses assessment data to profile student learning and appropriately communicates student progress to students, parents, and colleagues

❑ the teacher reflects upon his/her own teaching and practices reflective thinking to adapt instruction, improve student learning and navigate professional growth. Each of these core elements will be addressed in different sections of the work sample.

### **I. The Setting : Contextual Factors**

While different schools may be similar with respect to the basic mathematics 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**

Provide a description of the school and the local community. Focus on:

1. the location of the school and the district
2. the resources of the district and its support of education
3. the socio-economic and linguistic profile of the community
4. the performance of the school on state assessments
5. the percentage of students classified as Special Education/504
6. the percentage of ESL students and their level of English proficiency

Much of this information can be found in the report cards issued yearly for each <http://www.emsc.nysed.gov/repcrd2005/>. 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/home.html>.

#### **B. School, Classroom, and Individual Students**

1. Describe the school (size, organization plan, ability grouping, scheduling patterns, disciplinary policies, etc.)
2. Describe the racial and ethnic profile of the school population, and the sample of students
3. Describe the physical layout of the classroom(s) in which you are teaching, whether you are required to share this classroom with other teachers, and the technology and other resources available
4. Describe the school climate, and any issues relating to student behavior
5. Identify the specific class that will comprise the participants in the work sample and discuss the composition of that class. Be sure to take into account students with individual education plan (IEP) modifications, students with limited English proficiency, and any other relevant student characteristics

6. Provide a description of the shared social and socio-mathematical norms in this classroom.

C. Describe how the data and characteristics presented in subsections A and B above may influence instructional design, your teaching, and assessment.

## II. Learning Goals

Part of the work sample involves the design of a plan for the implementation of a 2-4 week unit of standards-based instruction. The plan itself should be based on the New York State Mathematics Core Curriculum. It should consist of a sequence of interrelated lessons organized around one or more essential questions and a limited number of process strand performance indicators and content strand performance indicators. The essential questions, factual information, concepts, and the skills necessary to address the performance indicators should be included. Please provide the following details.

In this section, you should:

1. Identify which unit will be the basis for your work sample. Describe the fundamental concepts and big ideas around which you are planning this unit and briefly explain how the individual lessons equip the students with the knowledge, concepts and skills necessary to come to grips with these essential questions
2. Based on your pre-assessment of the students (see below) identify 4-6 learning goals for the unit. These will form the basis for your assessment of student learning
3. Use a chart or other graphic organizer to show how your learning goals are aligned with the relevant national and state standards. Links to national and state standards can generally be found on the Blackboard page for your program under External Links
4. Explain briefly why you think that these ideas are appropriate for your students.

More specifically, this part should identify:

- A. Details about the unit of instruction
  1. Topic to be taught
  2. Core Curriculum being addressed
  3. Targeted grade level
  4. Length of the unit
- B. Having identified the Core Curriculum unit, define:
  1. The content and process standards to be addressed
  2. The performance indicators to be addressed

3. Some big ideas whose importance extends beyond the unit
  4. Some essential questions to guide student inquiry and focus instruction for uncovering the important ideas of the content in the unit.
  5. Desired understandings to be achieved
  6. Key knowledge, concepts and skills that you expect students to acquire upon completion of the unit
  7. Connections between the unit and the rest of the course
  8. Connections between the unit and the real world, if appropriate
  9. Connections between the unit and students' interests
- C. Include an appropriate chart, table, or other graphic organizer.

### **III. Assessment**

Well-designed formative assessments can be used to diagnose prior knowledge, to check for understanding, to monitor progress, to adapt teaching strategies, and to evaluate learning. Formative assessments are important because they enable the teacher to diagnose what students have and have not learned, to understand students' misconceptions, and, on the basis of this knowledge, to modify instruction accordingly. Formative assessment may be informal, such as evaluation of student answers to teacher or student questions, evaluation of a whole-class discussion, feedback from a writing task, and observation of students as they work on a class activity.

The first component of the assessment plan should be a pre-assessment, conducted in order to determine what students do and do not know before teachers define the learning goals of the unit. The instructional design portion of the unit plan should take into account knowledge gaps and misconceptions that the pre-assessment might have revealed, as well as the subject matter that has been mastered by students. The summative component of the assessment plan for the unit should correlate with the learning goals of the unit. The assessment plan should employ multiple forms of assessment. Some assessment might include a complex performance task (e.g. a multi-staged problem solving task) that shows a student has internalized a targeted concept. Such an assessment needs to be accompanied by a rubric, so that the student is aware of what s/he needs to do on the performance assessment to be successful. Other assessments might include tests, quizzes, open-ended questions that require an academic response in writing, observational or discussion checklists, and student self-assessment. It is also important to provide opportunities for self and/or peer assessment, for ongoing feedback to students, and for student revisions.

In summary, the assessment section of the project should:

- A. Include a pre-assessment designed to establish a baseline of prior student knowledge, knowledge gaps and/or misconceptions. The pre-assessment might include a quiz, or might be based on a set of structured questions that are explored in a whole-class setting. In the pre-assessment that you design for this unit, include the instruments that you will use to assess the students' prior knowledge of the questions, key knowledge and skills, concepts and understandings specified in Work Sample II, Section B (items 1-6). The data collected from the pre-assessment will not only be used to design an instructional plan, but also in your analysis of students' learning in Section V.
- B. Provide a description of the entire assessment plan for the unit with an appropriate justification of why you think your assessment instruments will measure what you claim they will. A graphic organizer might be useful.
- C. Include copies of all of your assessment instruments (tests, checklists, rubrics, set of probing questions, etc.). Include clear references for all resources and materials that you adopt and/or adapt. Include a rubric or scoring guide for one of your *major* assessments that establishes clear criteria for various performance levels.
- D. Indicate how your assessments can be modified for diverse learners (e.g. ESL learners) in order to meet the needs of some of your students that might appear on an IEP.

#### **IV. Instructional Design**

Using your knowledge of the teaching-learning context and the results of your pre-assessment, design a 2-4 week unit of instruction which will help all of your students achieve the standards-based learning goals outlined in your Work Sample. Use Lesson 1 to open the unit with an essential question designed to engage the students, and the last lesson to evaluate student learning. In addition, this section of the work sample should include:

1. All lesson plans of the unit, sequentially numbered, written in a structured lesson format, and bearing a header with the title of the lesson
2. All supplementary materials used in the unit. Copies of worksheets, handouts, games, or other instructional materials should be enclosed.
3. Clear references (date, author, publisher, place of publication) for all the resources and materials you plan to use with the unit.

- A. The individual lesson plan should include:
1. Content that is appropriate for the students and for the time available
  2. Content that requires and facilitates inquiry, mathematical reasoning, and problem solving
  3. Materials that are relevant and appropriate for the goals of the unit and the needs of students with diverse backgrounds
  4. Activities that are likely to interest and engage diverse learners and to foster increased understanding
  5. Activities that build on one another, and are structured for systematic development of learning
  6. Learning experiences that allow equality of access
  7. Tasks that are considered in relation to the needs of English language learners and students with specific learning needs, and which address different students' prior knowledge and readiness
  8. Tasks that are well-scaffolded
  9. Evidence of provisions for modeling of key performances, and skills
  10. Activities that allow for individual and collaborative work
  11. Multiple forms of instruction that are used in ways suited to the content and specified goals
  12. Multiple forms of assessment
  13. A concise closure component
- B. The instructional design should form a coherent, connected sequence from the first to the last day of the unit, and should include the following components:
1. Multiple forms of instruction (e.g. lecture, small-group or whole-class discussion, peer presentation, Socratic dialogue, production of hands on work), that are used in ways suited to the content and specified goals
  2. If appropriate, some form of technology that is used creatively to support student learning by providing scaffolding and tools (visualizations, simulations, etc.); opportunity for feedback, reflection, and revision; opportunities for building connections to real world communities, or for building interdisciplinary connections
  3. A minimum of two homework assignments other than those drawn from a textbook. Include components that require reflective writing
  4. Formal and informal assessments
  5. If appropriate, include tasks that expose connections between the targeted concept and its role in the history of mathematics or its practical applications, and which allow for further discussions or explorations

## V. Analysis

The purpose of this section is to show that you are able to analyze your own teaching and your students' learning. This section should be written once the unit plan has been implemented (*if this is not possible, speak to your instructor for alternate instructions*).

A. In order to analyze the class as a whole, use the pre-assessment data and the assessment at the end of the unit to discuss student learning with respect to the unit learning goals. If possible, use quantitative and qualitative methodology to assess student learning by comparing pre- and post-test results, as well as other types of assessment used during the course of the unit. Include copies of all assessment tools used. Organize your summary with graphs, charts, or other visual organizers.

Then select a minimum of 3-5 students of different ability levels on the basis of a characteristic which you believe to be relevant to student achievement (language proficiency, ability level, learning style, etc.) and track their learning during the unit. For each individual student

1. Indicate their grade level, gender, and the characteristic that was used to select the student. Do not identify students by name
  2. Explain which instructional strategies were most and least effective for each individual student, and give possible reasons for learning outcomes.
  3. Describe how each student utilized their own assessment results during the unit, and the feedback provided by teacher or peers in order to analyze their own learning, or to identify relevant strengths and weaknesses.
- B. Reflect on the data gathered for both whole class and individuals. Discuss your students' achievements on the basis of a comparison between pre- and post-tests, teacher's notes, students' homework, and journals. Discuss the implications of this analysis for the future teaching of the same unit, and the resulting student learning.
- C. Thorough unit and lesson planning is essential if a teacher is to deliver effective instruction. However, few plans work perfectly. There are often occasions

requiring modifications of some aspects of the original plan, even after adjustments resulting from pre-assessment have been made and an actual lesson has begun. Recall two different times during the unit when a student's response or reaction forced you to modify your original design for instruction. Cite specific examples for each case.

#### **VI. Self-evaluation and Reflection.**

A. Evaluate the success of each of the lessons taught during the unit or time period. Things to be considered include:

1. Alignment between the learning goals, instruction, and assessment
2. Evaluation of the mathematical tasks used
3. Evaluation of the sequencing of tasks
4. Evaluation of the motivation that the activities/tasks provoked
5. Evaluation of students' classroom participation and engagement with class activities
6. Identification of the lessons' strengths and weaknesses
7. Identification of unanticipated events that affected the lesson and the students' attention and performance
8. Discussion of classroom management issues and the effectiveness of the teacher's responses to these issues
9. Evaluation of time management and smooth transitions between activities
10. Evaluation of the diversity of types of student-teacher interactions

B. Reflecting on the analysis done in Part VI above, describe how planning and teaching the unit has helped you to grow professionally. Identify specific areas (assessment, individualization of instruction, diversifying instruction, content knowledge, teaching strategies, time management, questioning techniques, etc.) where:

1. improvement is needed to in order to become a more accomplished classroom teacher. Explain how identified weaknesses affected instruction. Identify specific professional development activities that could help remediate these weaknesses.
2. teaching was particularly strong. Provide evidence to support these assertions.

Note: The work sample should be submitted in both hard and electronic copy, the latter on a CD.



## Scoring Rubric for the Mathematics Teacher Candidate Work Sample (MTCWS)

Indicators	Inadequate	Meets Standards	Exemplary
Knowledge of learning theory and methodology of teaching school mathematics as evident from the narrative	Narrative displays little knowledge of learning theory and methods of teaching school mathematics.	Narrative displays satisfactory knowledge of learning theory and methods of teaching school mathematics.	Narrative displays in-depth knowledge of learning theory and methods of teaching school mathematics.
Clear, concise, and thorough response to prompts	Response is not relevant and not detailed enough.	The response is satisfactory, but not thorough. There is some attention to detail.	Responses are clearly articulated, and contain elaborate details.
Appropriate application of theoretical knowledge, knowledge of national and state standards, and curriculum materials as evident in the responses	Response demonstrates lack of appropriate application of knowledge of theory and/or standards and/or curriculum materials.	Response demonstrates satisfactory knowledge of theory, standards, and curriculum resources and their appropriate application.	Response demonstrates sophisticated knowledge of theory, standards, and curriculum materials and their appropriate use.
Organization and Accuracy of Presentation	Demonstrates poor organization and/or lack of accuracy and/or unacceptable use of grammar	Text is satisfactory and well organized. Demonstrates competent use of grammar and wording.	Text is highly organized and accurate. Demonstrates mastery of grammar and wording.

**A score of “Inadequate” on any element of the MTCWS requires that the work be revised.**

## Section I- The Setting: Contextual Factors

	(1)	(2)	(3)
<b>A. Community</b>			
Provide a description of the school and the local community. Focus on:			
the location of the school and the district			
the resources of the district and its support of education			
the socio-economic and linguistic profile of the community			
the performance of the school on state assessments			
the percentage of students classified as Special Education/504			
the percentage of ESL students and their level of English proficiency			
<b>B. School, Classroom, and Individual Students</b>			
Describe the school (size, organizational plan, ability grouping, scheduling patterns, disciplinary policies, etc.)			
Describe the racial and ethnic profile of the school population, and the sample of students			
Describe the physical layout of the classroom(s) in which you are teaching, whether you are required to share this classroom with other teachers, and the technology and other resources available			
Describe the school climate, and any issues relating to student behavior			
Identify the specific class that will comprise the participants in the work sample and discuss the composition of that class. Be sure to take into account students with individual education plan (IEP) modifications, students with limited English proficiency, and any other relevant student characteristics			
Provide a description of the shared social and socio-mathematical norms in this classroom.			
<b>C. Data's Potential Influence on Instructional Design and Assessment</b>			
Describe how the data and characteristics presented in subsections A and B above may influence instructional design, your teaching, and assessment.			
<b>Total score</b>			

**Section II- Learning Goals**

	(1)	(2)	(3)
<b>A. Details about the unit of instruction:</b>			
Topic to be taught			
Core Curriculum being addressed			
Targeted grade level			
Length of the unit			
<b>B. Having identified the Core Curriculum unit, define:</b>			
The content and process standards to be addressed			
The performance indicators to be addressed			
Some big ideas whose importance extends beyond the unit			
Some essential questions to guide student inquiry and focus instruction for uncovering the important ideas of the content in the unit			
Desired understandings to be achieved			
Key knowledge, concepts and skills that you expect students to acquire upon completion of the unit			
Connections between the unit and the rest of the course			
Connections between the unit and the real world, if appropriate			
Connections between the unit and students' interests			
<b>C. Include an appropriate chart, table, or other graphic organizer</b>			
<b>Total score</b>			

**Section III- Assessment**

	(1)	(2)	(3)
<b>A. Pre-assessment</b>			
Includes an appropriate pre-assessment to determine students' prior knowledge			
<b>B. Assessment Plan includes:</b>			

Assessment that reflects the goals for student learning			
A description of the entire assessment plan for the unit and justification for the choice of assessment instruments			
Formal and informal assessments that are used to diagnose knowledge, check for understanding, monitor progress, adapt teaching and evaluate learning			
Clear criteria for assessing understanding and performance to which students can aspire			
Opportunities for self and/or peer assessment			
Opportunities for ongoing, shared feedback to students and for revisions of work			
<b>C. Assessment instruments</b>			
Includes copies of all assessment instruments (tests, checklists, sets of probing questions, etc.)			
Includes a rubric or scoring guide for one of your major assessments with clearly established criteria for various performance levels			
Includes clear references for all resources and assessment instruments you adopt or adapt			
<b>D. Assessment and modifications for diverse learners</b>			
Indication of possible modification of your assessment instruments for diverse learners			
<b>Total score</b>			

#### Section IV- Instructional Design

	(1)	(2)	(3)
<b>A. Instructional lessons include:</b>			
Content appropriate for the students and the time available			
Content organized in a way that facilitates inquiry			
Materials that are relevant and appropriate for the goals of the unit and the needs of students with diverse backgrounds			
Plan for the activities that is detailed and specific			

Activities that are likely to interest and engage diverse learners and to foster increased understanding			
Activities that build on one another, and are structured for systematic learning			
Learning experiences that allow equality of access			
Tasks that are considered in relation to the needs of English language learners and students with specific learning needs, and which address different students' prior knowledge and readiness			
Activities that allow for individual and collaborative work			
Multiple forms of instruction (e.g. mini lecture, small-group or/and whole class discussion, peer presentation, Socratic dialogue, production of hands-on work) that are used in ways suited to the content and specified goals			
Some form of assessment			
A concise closure component			
<b>B. The instructional design should form a coherent, connected sequence from the first to the last day of the unit, and includes the following components:</b>			
If appropriate, technology that is used creatively to support student learning by providing scaffolding and tools (visualizations, simulations, etc.); opportunity for feedback, reflection, and revision; opportunity for building interdisciplinary connections			
Planned homework that helps to advance the knowledge, skills, and understandings targeted throughout the unit			
A minimum of two homework assignments other than those drawn from a textbook. Include components that require reflective writing			
Formal and informal assessment			
If appropriate, tasks that expose connections between the targeted concept and its role in the history of mathematics or its practical applications, and which allow for further discussions or explorations			
<b>C. The entire instructional unit includes:</b>			
All lesson plans of the unit, sequentially numbered, written in a structured lesson format, and bearing a header with the title of the lesson			
All supplementary materials used in the unit. Copies of worksheets, handouts,			

games, or other instructional materials are enclosed.			
Clear references (date, author, publisher, place of publication) for all of the resources and materials to be used with the unit.			
<b>Total score</b>			

### Section V- Analysis

	(1)	(2)	(3)
<b>A. Analysis of the entire group of students includes:</b>			
A quantitative comparison between pre- and post-assessment data			
If appropriate, a component that depicts student learning based on qualitative data (e.g. teacher's notes, excerpts from writing assignments, student interviews, surveys, etc.)			
Interpretation of results			
All assessment instruments used			
Graphic organization of findings			
<b>B. Analysis of individual students includes:</b>			
Description of individual characteristics: grade level, gender, language proficiency, other			
Identification of most effective strategies for each individual student			
Identification of least effective strategies for each individual student			
Interpretation of assessment data and individual student learning			
Interpretation of the role of feedback for each individual student for his/her learning			
<b>C. Discuss implications for student learning and future teaching of the same unit</b>			
<b>D. Discuss possible modifications of the unit</b>			
Include two examples of situations that required change of your original lesson plan			
<b>Total score</b>			

## Section VI- Self Evaluation and Reflection

	(1)	(2)	(3)
<b>A. Evaluation of success of the lessons with respect to:</b>			
Alignment between learning goals, instruction, and assessment			
Evaluation of the sequencing of tasks			
Evaluation of the motivation that the activities/tasks provoked			
Evaluation of students' classroom participation and engagement with class activities			
Evaluation and reflection , where appropriate, on the role of technology in the unit (if technology is not appropriate, reflect on this)			
Identification of the lesson's strengths and weaknesses			
Identification of unanticipated events that affected the lesson and the students' attention and performance			
Discussion of classroom management issues and the effectiveness of the teacher's responses to these issues			
Evaluation of time management and smooth transition between activities			
Evaluation of the diversity of types of student-teacher interactions			
<b>B. Reflection on Analysis in Part VI includes:</b>			
Assessment of one's own professional growth			
Identification of specific areas where improvement is needed			
Reflection on how identified weaknesses affected instruction			
Identification of professional development activities that could help remediate these weaknesses			
Examples of particular strengths of teaching			
<b>Total score</b>			