

**Generic or Subject Specific Teacher Work Samples  
as Evidence of Teacher Effectiveness?**

**Dr. Adele Schepige**  
Western Oregon University  
[schepia@wou.edu](mailto:schepia@wou.edu)

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## Generic or Subject Specific Teacher Work Samples as Evidence of Teacher Effectiveness?

In the world of teacher preparation, this is the age of accountability through evidence. If there was any doubt, one look at the Journal of Teacher Education's first two issues of 2006 should be convincing. The issues are devoted to research and programs that examine how to develop assessments and determine what kinds of assessments can be used as evidence needed to evaluate and improve teacher effectiveness. The use of valid and reliable assessments is essential to determine strengths and weaknesses in individual teacher candidates' preparation and readiness for teacher licensure, as well as for identifying needs for improvement in teacher preparation programs. The National Council for the Accreditation of Teacher Education (NCATE) has defined through its standards what highly qualified teacher candidates should know and be able to do (Program Standards) as well as standards for teacher education programs (Unit Standards). The NCATE program standards were developed by professional associations (SPAs) that are constituent members of NCATE (2006). The program standards are representative of a diverse group of professional associations such as National Association for the Education of Young Children, Teachers of English to Speakers of Other Languages, and the National Science Teachers Association. It is the standards from these associations that can facilitate the direction taken for determining the kinds of evidence teacher education programs should use.

In Oregon, teacher work samples (TWS) are a required source of evidence of teacher candidates' effectiveness and impact on student learning. Other states and institutions are beginning to use the teacher work sample as well. A Google search for teacher work

sample produces numerous education teacher work sample requirements, prompts, examples and scoring guides on websites. These requirements share the same basic teacher work sample components: contextual information, instructional plans and rationale for the unit, assessment instruments, assessment data and analysis of learning, and reflection about the teaching experience and unit. A review of those teacher work sample documents, including our own at Western Oregon University, reveals the predominance of a one size fits all model. The requirements, prompts and scoring guides are for all teacher candidates, with no special consideration given to the grade or developmental levels such as early childhood or specific pedagogical content knowledge needed to successfully teach and impact learning in a content area. Yet, if teacher education programs are looking for evidence that teacher candidates meet program standard requirements of the SPAs, the general requirements offered by the teacher work sample may not be enough to use as a primary source of documentation for having met the requirements.

Dissatisfaction with generic assessments is a part of what prompted the decision by a higher education consortium in California to develop the Performance Assessment for California Teachers (PACT). The PACT assessments are not a one size fits all model. The assessments are designed for different certification areas and subject areas such as elementary mathematics or secondary science (Pechione & Chung, 2006). Similarly, my own dissatisfaction with general requirements as evidence of science teacher effectiveness prompted the development of subject specific teacher work sample requirements that provide teacher candidates with specific information that addresses their science SPAs standards.

## **Need for content specific TWS: A science example**

The National Science Teachers Association's 2003 Standards for Science Teacher Preparation adopted by NCATE in 2004 state that teacher candidates need to demonstrate their knowledge and abilities at different assessment points that show knowledge and planning skills, the engagement of students in such topics as the relationship of science and technology, nature of science, inquiry in science and science-related issues (2003). The NSTA 2003 standards require that teacher candidates demonstrate their effectiveness in ten different standards (see Appendix A for descriptions): 1) Content 2) Nature of Science 3) Inquiry 4) Issues 5) General Skills of Teaching 6) Curriculum 7) Science in the Community 8) Assessment 9) Safety and Welfare, and 10) Professional Growth. Clearly these standards are not generic. They articulate the very specific knowledge and skills teachers of science should know and be able to do successfully. Essentially what are needed are performance assessments for pedagogical content knowledge. For example science teachers should know when a demonstration is more effective than a simulation. What a science teacher may deem effective in certain circumstances may not be effective for a history teacher.

In fact, it is possible that pedagogical content knowledge in a subject area as broad as science can be viewed in greater detail. Veal and Mckinster (1999) advocate for three different types of pedagogical content knowledge within a content area: general (example: science overall), domain specific (example: biology, geology, chemistry, etc.), and topic specific (the same concept present in two different domains areas may be taught differently). Veal and Kubasko Jr. (2003) explored this in a study of how the teaching of evolution played out in biology versus a geology setting. The results indicated that in

addition to years of experience and knowledge of students' prior knowledge and backgrounds, topic specific pedagogical content knowledge was important to how the biology teachers chose to teach evolution differently than the geology teachers.

Whether TWS can be used to assess content specific effectiveness needs to be examined. This aspect of TWS appears to be in its infancy, with few studies providing details about it. For example, Hegler (2003) describes the use of TWS specifically for teacher candidate evaluation in special education. The teacher work sample has general education program and special education outcomes. Cartwright & Blacklock (2003) used TWS in a reading methods course. Preservice teachers worked one on one with k-6 students. A modified teacher work sample was used to document teacher candidates teaching reading and learning gains in reading of individual students rather than an entire class. Pratt (2002) approached this from a different perspective. He studied 50 mathematics work samples that used general requirements developed from 1991-1999 from elementary through high school teacher candidates to determine the effectiveness of teacher work sample methodology in moving the National Council of Teachers of Mathematics (NCTM) national standards into the classroom and the extent to which teacher work sample methodology promotes the alignment of standards, content, instruction and assessment of instruction. His study revealed weak to no alignment with NCTM standards for all of the work samples. This subject area assessment is the kind of work the higher education consortium in California is beginning to do with their PACT project.

At Western Oregon University a set of general teacher work sample requirements has been used for years by all teacher candidates. Each component of the work sample has a

short description that explains the nature of the information in the section and is followed by a checklist of what must be included in the written portion. Each component of the work sample is assessed with a scoring guide. After reading and scoring science work samples over a five year period it became clear that the generic teacher work sample was not providing enough specific evidence that pertained to teaching science.

### **Development of science specific TWS requirements**

The development of science specific TWS requirements began in spring 2005. The first phase of the development was a short set of guidelines that had some specific science requirements for the work sample for the secondary level. Six teacher candidates used the general plus the specific requirements for their science work sample while five teacher candidates only used the general requirements for their science work samples. The work samples that had both the general and the specific requirements contained greater depth and emphasis on important aspects of teaching science than those who just had the general guidelines. For example, with science specific guidelines the teacher candidates had more depth and breadth when planning for laboratory instruction and lab safety. They also analyzed student prior knowledge more thoroughly, and some referred to specific prior knowledge research about the content they were planning to teach and connected that to their decisions about instruction. Teacher candidates are at the beginning stage of the development of their own pedagogical content knowledge and need support to improve it. Making components of the work sample more explicit in terms of science teaching appeared to cause the teacher candidates to think about teaching science differently. Because of the noticeable differences between the two kinds

of work samples, the decision was made to move to phase two and fully develop a science specific set of work sample requirements for the secondary level to be piloted in 2006.

To develop a content specific set of requirements, each component of the general teacher work sample requirements was first examined for possible alignment with each of the ten NSTA standards. What was found during the process was that there was some common ground. For example, the NSTA standard on assessment is aligned with the teacher work sample requirements for assessment. However, the generic language contained in the TWS rationale would not necessarily lead teacher candidates to demonstrate evidence of the NSTA content substandards about being able to convey major concepts, unifying concepts and personal and technological applications. Table 1 shows the rationale for the teaching unit and how its components could align with different NSTA standards that could guide language for a science specific rationale requirement. The process also made it seem possible that during a teaching unit, depending on what was taught, a few standards could be emphasized more than others.

Table 1 TWS Rationale Alignment with NSTA Standards

General Requirements for Rationale	NSTA Standards
Provide a conceptual overview	NSTA Knowledge of Conceptual Science Content 1a,1b,1c, NSTA Nature of Science 2a,2b, NSTA Inquiry 3a, NSTA Issues 4a
Explain the relationship to state goals/standards and the community.	NSTA Science in the Community 7a,7b
Provide a brief summary of the pre-assessment analysis	NSTA Assessment 8b
Explain instructional decisions, including the integration of literacy and the relationship to what is known about student prior knowledge	NSTA 5: General Skills of Teaching NSTA 6: Curriculum

For the teacher candidates, just knowing that the different components of the teacher work sample are aligned with national standards is not enough to improve their effectiveness and impact student learning.

The next step was to add descriptions and explanations to make the requirements more content specific. For example, in the general lesson plan requirements there is no mention of laboratory management, set up or lab safety. Metz (2005) states that successfully designing and implementing laboratory investigations is a challenge for science teachers. Without careful thought, parts of a lesson such as laboratory safety (NSTA Safety and Welfare Standard) could be a recipe for disaster. In the science lesson plan requirements the laboratory prompts help the teacher candidate focus on important aspects of teaching laboratories. In TWS lesson plans meeting varying student needs is often associated with multiple intelligences, talented and gifted students, English language learners, and other forms of diversity. When teaching science, however, issues such as evolution and global warming present a different situation for teacher candidates. Thus, the science lesson plan requirement also states that teacher candidates must provide for students whose views may conflict with accepted scientific viewpoints and explanations as appropriate.

In the TWS rationale general requirements there are simple prompts regarding student prior knowledge. In science education there have been hundreds of studies about prior knowledge and student misconceptions. There are websites devoted to science misconceptions. There are several well known books about student misconceptions and strategies to support changing them. Therefore, in the science specific requirements there is a prompt for the teacher candidates to consult resources concerning research on student

prior knowledge and misconceptions to help the candidates understand their students' misconceptions better and provide ideas for methods of teaching to them.

To assist the teacher candidates with the development of their teaching unit the teacher candidates are given a copy of the Oregon Teacher Observation Protocol (O-TOP). The O-TOP instrument (in Appendix B), is based on the work of Piburn, et al. (2000) and Lawrenz, Huffman, Appeldoorn and Sun (2001), and was designed to examine the kinds of reform-based instructional strategies used in the science or mathematics classroom. The O-TOP is a product of the Oregon Collaborative for the Excellence in the Preparation of Teachers, a National Science Foundation project that began in 1997 to improve mathematics and science teacher preparation. The development of the instrument is described in Wainwright, Flick and Morrell (2003). Essentially the O-TOP has ten reform-based strategies that have teacher and student possible behavior indicators for observers to be able to determine the degree to which the strategy was used in a lesson. The ten reform-based strategies have also been aligned with the NSTA standards. Although the O-TOP was designed as an observation tool, it can also be used as planning tool. Evidence of the use of the reform-based strategies should be apparent in the lessons of the teacher work sample. For example, one of the ten strategies is multiple representations. During a unit students should be exposed to different teaching strategies and to different materials such as concept maps, models and technology to support their understanding of science concepts, which falls under the NSTA General Teaching Skills standard.

Finally, the scoring guide had to be modified to account for the changes made in the work sample requirements. The scale remained the same but the criteria now include

specific references to science outcomes aligned to the NSTA standards within each component of the work sample.

### **The Pilot study**

In 2006 the science work sample will be piloted during the winter and spring terms. The work samples will be scored with the revised scoring guide. The intent is to have several scorers, preferably science teacher educator colleagues in Oregon. These work samples will be analyzed for depth and for how well they provide evidence of science teacher preparation. They will also be compared with science work samples that used general requirements that were collected during the past year. It is expected that the science teacher work sample requirements and scoring guide will need revision and further testing. These analyses should also reveal strengths and weaknesses in our science teacher preparation program that can then be addressed.

### **Conclusion**

Teacher work samples are one source of evidence of teacher candidate effectiveness. However, because the TWS requirements are generic the work sample is not as effective as it could be in providing evidence. By modifying the general requirements to include content area specific requirements, teacher candidate effectiveness can be more readily evaluated with regard to the national standards of professional associations. The pilot science work sample requirements are a step in that direction. Making changes like this take time. But if we are truly dedicated to provide the best evidence possible that we are preparing highly qualified teachers, then the time invested will be worth it.

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## Appendix A.

### **NSTA Standards for Science Teacher Preparation**

#### **Standard 1: Content**

Teachers of science understand and can articulate the knowledge and practices of contemporary science. They can interrelate and interpret important concepts, ideas, and applications in their fields of licensure; and can conduct scientific investigations.

#### **Standard 2: Nature of Science**

Teachers of science engage students effectively in studies of the history, philosophy, and practice of science. They enable students to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science.

#### **Standard 3: Inquiry**

Teachers of science engage students both in studies of various methods of scientific inquiry and in active learning through scientific inquiry. They encourage students, individually and collaboratively, to observe, ask questions, design inquiries, and collect and interpret data in order to develop concepts and relationships from empirical experiences.

#### **Standard 4: Issues**

Teachers of science recognize that informed citizens must be prepared to make decisions and take action on contemporary science- and technology-related issues of interest to the general society. They require students to conduct inquiries into the factual basis of such issues and to assess possible actions and outcomes based upon their goals and values.

#### **Standard 5: General Skills of Teaching**

Teachers of science create a community of diverse learners who construct meaning from their science experiences and possess a disposition for further exploration and learning. They use, and can justify, a variety of classroom arrangements, groupings, actions, strategies, and methodologies.

#### **Standard 6: Curriculum**

Teachers of science plan and implement an active, coherent, and effective curriculum that is consistent with the goals and recommendations of the National Science Education Standards. They begin with the end in mind and effectively incorporate contemporary practices and resources into their planning and teaching.

#### **Standard 7: Science in the Community**

Teachers of science relate their discipline to their local and regional communities, involving stakeholders and using the individual, institutional, and natural resources of the community in their teaching. They actively engage students in science-related studies or activities related to locally important issues.

**Standard 8: Assessment**

Teachers of science construct and use effective assessment strategies to determine the backgrounds and achievements of learners and facilitate their intellectual, social, and personal development. They assess students fairly and equitably, and require that students engage in ongoing self-assessment.

**Standard 9: Safety and Welfare**

Teachers of science organize safe and effective learning environments that promote the success of students and the welfare of all living things. They require and promote knowledge and respect for safety, and oversee the welfare of all living things used in the classroom or found in the field.

**Standard 10: Professional Growth**

Teachers of science strive continuously to grow and change, personally and professionally, to meet the diverse needs of their students, school, community, and profession. They have a desire and disposition for growth and betterment.

Appendix B: O-TOP Instrument

**OCEPT-Teacher Observation Protocol (O-TOP)**

**Outcomes Research Study**

This instrument is to be completed following observation of classroom instruction. Prior to instruction, the observer will review planning for the lesson with the instructor. During the lesson, the observer will write an anecdotal narrative describing the lesson and then complete this instrument. Each of the ten items should be rated ‘globally’; the descriptors are **possible indicators**, not a required ‘check-off’ list.

		Not Observed			Characterizes Lesson
<p>1. This lesson encouraged students to seek and value various modes of investigation or problem solving. (Focus: Habits of Mind) <b>(NSES Standard B, NSTA 3b,5a,5d)</b></p>	N/O	1	2	3	4
<p>Teacher/Instructor: Presented open-ended questions Encouraged discussion of alternative explanations Presented inquiry opportunities for students Provided alternative learning strategies</p> <p>Students: Discussed problem-solving strategies Posed questions and relevant means for investigating Shared ideas about investigations</p>					
<p>2. Teacher encouraged students to be reflective about their learning. (Focus: Metacognition – students’ thinking about their own thinking) <b>(NSES Standard C, NSTA 8c)</b></p>	N/O	1	2	3	4
<p>Teacher/Instructor: Encouraged students to explain their understanding of concepts Encouraged students to explain in own words both what and how they learned Routinely asked for student input and questions</p> <p>Students: Discussed what they understood from the class and how they learned it Identified anything unclear to them Reflected on and evaluated their own progress toward understanding</p>					
<p>3. Interactions reflected collaborative working relationships and productive discourse among students and between teacher/instructor and students. (Focus: Student discourse and collaboration) <b>(NSES Standard B, NSTA 5c)</b></p>	N/O	1	2	3	4
<p>Teacher/Instructor: Organized students for group work Interacted with small groups Provided clear outcomes for group</p> <p>Students: Worked collaboratively or cooperatively to accomplish work relevant to task Exchanged ideas related to lesson with peers and teacher</p>					

<p>4. Intellectual rigor, constructive criticism, and the challenging of ideas were valued. (Focus: Rigorously challenged ideas)  <b>(NSES Standard B, NSTA 2c,4b,5a,)</b></p>	<p>N/O 1 2 3 4</p>
<p>Teacher/Instructor:  Encouraged input and challenged students' ideas  Was non-judgmental of student opinions  Solicited alternative explanations  Students:  Provided evidence-based arguments  Listened critically to others' explanations  Discussed/Challenged others' explanations</p>	
<p>5. The instructional strategies and activities probed students' existing knowledge and preconceptions. (Focus: Student preconceptions and misconceptions)  <b>(NSES Standard A&amp;C, NSTA 5e)</b></p>	<p>N/O 1 2 3 4</p>
<p>Teacher/Instructor:  Preassessed students for their thinking  Helped students confront and/or build on their ideas  Refocused lesson based on student ideas to meet needs  Students:  Expressed ideas even when incorrect or different from the ideas of other students  Responded to the ideas of other students</p>	
<p>6. The lesson promoted strongly coherent conceptual understanding in the context of clear learning goals. (Focus: Conceptual thinking)  <b>(NSES Standard A &amp; B, NSTA 1a,1b,6a,6b)</b></p>	<p>N/O 1 2 3 4</p>
<p>Teacher/Instructor:  Asked higher level questions  Encouraged students to extend concepts and skills  Related integral ideas to broader concepts  Students:  Asked higher level questions  Related subordinate ideas to broader concept</p>	
<p>7. Students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence. (Focus: Divergent thinking)  <b>(NSES Standard B, NSTA 4b,5f)</b></p>	<p>N/O 1 2 3 4</p>
<p>Teacher/Instructor:  Accepted multiple responses to problem-solving situation  Provided example evidence for student interpretation  Encouraged students to challenge the text as well as each other  Students:  Generated conjectures and alternate interpretations  Critiqued alternate solution strategies of teacher and peers</p>	
<p>8. Appropriate connections were made between content and other curricular areas. (Focus: Interdisciplinary connections)  <b>(NSES Standard A, D, NSTA 1a,1c,5b,7a,7b)</b></p>	<p>N/O 1 2 3 4</p>
<p>Teacher/Instructor:  Integrated content with other curricular areas  Applied content to real-world situations  Students:  Made connections with other content areas  Made connections between content and personal life</p>	

9. The teacher/instructor had a solid grasp of the subject matter content and how to teach it. (Focus: Pedagogical content knowledge) **(NSES Standard A, NSTA 1)**

N/O	1	2	3	4
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<p>Teacher/Instructor:</p> <ul style="list-style-type: none"> <li>Information presented was accurate and appropriate to student cognitive level</li> <li>Selected strategies that made content understandable to students</li> <li>Was able to field student questions in a way that encouraged more questions</li> <li>Recognized students' ideas even when vaguely articulated</li> </ul> <p>Students</p> <ul style="list-style-type: none"> <li>Responded to instruction with ideas relevant to target content</li> <li>Appeared to be engaged with lesson content</li> </ul>	
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10. The teacher/instructor used a variety of means to represent concepts. (Focus: Multiple representations of concepts) **(NSES Standard D, NSTA 5a, 5d)**

N/O	1	2	3	4
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<p>Teacher/Instructor:</p> <ul style="list-style-type: none"> <li>Used multiple methods, strategies and teaching styles to explain a concept</li> <li>Used various materials to foster student understanding (models, drawings, graphs, concrete materials, manipulatives, etc.)</li> </ul>	
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