Observation Rubric for Secondary Science

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ABSTRACT

The teacher observation rubric for secondary science was developed for observing pre-service teachers in UCLA's urban teacher residency program within the Teacher Education Program. The rubric focuses on four aspects of teaching - content rigor, student discourse, equitable student access to content, and classroom ecology - and includes examples of potential instructional strategies in each category.

science observation rubric

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UCLA Teacher Education Program

SCIENTIFIC RIGOR

TEACHING DIMENSIONS	CONTEMPLATING LEVEL 1	EMERGING/APPLYING LEVEL 2	INTEGRATING LEVEL 3	INNOVATING LEVEL 4	EXAMPLES OF INSTRUCTIONAL STRATEGIES
INSTRUCTIONAL FOCUS OF SCIENTIFIC TASK	There is no instructional focus or limited one-dimensional focus (e.g., solely on memorizing facts, rules, formulas, or definitions.)	There is no instructional focus or limited one-dimensional focus. (e.g., solely on a scientific phenomenon, science concept, or investigation/ experimentation skills).	Instructional focus includes clear connections among scientific concepts, investigation/experimental skills. A progression of learning tasks builds understanding about the central focus.	The learning tasks focus on multiple dimensions of science learning through clear connections of concepts, investigation, and experimentation skills. A progression of the learning tasks builds deep understandings of the instructional focus of the learning segment.	• Pressing for accuracy (academic language/ terminology) • Building on prior knowledge • Pressing for reasoning based on evidence • Error analysis; analyze sources of scientific error. • Getting students to respond to and learn from evidence. • Use of formative assessments to press for understanding Inquiry activities, laboratory inquiries, debates, analysis • Connections to the real world • Engagement in scientific process
INSTRUCTIONAL COGNITIVE ENGAGEMENT (CRITICAL THINKING)	Little to no cognitive engagement is appropriate for the grade level.	Cognitive engagement emphasizes recall of discrete pieces of scientific information, definitions, formulas, and procedural steps. Little to no evidence of probing for higher order cognitive processes such as understanding, connections among concepts, or generalization.	Higher order cognitive processes (e.g. understanding, generalization, and connections among concepts) are included, and are a central focus of instruction.	Higher order cognitive processes, such as understanding complex scientific concepts and the connections among them and generalizing from facts to concepts, are a central focus of instruction and assessment.	
ENGAGING STUDENTS IN LEARNING	Little or no opportunity for learner engagement in scientific inquiry.	Learners engage in two of the following: collection, analysis, interpretation of scientific data/or interpretation, questioning and analysis of scientific concepts.	Learners engage in three of the following: collection, analysis, interpretation of scientific data/or interpretation, questioning and analysis of scientific concepts.	Level 3 plus engagement strategies that reflect student-learning needs, including language needs.	
CHECKING FOR UNDERSTANDING	Teacher is not monitoring student progress in the lesson.	Teacher monitors student progress but does not change or adapt instruction to address the student needs based on information gathered.	Teacher monitors student progress throughout the lesson and this information is used to make instructional decisions during the lesson but it may not always further students' scientific understanding.	Teacher uses multiple opportunities and implements various strategies to monitor student progress throughout the lesson and this information is used to make sound instructional decisions during the lesson to further students' scientific understanding.	

SCIENTIFIC DISCOURSE

TEACHERS DISCOURSE: QUESTIONING	Teacher asks only non-science questions or provides no wait time or questions lead learners to misunderstandings or no informal assessments through questioning are evident.	Teacher elicits student responses that require scientific understanding, and there are attempts to improve ability to collect, interpret, and question scientific data or interpret, analyze and question scientific concepts.	Level 2 plus Teacher uses student input to further elicit student thinking	Level 3 plus Student thinking includes explanations of concepts, reasoning and/or scientific data.	• Asking students to predict, make conjectures, and then using evidence/ rationale • Modeling and re-voicing student thinking • Clarifying questions that evaluate student's scientific thinking or provide counter explanations. • Discussions focusing on analyzing sources of scientific error. • Having students relate to one another's ideas • Wait time • Participation structures: Small, flexible, leveled groups
TEACHER DISCOURSE: LINKING IDEAS	No linking in class discourse.	Teacher revoices or acknowledges student responses but it does not further the discussion.	Teacher revoices, acknowledges or questions student responses to further the discussion 1-2 times.	Teacher revoices, acknowledges or questions student response to further the discussion 3 or more times.	
STUDENTS DISCOURSE: LINKING IDEAS	No student linking in discourse	Students link their answers or ideas to others but do not use the connection to compare data or concepts, generate ideas or build upon knowledge.	Students link their answers or ideas to others 1-2 times in ways that compare data or concepts, generate ideas or build upon knowledge.	Students link their answers or ideas to others 3 or more times in ways that compare data or concepts, generate ideas or build upon knowledge.	
STUDENT DISCOURSE: SCIENCE RIGOR	Student responses do not involve justification.	1-2 students justify their ideas or conclusions based on the scientific concept or results from an investigation/ experiment.	3-4 Students justify their ideas or conclusions based on the scientific concept or results from an investigation/experiment.	5 or more Students justify their ideas or conclusions based on the scientific concept or results from an investigation/experiment.	
STUDENT PARTICIPATION IN DISCOURSE	Zero, one or two students participate in the science discussion.	More than one or two but less than ¼ of students in class participate in discussion around the science topic	About 1/2 of students in class participate in discussion around the science topic.	Majority of students in class participate in discussion around the science topic.	
PARTICIPATION STRUCTURES	Teacher does not implement participation learning structures for student participation and/or discourse.	Teacher implements participation learning structures with limited structure for equitable student participation -Some seating arrangements allow for discourse in pairs/small groups.	Teacher implements participation learning structures with some structure for equitable student participation. -Seating arrangements are in pairs/ small groups -Some consideration for student needs.	Teacher implements participation learning structures with structure for equitable student participation -Pair sharing -Small groups have individual roles and responsibilities. -Consideration for student needs.	

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EQUITABLE ACCESS TO CONTENT

TEACHING DIMENSIONS	CONTEMPLATING LEVEL 1	EMERGING/APPLYING LEVEL 2	INTEGRATING LEVEL 3	INNOVATING LEVEL 4	EXAMPLES OF INSTRUCTIONAL STRATEGIES
SUPPORTING DEVELOPMENT OF ACADEMIC LANGUAGE	Little to no support of *learners'* language needs in instructional task. OR Content is oversimplified, limiting access to content	Teacher applies scaffolding and language development strategies to support the conceptual understanding of the learning task(s).	Level 2 plus Teacher provides explicit models and opportunities to practice, and feedback for *learners* to develop further language proficiency.	Level 3 plus Teacher differentiates language strategies to further develop language proficiency.	• Accessing prior knowledge • Multi-tiered, multicultural, application tasks • Academic language strategies: word bank, association, sentence frames, etc. • Use of multiple learning modalities – productive & receptive, visual, kinesthetic, auditory, etc. • SDAIE/sheltered strategies: group projects, choral reading, concept mapping, graphic organizers, pantomime-a-tale, pass-the-picture, prediction, quickwrite, quickdraw, read-around groups, reciprocal teaching, reflection, sentence starters/frames, verbalizing, visualizing, vocabulary cards, etc. • Technology • Connections to real life scientific phenomena and student real life experiences. • Differentiated instruction though teacher input and student output.
SDAIE TO SUPPORT ELLS	Little to no evidence of SDAIE strategies used to support ELLs.	Some SDAIE strategies are evident.	Several SDAIE strategies are evident.	Several SDAIE strategies are used during instruction and 3 + SDAIE strategies are used as a form of formative assessment.	
MAKING CONTENT RELEVANT FOR LEARNERS	Limited to no evidence of connecting content to the real world (can include culturally relevant pedagogy or critical pedagogy).	Connection to the real world (can include culturally relevant pedagogy or critical pedagogy) is vague and not fully integrated into instructional focus.	Connection to the real world (can include culturally relevant pedagogy or critical pedagogy) is clear and integrated into the instructional focus and learning tasks.	Connection to the real world (can include culturally relevant pedagogy or critical pedagogy) and student lives is fully integrated into the learning tasks and instructional focus.	
DIFFERENTIATION	Little to no evidence of the use of diverse learning modalities to address student achievement needs.	Some evidence of the use of diverse learning modalities to address student achievement needs.	Evidence of the use of diverse learning modalities that effectively address student learning.	Effective use of diverse learning modalities that effectively address most or all students' achievement needs.	

CLASSROOM ECOLOGY

CLASSROOM NORMS	Few to no observable classroom routines (class running, lesson running, interaction) exist causing student actions to interfere with learning. OR Potential safety hazards are evident.	Some observable classroom routines exist (class running, lesson running, and interaction) that may or may not facilitate a positive learning environment. No potential safety hazards are evident.	Observable classroom routines exist (class running, lesson running, and interaction) that facilitate a positive learning environment and may or may not promote critical thinking. No potential safety hazards are evident.	Observable routines (classroom running, lesson running, and interaction routines) exist that facilitate a democratic and positive learning environment and promote critical thinking. No potential safety hazards are evident.	• Instructional time is used wisely • Structure, transitions from activity to activity are planned • Classroom routines: a) class-running routines, b) lesson-running routines, c) interaction routines planned • Safety concerns are addressed appropriately • Teacher is professional in speech, dress, interactions with students, responsibilities to the profession
DEMOCRATIC CLASSROOM	Teacher demonstrates little to no respect of student input.	A few voices are respected but teachers' response to student input does not often enhance learning and does not often promote healthy student-student-teacher relationship.	Some voices are respected but teachers' response to student input enhances learning and can promote healthy student-student-teacher relationship.	Most to all voices are respected. Negotiations and student input enhances learning and promotes healthy student-student-teacher relationship without undermining teacher knowledge and responsibility.	
PROFESSIONALISM	Little to no evidence of professionalism pertaining to the following: Planning, dress, academic language/ professional talk, organization, timeliness.	Missing 2 or more: Planning, dress, academic language/ professional talk, organization, timeliness.	Missing 1: Planning, dress, academic language/professional talk, organization, timeliness.	Planning, dress, academic language/ professional talk, organization, and timeliness all evident.	

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