# e-Quality Instruction in Science (e-QIS) Dimensions

**Rubric Final Version Updated (Version 12)**
**Revised March 8, 2017**

**Teacher ____ Portfolio #____ Rater Initial ____**

List of Dimensions

Dimension 1: Eliciting Student Initial Thinking About Scientific Phenomena (Eliciting Thinking)
Dimension 2: Supporting the Needs of Diverse Learners (Diverse Learners)
Dimension 3: Engaging Students in Productive Talk (Productive Talk)
Dimension 4: Demonstrating Accurate Content Knowledge (Accuracy)
Dimension 5: Challenging Students to Engage in Multiple Ways of Knowing (Ways of Knowing)
Dimension 6: Working with and Investigating Scientific Questions (Investigations)
Dimension 7: Supporting the Analysis and Interpretation of Data (Data Analysis)
Dimension 8: Facilitating Students' Construction and Use of Scientific Products (Scientific Products)
Dimension 9: Constructing Diverse Assessments (Assessment Variety)
Dimension 10: Providing Feedback (Feedback)
Dimension 11: Using Information about Student Learning to Improve Teaching (Using Information)
Dimension 12: Overall Quality of Science Teaching Practice (Overall)

| Dimension 1: Eliciting Student Initial Thinking About Scientific Phenomena | |
|---|---|
| This Dimension measures the extent to which the evidence in the Portfolio suggests that students have opportunities to share their initial ideas about the natural and material world relative to the learning goal. | |
| 5<br>Fully Realized | Fully realizing this Dimension includes evidence of:<br>A. Multiple instances of the teacher eliciting students' **initial** ideas about **why or how** scientific phenomena occur (e.g. probing student ideas about causal mechanisms through questioning, demonstrations, discussion, or model construction).<br>AND<br>B. Multiple students' initial ideas are elicited in some form (e.g. task noted in the lesson plan that all students will draw models or engage in small group discussion versus the teacher asking only one student about her ideas). |
| 4 | |
| 3<br>Moderately Realized | Moderately realizing this Dimension includes evidence of:<br>A. Multiple instances of the teacher eliciting students' **initial** ideas about **what** occurs with scientific phenomena (e.g. through questioning, demonstrations, discussion, or model construction) or abstract problems (e.g. a pre-test that asks students to answer true/false questions or solve force problems). |
| 2 | |
| 1<br>Not Realized | The teacher's artifacts and artifact annotations do not provide evidence of instances of the teacher eliciting students' ideas about scientific phenomena. |

***Clarifying Conditions***
*N/A*

***Evidence:***

**My rating for this Dimension____**

| Dimension 2: Supporting the Needs of Diverse Learners | |
|---|---|
| This Dimension measures the extent to which the evidence in the Portfolio suggests that instruction meets the cultural, language, and/or documented special education needs of students. | |
| 5<br>Fully Realized | Fully realizing this Dimension includes evidence of:<br>A. Multiple instances each of high-quality instructional **and** assessment supports that attend to the dominant needs of the learners in the classroom. These needs may include cultural, language, or special education needs that are reported by the teacher. |
| 4 | |
| 3<br>Moderately Realized | Moderately realizing this Dimension includes evidence of:<br>A. Multiple instances of **either** instructional **or** assessment supports that attend to the dominant needs of the learners in the classroom. These needs may include cultural, language, or special education needs that are reported by the teacher. The majority of these supports are high quality. |
| 2 | |
| 1<br>Not Realized | The teacher's artifacts and artifact annotations do not reflect evidence of supports for dominant needs of the learners in the classroom. |

***Clarifying Conditions***

- *Teacher annotations for instructional and assessment artifacts count as evidence for this criterion. Comments found in the initial and concluding folders do not count as evidence toward this Dimension, rather contextual information about the classroom.*
- *The conditional language at the level of a '5' requires a total of four instances, with evidence for both instructional and assessment supports.*

***Evidence:***

**My rating for this Dimension____**

| Dimension 3: Engaging Students in Productive Talk | |
|---|---|
| This Dimension measures the extent to which the evidence in the Portfolio suggests that students are engaged in productive talk. Productive talk includes discussions (either small group or whole group) in which students respond to the teacher's and to one another's ideas and justifications to build collective knowledge about science ideas. | |
| 5<br>Fully<br>Realized | Fully realizing this Dimension includes evidence of:<br>A. Multiple instances of productive talk. This includes having:<br>a. Students using and responding to each other's ideas about the science idea of focus (**in addition** to any student-teacher talk).<br>AND<br>b. A strong emphasis on students justifying their claims and ideas. |
| 4 | |
| 3<br>Moderately<br>Realized | Moderately realizing this Dimension includes evidence of:<br>A. Multiple instances of productive talk. This includes having:<br>a. Students using and responding to each other's ideas about the science idea of focus (**in addition** to any student-teacher talk).<br>BUT<br>b. Some emphasis on students justifying their claims and ideas. |
| | |
| 1<br>Not Realized | The teacher's artifacts and artifact annotations do not reflect evidence of productive talk. |

***Clarifying Condition***

- *This Dimension only addresses student talk. Written explanations and arguments are addressed in Dimension 8.*
- *Opportunities for discussion made explicit in print material such as lesson plans or lists of discussion questions can earn up to, but not exceed a '3' if there is no video evidence of how students and teachers engage with each others' ideas.*
- *Just mentioning that students will engage in discussion without a list of central questions can earn no higher than a '2'.*

***Evidence:***

**My rating for this Dimension____**

| Dimension 4: Demonstrating Accurate Content Knowledge | |
|---|---|
| This Dimension measures the extent to which the evidence in the Portfolio suggests that instruction provides accurate representations of the best explanations of science and scientific practice to students. | |
| 5<br>Fully Realized | Fully realizing this Dimension includes evidence of:<br>A. Completely accurate representations of disciplinary content. |
| 4 | |
| 3<br>Moderately Realized | Moderately realizing this Dimension includes evidence of:<br>A. Mostly accurate representations of disciplinary content. |
| 2 | |
| 1<br>Not Realized | The teacher's artifacts and annotations:<br>A. Contain major or numerous inaccuracies in relation to the disciplinary content. |

***Clarifying Conditions***

- *This Dimension does not suggest that misconceptions cannot be present in the student materials or that the teacher must immediately correct misconceptions. Rather, when stating ideas to students from a position of authority, the teacher's representations of content need to align with our best understanding of that content.*

***Evidence:***

**My rating for this Dimension____**

| Dimension 5: Challenging Students to Engage in Multiple Ways of Knowing | |
|---|---|
| This Dimension measures the extent to which the evidence in the Portfolio suggests that instruction challenges students at a developmentally appropriate level and provides opportunities for students to engage science in four ways of knowing: declarative, procedural, schematic, and strategic. | |
| 5<br>Fully<br>Realized | Fully realizing this Dimension includes evidence of:<br>A. Opportunities for students to engage in **all** four ways of knowing: declarative, procedural, schematic, and strategic.<br>AND<br>B. An emphasis placed on students engaging in schematic thinking in a majority of the days for which artifacts are collected. |
| 4 | |
| 3<br>Moderately<br>Realized | Moderately realizing this Dimension includes evidence of:<br>A. Opportunities for students to engage content beyond declarative knowledge.<br>AND<br>B. At least two tasks and activities that require schematic knowledge. |
| 2 | |
| 1<br>Not Realized | The teacher's artifacts and artifact annotations do not reflect evidence of opportunities for students to engage with anything beyond declarative knowledge. |

***Clarifying Condition***

- *Scoring this Dimension does not require evidence of the four ways of knowing in student work.*

***Evidence:***

**My rating for this Dimension____**

| Dimension 6: Working with and Investigating Scientific Questions | |
|---|---|
| This Dimension measures the extent to which the evidence in the Portfolio suggests that students work with and investigate scientific questions about the natural world and are active participants in scientific investigations. | |
| 5<br>Fully<br>Realized | Fully realizing this Dimension includes evidence of:<br>A. Questions presented by the teacher or developed/co-developed by the students that are empirical and testable.<br>AND<br>B. Opportunities for students to construct investigation procedures and select the relevant variables to answer the investigative questions. |
| 4 | |
| 3<br>Moderately<br>Realized | Moderately realizing this Dimension includes evidence of:<br>A. Questions presented by the teacher or developed/co-developed by the students that are empirical and testable.<br>AND<br>B. Opportunities for students to understand how a given set of procedures or determined variables will lead to reliable data to answer the investigative questions. |
| 2 | |
| 1<br>Not Realized | The teacher's artifacts and artifact annotations show no evidence of opportunities for investigations based on scientific questions. |

***Clarifying Condition***

- *This criterion is focused on the quality of the question developed, regardless of who developed it.*

***Evidence:***

**My rating for this Dimension____**

| Dimension 7: Supporting the Analysis and Interpretation of Data | |
|---|---|
| This Dimension measures the degree to which the evidence in the Portfolio indicates that students have opportunities to organize, analyze, interpret, and share data related to an investigation. While some scenarios might require more or less support from the teacher, the key to this dimension is that the teacher creates an environment where students are still required to make sense of or decisions about how the data are used and understood. | |
| 5<br>Fully Realized | Fully realizing this Dimension includes evidence of:<br>A. Multiple opportunities for students to analyze and interpret data related to an investigation in which students have some opportunities to share their ideas about the data patterns, either in written, oral, or diagrammatic form.<br>AND<br>B. Scaffolds, when appropriate, that help students organize data, but still allow students to make decisions about how the data are understood/represented (e.g. A teacher might provide a data table to help students collect the data, but the teacher does not necessarily prescribe how the data is represented graphically). |
| 4 | |
| 3<br>Moderately Realized | Moderately realizing this Dimension includes evidence of:<br>A. Multiple opportunities for students to analyze and interpret data related to an investigation.<br>AND<br>B. Scaffolds that prescribe for students how to organize and analyze the data (e.g. telling students how to represent the data or asking students step-by-step questions). |
| 2 | |
| 1<br>Not Realized | The teacher's artifacts and artifact annotations provide no evidence of opportunities for students to analyze or interpret data. |

***Clarifying Condition***

- *This criterion uses an informal definition of data (both quantitative and qualitative) to count as evidence (e.g qualitative data could be observations of demonstrations and quantitative could a set of planetary distances in the solar system given to students for analysis about scale and proportion).*
- *Quantitative problem sets do not count as evidence for data analysis (e.g. a set of 10 physics problems that includes calculations)*

***Evidence:***

**My rating for this Dimension____**

| Dimension 8: Facilitating Students' Construction and Use of Scientific Products | |
|---|---|
| This Dimension measures the degree to which the evidence in the Portfolio indicates that students have opportunities and scaffolds to create or use scientific products including models, explanations, or arguments and revise these scientifically authentic products in light of new information. | |
| 5<br>Fully<br>Realized | Fully realizing this Dimension includes evidence of:<br>A. Multiple opportunities for students to **construct** new models, explanations, or arguments about phenomena that have not already been explained to them.<br>AND<br>B. Opportunities for students to revisit and revise these products in light of new information or feedback. |
| 4 | |
| 3<br>Moderately<br>Realized | Moderately realizing this Dimension includes evidence of:<br>A. Multiple opportunities for students to **use** existing conceptual models (e.g. Bohr or Lewis structures), explanations, or arguments about phenomena that have not already been explained to them.<br>AND<br>B. At least one opportunity for students to revisit or revise these products. |
| 2 | |
| 1<br>Not Realized | The teacher's artifacts and artifact annotations provide no opportunities for students to create or use conceptual models, explanations, or arguments. |

***Clarifying Condition***

- *These opportunities go beyond questions that state, "explain Newton's Laws" – questions that basically ask students to provide definitions or repeat explanations that have been stated in class.*
- *Using an existing model to get factual information, such as using a periodic table to get the atomic mass of carbon, does not count as the construction or use of a model. Nor does just color-coding a periodic table.*

***Evidence:***

**My rating for this Dimension____**

| Dimension 9: Constructing Diverse Assessments | |
|---|---|
| This Dimension measures the degree to which the evidence in the Portfolio suggests that assessment tasks provide students opportunities to show their understandings and skills in multiple formats. Specific question types should also vary either across a single large assessment (multiple-choice, free-response, mathematical calculations, etc.) or across multiple small assessments (written response, oral response, white boarding, clicker use, model development, etc.). | |
| 5<br>Fully<br>Realized | Fully realizing this Dimension includes evidence of:<br>A. Assessment structures that allow students to show what they know and can do via at least one written (e.g. explanation on a test) **and** one oral (e.g. presentation) format.<br>AND<br>B. Multiple question types (e.g. graphing, diagram interpretation, mathematical problems, oral justification) across the body of assessments (e.g. unit assessments, projects, exit tickets, oral questioning), including multiple free-response items. |
| 4 | |
| 3<br>Moderately<br>Realized | Moderately realizing this Dimension includes evidence of:<br>A. Assessment structures that allow students to show what they know and can do in only one of the following formats: written (e.g. explanation on a test) **or** oral (e.g. presentation).<br>AND<br>B. Minimal variety of question types across the body of assessments (e.g. unit assessments, projects, exit tickets, oral questioning), but inclusion of at least one free-response item. |
| 2 | |
| 1<br>Not Realized | The teacher's artifacts and artifact annotations provide no variety in both structure or question type and question types are nearly all restricted response. |

***Clarifying Condition***

- *These assessment forms might vary within a single large assessment (multiple-choice, free-response, mathematical calculations, etc.) or across multiple small assessments (written response, oral response, white boarding, clicker use, model development, etc.).*
- *This criterion is independent of the cognitive complexity of the assessment structure or question type.*

***Evidence:***

**My rating for this Dimension____**

| Dimension 10: Providing Feedback | |
|---|---|
| This Dimension measures the degree to which the evidence in the Portfolio suggests that students receive specific feedback from teachers or their peers about their learning relative to the goals of the unit and that students have opportunities to act on this feedback. Through questions, comments, or resources, the depth of the feedback provides students a bridge from their current understanding toward the learning goal. | |
| 5<br>Fully Realized | Fully realizing this Dimension includes evidence of:<br>A. The majority of feedback, either verbal or written (e.g. comments, grades, or symbolic markings), is specific and addresses student thinking or skills in light of the learning goal.<br>AND<br>B. Multiple opportunities for students to respond to or use the feedback. |
| 4 | |
| 3<br>Moderately Realized | Moderately realizing this Dimension includes evidence of:<br>A. Multiple instances of specific feedback that address student thinking or skills in light of the learning goal are present.<br>AND<br>B. At least one opportunity for students to respond to or use the feedback. |
| 2 | |
| 1<br>Not Realized | Regardless of frequency, the teacher provides students feedback that only provides a grade, praise (e.g. 'Great work'), or simply marking right or wrong.<br>OR<br>The teacher consistently provides inaccurate feedback. |

***Clarifying Conditions***

- *Comments in the annotations that the teacher provided verbal feedback will not be accepted as evidence.*
- *Changes to lesson plans are not considered feedback, this teacher practice is captured in Dimension 12 – using information about student learning to improve teaching.*
- *Comments in the annotations that state if students will use the feedback will be accepted as evidence.*

***Evidence:***

**My rating for this Dimension____**

| Dimension 11: Using Information about Student Learning to Improve Teaching | |
|---|---|
| This Dimension measures the degree to which the teacher uses evidence of student thinking and skills to inform instructional decisions for current and future students. While these instructional adaptations may be closely related to the feedback provided to students (Dimension 11), this Dimension requires the translation of the feedback into instructional decisions. | |
| 5<br>Fully<br>Realized | Fully realizing this Dimension includes evidence of:<br>A. Multiple instances of the teacher using information about student learning to inform instruction for **both** current **and** future students (e.g. edits to lesson or unit plans, shifts in instruction in real time, and reflections on both instructional and assessment artifacts).<br>AND<br>B. At least three instructional changes that go beyond re-teaching or review (e.g. changes in pacing, grouping of students, enacting different instructional strategies, etc.). |
| 4 | |
| 3<br>Moderately<br>Realized | Moderately realizing this Dimension includes evidence of:<br>A. Multiple instances of using information to inform instruction for future students.<br>AND<br>B. At least one instructional change that goes beyond re-teaching or review. |
| 2 | |
| 1<br>Not Realized | The teacher's artifacts and artifact annotations provide no evidence that the teacher uses information about student learning for instructional decision-making. |

***Clarifying Conditions***

- *Comments in the annotations about changes for future students will count as evidence.*
- *For all references to instructional changes, we do not need to see the evidence of changes to count it for this criterion.*

***Evidence:***

**My rating for this Dimension____**

| Dimension 12: Overall Quality of Science Teaching Practice | |
|---|---|
| This Dimension measures the degree to which the evidence in the notebook embodies the model of science teaching practice reflected in the previous eleven dimensions. | |
| 5<br>Fully<br>Realized | The Portfolio exemplifies advanced science teaching practice. |
| 4 | The Portfolio exemplifies proficient science teaching practice. |
| 3<br>Moderately<br>Realized | The Portfolio exemplifies adequate science teaching practice. |
| 2 | The Portfolio exemplifies marginal science teaching practice. |
| 1<br>Not Realized | The Portfolio exemplifies inadequate science teaching practice. |

***Clarifying Condition***

- *This is not the arithmetic average of your ratings on the previous eleven Dimensions. The rating on this Dimension should reflect your holistic qualitative judgment about the evidence of science teaching practice in the Portfolio.*

***Evidence:***

**My rating for this Dimension____**