edTPA®

Secondary Science

Assessment Handbook

Version 09

edTPA stems from a twenty-five-year history of developing performance-based assessments of teaching quality and effectiveness. The Teacher Performance Assessment Consortium (Stanford and AACTE) acknowledges the National Board for Professional Teaching Standards, the Interstate Teacher Assessment and Support Consortium, and the Performance Assessment for California Teachers for their pioneering work using discipline-specific portfolio assessments to evaluate teaching quality. This version of the handbook has been developed with thoughtful input from over six hundred teachers and teacher educators representing various national design teams, national subject matter organizations (ACEI, ACTFL, AMLE, CEC, IRA, NAEYC, NAGC, NCSS, NCTE, NCTM, NSTA, SHAPE America), and content validation reviewers. All contributions are recognized and appreciated.

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SCALE

Stanford Center for Assessment, Learning, & Equity

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Introduction to edTPA Secondary Science

Purpose

The purpose of edTPA Secondary Science, a nationally available performance-based assessment, is to measure novice teachers' readiness to teach science at the secondary level. The assessment is designed with a focus on student learning and principles from research and theory. It is based on findings that successful teachers

- develop knowledge of subject matter, content standards, and subject-specific pedagogy
- develop and apply knowledge of varied students' needs
- consider research and theory about how students learn
- reflect on and analyze evidence of the effects of instruction on student learning

As a performance-based assessment, edTPA is designed to engage candidates in demonstrating their understanding of teaching and student learning in authentic ways.

Overview of the Assessment

The edTPA Secondary Science assessment is composed of three tasks:

1. Planning for Instruction and Assessment
2. Instructing and Engaging Students in Learning
3. Assessing Student Learning

For this assessment, you will first plan **3–5 consecutive science lessons** (or, if teaching science within a large time block, **3–5 hours of connected instruction**) referred to as a learning segment. A learning segment prepared for this assessment should reflect a balanced approach to science, including opportunities for students to develop their abilities to use scientific concepts and apply scientific practices through inquiry to explain or make predictions about a real-world phenomenon.

Scientific practices through inquiry, as defined by the *Next Generation Science Standards,* focus on eight key components:

- Asking questions
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

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After planning your learning segment, you will then teach the learning segment, making a video recording of your interactions with students during instruction. You will also assess, informally and formally, students' learning **throughout** the learning segment. Upon completion of the three tasks, you will submit artifacts from the tasks (e.g., lesson plans, clips from your videorecording, assessment materials, instructional materials, student work samples), as well as commentaries that you have written to explain and reflect on the Planning, Instruction, and Assessment components of the tasks. The artifacts and commentaries for each task will then be evaluated using rubrics especially developed for each task.

Understanding Academic Language in edTPA: Supporting Learning and Language Development

Academic language (AL) is the oral and written language used for academic purposes. AL is the "language of the discipline" used to engage students in learning and includes the means by which students develop and express content understandings.

When completing your edTPA, you must consider the AL (i.e., **language demands**) present throughout the learning segment in order to support student learning and language development. The **language demands** in Secondary Science include **function**; **vocabulary/symbols**; **written, visual, or verbal communication**; and **grammatical structures (syntax)**.

As directed:

- Identify a *key language function* and one essential learning task within your learning segment lesson plans that allows students to practice the function (Planning Task 1, Prompts 4a/b).
- Identify *vocabulary/symbols and one additional language demand* related to the language function and learning task (Planning Task 1, Prompt 4c).
- Identify and describe the *instructional and/or language development supports* you have planned to address the language demands (Planning Task 1, Prompt 4d). *Language development supports* are scaffolds, representations, and instructional strategies that teachers intentionally provide to help learners understand and use the language they need to learn within disciplines.

It is important to realize that not all learning tasks focus on written, visual, or verbal communication and grammatical structures. As you decide which additional language demands (i.e., grammatical structures and/or written, visual, or verbal communication) are relevant to your identified function, examine the language understandings and use that are **most relevant** to the learning task you have chosen. Then, you should plan to provide appropriate and targeted language development supports for students to learn and practice the language demands within the chosen learning task.

Academic language definitions and a few examples of language demands and supports to help teacher candidates and educator preparation programs understand edTPA Rubrics 4 and 14 are provided in the Appendix. See the edTPA Secondary Science Glossary and the Understanding Rubric Level Progressions for Rubric 4 and Rubric 14 for additional examples of language demands.

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Understanding Rubrics

When preparing your artifacts and commentaries, refer to the rubrics frequently to guide your thinking, planning, and writing.

After each rubric, there is a corresponding resource called Understanding Rubric Level Progressions (URLP). The URLP for each rubric presents score-level distinctions and other information for each edTPA rubric, including:

1. Elaborated explanations for rubric Guiding Questions
2. Definitions of key terms used in rubrics
3. Primary sources of evidence for each rubric
4. Rubric-specific scoring decision rules
5. Examples that distinguish between levels for each rubric: Level 3, below 3 (Levels 1 and 2), and above 3 (Levels 4 and 5).

Secondary Science Learning Segment Focus:

Candidate's instruction should support students to use science concepts and scientific practices during inquiry to explain a real-world phenomenon.

Helpful Resources

In addition to the instructions and rubrics, the following requirements and resources are provided for you in this handbook:

- **Secondary Science Evidence Chart**: specifications for electronic submission of evidence (artifacts and commentaries), including templates, supported file types, number of files, response length, and other important evidence specifications
- **Glossary:** definitions of key terms can be accessed by referring to the **Secondary Science Glossary**.

You should review the *Making Good Choices* document prior to beginning the planning of the learning segment. If you are in a preparation program, it will have additional resources that provide guidance as you develop your evidence.

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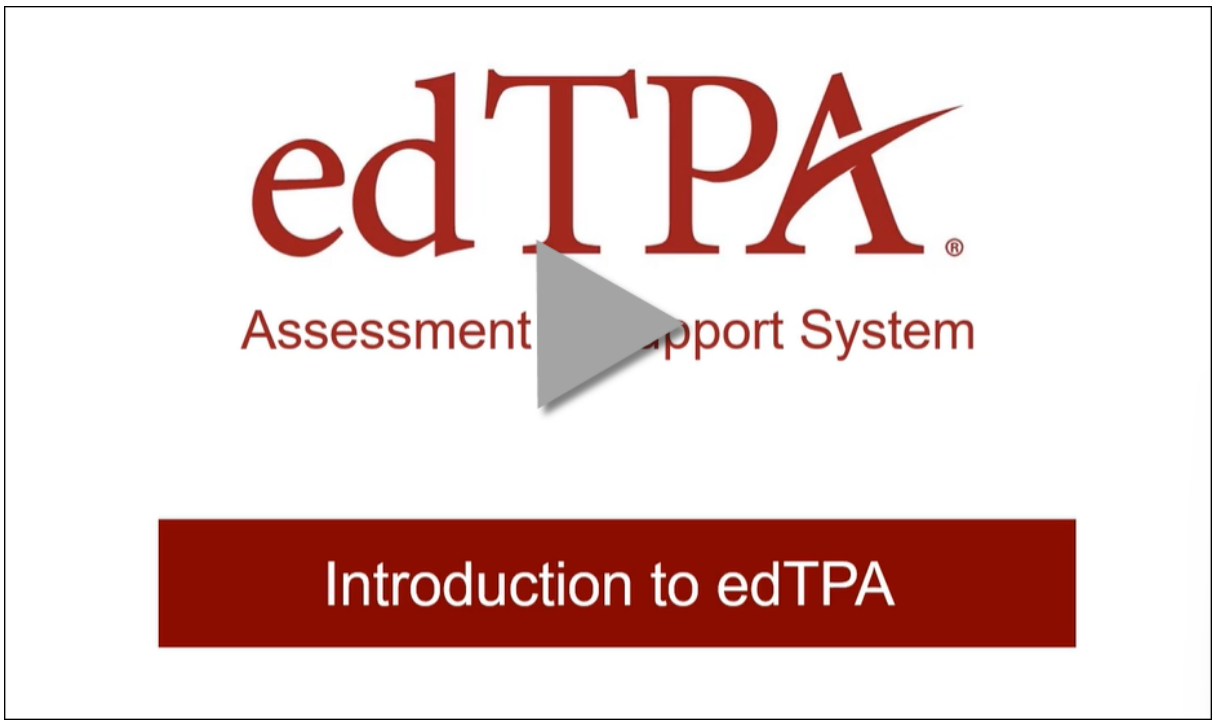
Candidate Support Webinar: Introduction to edTPA



Video URL: https://vimeo.com/771727364/8cd3cb66c5

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Planning Task 1: Planning for Instruction and Assessment

What Do I Need to Do?

- **Select a class.** If you teach more than one class, select one focus class for this assessment. If your placement for science has you responsible for a group rather than a whole class, plans should describe instruction for that group (**minimum of 4 students**). That group will constitute "the whole class" for edTPA.
  - **Note: California candidates**—within your edTPA, you must include an English learner, a student with an identified disability, and a student from an underserved education group.[1]
- **Provide context information.** Complete and submit the Secondary Science Context for Learning Information template found in your account. This template provides essential information about your students and your school/classroom. The context information you submit should be **no more than 4 pages, including prompts**.
- **Identify a learning segment to plan, teach, and analyze.** Review the curriculum with your cooperating teacher and select a learning segment of **3–5 consecutive lessons**. (If teaching science within a large time block, select a learning segment of about **3–5 hours of connected instruction**.)
- **Identify a central focus.** Identify the central focus along with the content standards and objectives you will address in the learning segment. The central focus should support students in using scientific concepts and applying scientific practices through inquiry to explain a real-world phenomenon or predict reasonable outcomes based on patterns in evidence and/or data.
- **Identify and plan to support language demands.** Select a key language function from your learning objectives. Choose a learning task that provides opportunities for students to practice using that language function. Identify additional language demands associated with that task. Plan targeted supports that address the identified language demands, including the language function.
- **Write a lesson plan** for each lesson in the learning segment. Your lesson plans should be detailed enough that a substitute or other teacher could understand them well enough to use them.
- Your lesson plans must include the following information even if your teacher preparation program requires you to use a specific lesson plan format:
  - State-adopted student academic content standards that are the target of student learning (Note: Please include the **number and text** of each standard that is being addressed. If only a portion of a standard is being addressed, then only list the part or parts that are relevant.)
  - Learning objectives associated with the content standards

[1] California candidates—If you do not have any English learners, select a student who is challenged by academic English. If you do not have a student with an identified disability or a student who is from an underserved education group, select a student receiving tiered support within the classroom or a student who often struggles with the content.

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  - Informal and formal assessments used to monitor student learning, including type(s) of assessment and what is being assessed
  - Instructional strategies and learning tasks (including what you and the students will be doing) to support the needs of all students
  - Instructional resources and materials used to engage students in learning
- **Each lesson plan must be no more than 4 pages in length.** You will need to condense or excerpt lesson plans longer than 4 pages. Any explanations or rationale for decisions should be included in your Planning Commentary and deleted from your plans.
- **Respond to the prompts** listed in the Planning Commentary template found in your account **prior to teaching the learning segment** and submit the completed template.
- **Submit your original lesson plans.** If you make changes while teaching the learning segment, you may offer reflection on those changes in the Instruction Task 2 and Assessment Task 3 Commentaries.
- **Select and submit key instructional materials.** These are needed to understand what you and the students will be doing (**no more than 5 additional pages per lesson plan**). The instructional materials might include such items as class handouts, assignments, slides, and interactive whiteboard images.
- **Submit copies of all written assessments and/or directions for any oral or performance assessments.** (Submit only the blank assessment given to students; do not submit student work samples for this task.)
- **Provide citations for the source of all materials that you did not create** (e.g., published texts, websites, and material from other educators). List all citations by lesson number at the end of the Planning Commentary. Note: Citations do not count toward the commentary page limit.

See the Planning Task 1: Artifacts and Commentary Specifications in the Secondary Science Evidence Chart for instructions on electronic submission of evidence. This evidence chart identifies templates, supported file types, number of files, response length, and other important evidence specifications. Your evidence cannot contain hyperlinked content. Any web content you wish to include as part of your evidence must be submitted as a document file, which must conform to the file format and response length requirements.

Review the Planning Task 1 Key Decisions and Key Points in the *Making Good Choices* document for supplementary advice for completing specific components of Planning Task 1.

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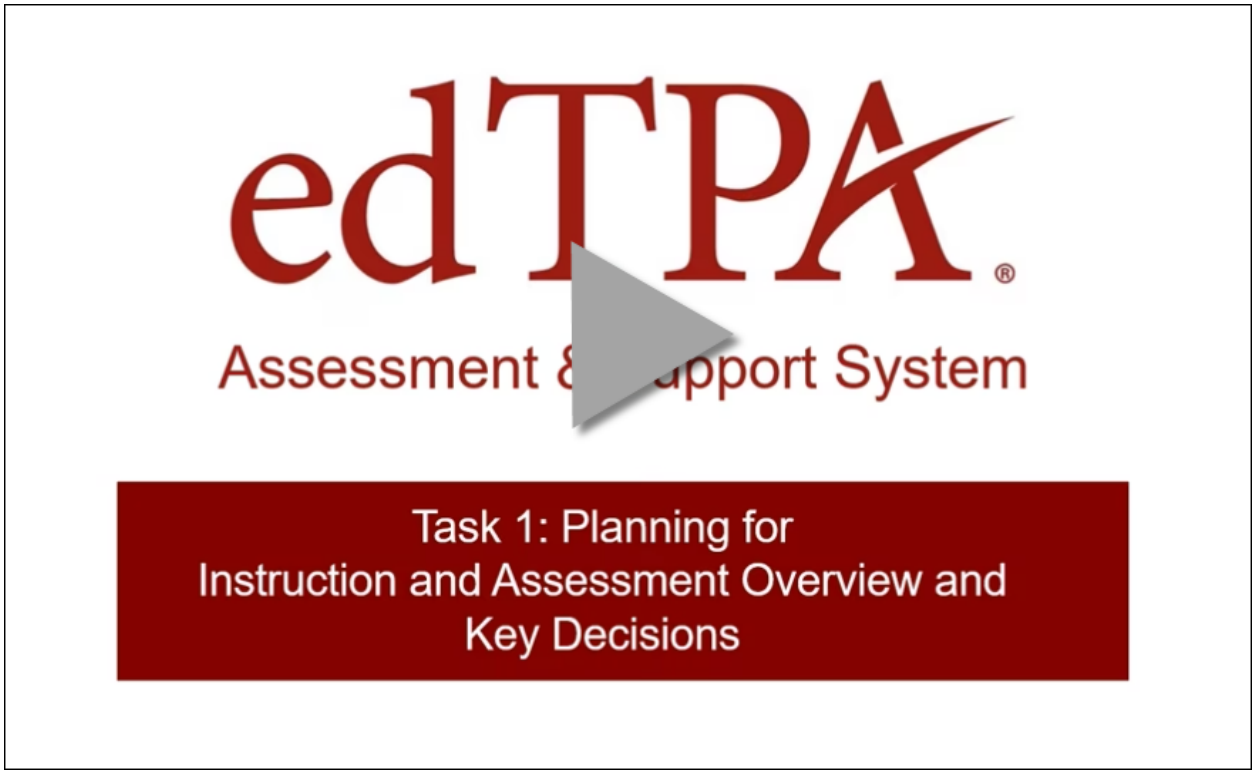
Candidate Support Webinar: Task 1: Planning for Instruction and Assessment Overview and Key Decisions



Video URL: https://vimeo.com/797488626/3d5cac5f63

How Will the Evidence of My Teaching Practice Be Assessed?

For Planning Task 1, your evidence will be assessed using rubrics 1–5, which appear on the following pages. When preparing your artifacts and commentaries, refer to the rubrics frequently to guide your thinking, planning, and writing.

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Planning Rubrics

Rubric 1: Planning for Scientific Understandings

How do the candidate's plans build students' abilities to use science concepts and scientific practices during inquiry to explain or make predictions about a real-world phenomenon?

Level 1[2]	Level 2	Level 3	Level 4	Level 5
Candidate's plans for instruction **focus solely on memorization and following prescribed procedures for an "inquiry" with no opportunities** for students to engage in scientific practices through inquiry. **OR** There are **significant content inaccuracies** that will lead to student misunderstandings. **OR** Standards, objectives, and learning tasks and materials are **not aligned** with each other.	Candidate's plans for instruction **include opportunities** for students to engage in scientific practices through inquiry.	Candidate's plans for instruction **build on each other** to support students to • **learn science concepts,** • **investigate a phenomenon by engaging in scientific practices through inquiry,** **AND** • **construct explanations of the phenomenon or reasonable predictions based on evidence and/or data**.	Candidate's plans for instruction build on each other to support students to • learn science concepts, • investigate a phenomenon by engaging in scientific practices through inquiry, **AND** • construct **evidence-based** explanations of the phenomenon or **support predictions with patterns in** evidence and/or data.	Candidate's plans for instruction build on each other to support students to • learn science concepts, • investigate a phenomenon by engaging in scientific practices through inquiry, **AND** • construct and **evaluate** evidence-based explanations of the phenomenon or predictions based on patterns in evidence and/or data.

[2] Text representing key differences between adjacent score levels is shown in bold. Evidence that does not meet Level 1 criteria is scored at Level 1.

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Understanding Rubric Level Progressions: Rubric 1

The Guiding Question

The Guiding Question addresses how a candidate's plans build a learning segment of three to five lessons around a central focus. Candidates will explain how they plan to organize tasks, activities, and/or materials to align with the central focus and the standards/objectives. The planned learning segment must develop students' use of science concepts and the ability to apply scientific practices through inquiry to develop evidence-based explanations or to make predictions for a real-world phenomenon.

Key Concepts of Rubric:

- Aligned[3]
- Significant content inaccuracies

Science Terms Central to the edTPA:

- Scientific practices through inquiry
- Evidence-based explanation
- Making predictions

Primary Sources of Evidence:

Context for Learning Information

Planning Commentary **Prompt 1**

Strategic review of Lesson Plans and Instructional Materials

Scoring Decision Rules

Multiple Criteria	▪ N/A for this rubric
AUTOMATIC 1	▪ Pattern of **significant content inaccuracies** that are core to the central focus or a key learning objective for the learning segment ▪ A pattern of misalignment is demonstrated in relation to standards/objectives, learning tasks and materials across two or more lessons

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3:

- Plans for instruction are **logically sequenced** to facilitate students' learning.

[3] Links to terms from the Secondary Science Glossary are included for quick access to the definitions. To navigate to the glossary definition, click the hyperlinked word(s). To navigate back to the page origin, use the "Previous View" command (or ALT+Left Arrow).

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- Plans are presented in a sequence in which **each lesson builds on the previous one**(s).
- In addition, the sequencing of the plans supports students' learning by connecting science concepts, a phenomenon, and evidence-based explanations or predictions from inquiry during the learning segment. **These connections are explicitly written in the plans or commentary**, and how the connections are made is not left to the determination of the scorer. The explanations or the predictions may only address a piece of the phenomenon related to the inquiry, and not the complete phenomenon.
- Be sure to pay attention to each component of the subject-specific emphasis (learn science concepts, investigate a phenomenon, generate explanations or make predictions through engagement in scientific practices through inquiry).

Below 3

Evidence that demonstrates performance below Level 3:

- Plans for instruction support student learning of facts and engagement in inquiry but **with little or no** planned instruction to guide understanding of how to generate evidence-based explanations or make predictions of scientific phenomena through inquiry.

What distinguishes a Level 2 from a Level 3: At Level 2,

- The candidate is directing student engagement in an "inquiry" with some opportunities for students to collect, analyze, and interpret data, but opportunities to use evidence to construct or adjust explanations of a phenomenon are at best **fleeting or vague**, e.g., completing sections of a lab report to accept or reject a claim on a basis that is not strongly connected to data from the inquiry. (For example, students will take measurements and record data but will not use data to arrive at a conclusion or to describe a pattern seen in data.)

What distinguishes a Level 1 from a Level 2: At Level 1,

- The candidate is **focused on teaching memorization of facts or following prescribed procedures for an "inquiry"** with no opportunities for students to collect, analyze, and interpret data to adjust their understandings.

Automatic Score of 1 is given when:

- There is a pattern of **significant content inaccuracies** that will lead to student misunderstandings. Content flaws in the plans or instructional materials are significant and systematic and interfere with student learning.
- **Standards, objectives, learning tasks, and materials are not aligned** with each other. There is a pattern of misalignment across two or more lessons. If one standard or objective does not align within the learning segment, this level of misalignment is not significant enough for a Level 1.

Above 3

Evidence that demonstrates performance above Level 3:

- Learning tasks are designed to support students to use both data and science concepts to construct explanations of the phenomenon or reasonable predictions based on patterns in evidence and/or data by the end of the learning segment.

What distinguishes a Level 4 from a Level 3: At Level 4,

- In the commentary, the candidate addresses supporting students in constructing an **evidence-based explanation regarding a scientific phenomenon or in**

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supporting predictions with patterns in evidence and/or data. Be sure to pay attention to each component of the subject-specific emphasis (learn science concepts, investigate a phenomenon, generate explanations or support predictions by engagement in scientific practices through inquiry).

- The candidate uses this **support to deepen student understanding of the central focus**.

What distinguishes a Level 5 from a Level 4: At Level 5,

- The candidate supports students in not only constructing but also **evaluating the fit of evidence to a scientific explanation or prediction** and what the students know about the science concepts to revise or refine a claim about the phenomenon.

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Rubric 2: Planning to Support Varied Student Learning Needs

How does the candidate use knowledge of his/her students to target support for students to use science concepts and scientific practices during inquiry to explain or make predictions about a real-world phenomenon?

Level 1	Level 2	Level 3	Level 4	Level 5
There is **no evidence of planned supports**. **OR** **Candidate does NOT attend to ANY INSTRUCTIONAL requirements in IEPs and 504 plans.**	Planned supports are **loosely tied to learning objectives or the central focus of the learning segment**.	Planned supports are **tied to** learning objectives and the central focus **with attention to the characteristics of the class as a whole**.	Planned supports are tied to learning objectives and the central focus. **Supports address the needs of specific individuals or groups with similar needs**.	**Level 4 plus:** **Supports include specific strategies to identify and respond to preconceptions, common errors, and misunderstandings for the majority of students.**

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Understanding Rubric Level Progressions: Rubric 2

The Guiding Question

The Guiding Question addresses how the candidate plans to support students in relationship to students' characteristics. This includes using the candidate's understanding of students to develop, choose, or adapt instructional strategies, learning tasks and materials.

Key Concept of Rubric:

- Planned supports[4]

Primary Sources of Evidence:

Context for Learning Information (required supports, modifications, or accommodations)

Planning Commentary **Prompts 2 and 3**

Strategic review of Lesson Plans and Instructional Materials to clarify planned supports

Scoring Decision Rules

Multiple Criteria	▪ N/A for this rubric
AUTOMATIC 1	▪ Planned support according to requirements in IEP or 504 plans is completely missing. The automatic 1 is only related to the support for IEP or 504 plans, not for students with other learning needs. ▪ If there are no students with IEPs or 504 plans, then this criterion is not applicable.

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3:

- Candidate explains how planned supports for students address the learning needs of the whole class while assisting them in achieving the learning objectives.
- Candidate addresses at least one of the requirements from IEPs and 504 plans as described in the Context for Learning Information.
    - Requirements must be explicitly addressed in the commentary and/or the Planning Task 1 artifacts. List of requirements and/or accommodations in the Context for Learning Information document is not sufficient by itself.

Below 3

Evidence that demonstrates performance below Level 3: Candidate plans insufficient supports to develop students' learning relative to the identified learning objectives or the central focus. Evidenced by ONE or more of the following:

[4] Links to terms from the Secondary Science Glossary are included for quick access to the definitions. To navigate to the glossary definition, click the hyperlinked word(s). To navigate back to the page origin, use the "Previous View" command (or ALT+Left Arrow).

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- Candidate does not plan supports for students.
- Planned supports are not closely tied to learning objectives or the central focus.
- Evidence does not reflect ANY instructional requirements in IEP or 504 plans.

What distinguishes a Level 2 from a Level 3: At Level 2,

- Plans address at least one of the instructional requirements set forth in IEPs and 504 plans. However, it is not clear that other planned supports will be helpful in supporting students to meet the learning objectives.
- The supports would work for almost any learning objective. The support is written in general terms and could fit any class and/or any subject area. Therefore, supports are not closely connected to the learning objectives or central focus (e.g., pair high and low students during partner work without a specific description of how that supports students with a specific need, check on students who are usually having trouble, without any specific indication of what the candidate might be checking for, such as correctly setting up a data table).
- Supports are tied to learning objectives within each lesson, but there is no central focus.

What distinguishes a Level 1 from a Level 2: At Level 1,

- Evidence of intentional support for students' needs as described by the candidate is absent.

Automatic Score of 1 is given when:

- If IEP/504 requirements are described in the Context for Learning or commentary but none are included in the planned support, then the rubric is scored as an Automatic Level 1, regardless of other evidence of support for the whole class or groups or individuals in the class. If the candidate describes one or more of the IEP or 504 plan requirements for any student in the lesson plans or commentary, then the score is determined by the Planned Support criterion. **(If there are no students with IEPs or 504 plans, then this criterion is not applicable.)**

Above 3

Evidence that demonstrates performance above Level 3:

- Plans address specific student needs (beyond those required in IEP and 504 plans) by including scaffolding or structured supports that are explicitly selected or developed to help individual students and groups of students with similar needs to gain access to content and meet the learning objectives.

What distinguishes a Level 4 from a Level 3: At Level 4,

- The candidate explains how the supports tied to the learning objectives are intended to meet specific needs of individuals or groups of students with similar needs, in addition to the whole class. Supports should be provided for more than one student—either more than one individual or for a specific group of students with similar needs (e.g., more instruction in a prerequisite skill).

What distinguishes a Level 5 from a Level 4: At Level 5, the candidate meets all of Level 4 AND

- Identifies possible preconceptions, errors, or misconceptions associated with the central focus, and describes specific strategies to identify and respond to them.

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- If the plans and commentary attend to preconceptions, errors, or misconceptions without also satisfying Level 4 requirements, this is not sufficient evidence for Level 5.

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Rubric 3: Using Knowledge of Students to Inform Teaching and Learning

How does the candidate use knowledge of his/her students to justify instructional plans?

Level 1	Level 2	Level 3	Level 4	Level 5
Candidate's justification of learning tasks is either **missing** **OR** **represents a deficit view** of students and their backgrounds.	Candidate justifies learning tasks with **limited attention** to **students'** • **prior academic learning and/or prerequisite skills** **OR** • **personal or community assets**.	Candidate **justifies** why learning tasks (or their adaptations) **are appropriate using examples of students'** • prior academic learning and/or prerequisite skills **OR** • personal or community assets. **Candidate makes superficial connections to research and/or theory.**	Candidate justifies why learning tasks (or their adaptations) are appropriate using examples of students' • prior academic learning and/or prerequisite skills **AND** • personal or community assets. Candidate makes **connections** to research and/or theory.	**Level 4 plus:** Candidate's justification is **supported by principles from** research and/or theory.

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Understanding Rubric Level Progressions: Rubric 3

The Guiding Question

The Guiding Question addresses how the candidate justifies the ways in which learning tasks and materials make content meaningful to students, by drawing upon knowledge of individuals or groups, as well as research or theory.

Key Concepts of Rubric:

- Deficit thinking[5]
- Prior academic learning and/or prerequisite skills
- Assets (personal, community)

Primary Sources of Evidence:

Planning Commentary **Prompts 2 and 3**

Scoring Decision Rules

Multiple Criteria	▪ Criterion 1 (**primary**): Justification of plans using knowledge of students—i.e., prior academic learning and/or prerequisite skills **AND/OR** assets (personal, community) ▪ Criterion 2: Research and theory connections ▪ Place greater weight or consideration on criterion 1 (justification of plans using knowledge of students).
AUTOMATIC 1	▪ Deficit view of students and their backgrounds

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3:

- **Primary Criterion:** The candidate explains how the learning tasks are explicitly connected to the students' prior academic knowledge OR knowledge of students' assets (personal, community). Assets include students' backgrounds, interests, community or family resources and personal experiences.
- **Secondary Criterion:** The candidate refers to research or theory in relation to the plans to support student learning. The connections between the research/theory and the tasks are superficial/not clearly made. They are not well connected to a particular element of the instructional design.
- If evidence meets the primary criterion at Level 3, the rubric is scored at Level 3 **regardless of the evidence for the secondary criterion**.
- If evidence meets the primary criterion at Level 4, and candidate has NO connection to research/theory, the rubric is scored at Level 3.

[5] Links to terms from the Secondary Science Glossary are included for quick access to the definitions. To navigate to the glossary definition, click the hyperlinked word(s). To navigate back to the page origin, use the "Previous View" command (or ALT+Left Arrow).

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Below 3

Evidence that demonstrates performance <u>below Level 3</u>:

- There is a limited amount of evidence that the candidate has considered his/her particular class in planning.

OR

- The candidate justifies the plans through a deficit view of students and their backgrounds.

What distinguishes a Level 2 from a Level 3: At Level 2,

- The candidate's justification of the learning tasks makes some connection with what they know about students' prior academic learning and/or prerequisite skills OR assets (personal, community). These connections are not strong, but are instead vague or unelaborated, or involve a listing of what candidates know about their students in terms of prior knowledge or background without making a direct connection to how that is related to planning. For example, the candidate might mention a previous lesson or unit the students have learned but does not justify or explain how the previous lesson/unit connects to the learning segment presented.

What distinguishes a Level 1 from a Level 2: At Level 1,

- There is no evidence that the candidate uses knowledge of students to plan.

Automatic Score of 1 is given when:

- Candidate's justification of learning tasks includes a pattern representing a deficit view of students and their backgrounds. (See the explanation of deficit thinking listed above under Key Concepts of Rubric.)

Above 3

Evidence that demonstrates performance <u>above Level 3</u>:

- The candidate's justification not only uses knowledge of students—as both academic learners AND as individuals who bring in personal or community assets—but also uses research or theory to inform planning.

What distinguishes a Level 4 from a Level 3: At Level 4,

- The evidence includes specific examples from students' prior academic learning and/or prerequisite skills **AND** knowledge of students' assets (personal, community), and explains how the plans reflect this knowledge. The explanation needs to include **explicit connections** between the learning tasks and the examples provided.
- The candidate explains how research or theory informed the selection or design of at least one learning task or the way in which it was implemented. The connection between the research or theory and the learning task(s) must be explicit.
- Scoring decision rules: To score at Level 4, the candidate must meet the primary criterion at Level 4 and make at least a fleeting, relevant reference to research or theory (meet the secondary criterion at least at Level 3).

What distinguishes a Level 5 from a Level 4: At Level 5, the candidate meets all of Level 4 AND

- Explains how principles of research or theory support or **set a foundation for** their planning decisions. The connection should include explicit reference to theory and/or research. For example, the candidate could state, "This learning segment is developed based on the constructivism theory, which states, "Learning is an active

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process. The learners construct their own knowledge and build their own understanding by linking new information to prior knowledge." So, for example, "In the last unit, the students used Celsius thermometers to take the temperature of the room and outside on the window ledge (prior knowledge). In this learning segment, they will use the same thermometers to take the temperatures as ice is heated in a beaker (new information) as we study phase changes. References have been made to the fact that it is spring and the ice on the closest Great Lake has begun to melt; we can hear the sounds of the ice cracking here at school. The students know the ice is moving and changing in the lake (connect new knowledge to what the students already know and to a real-world phenomenon) and will be able to see the changes that ice will go through as it is heated in the beaker and make a connection back to the Great Lake. My students are in the concrete operational stage of Piaget's cognitive development theory (his work contributed to the Constructivism Theory). They are starting to make sense of abstract thinking (temperature), to follow multi-step complex procedure (carry an investigation independently in collaborative group), and to make connections to the world around them (connection to the Great Lake). In addition, according to Bonwell's theory of active learning, when the students are up and moving, they are engaged, and so to make sure that the students are thinking about phase changes, we will be recording the temperatures while working at the lab stations."

- The justifications are explicit, well-articulated, and demonstrate a thorough understanding of the research/theory principles that are clearly reflected in the plans.

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Rubric 4: Identifying and Supporting Language Demands

How does the candidate identify and support language demands associated with a key science learning task?

Level 1	Level 2	Level 3	Level 4	Level 5
Language demands[6] identified by the candidate are **not consistent with the selected language function**[7] **OR task**. **OR** **Language development supports are missing or are not aligned with the language demand(s)** for the learning task.	**Language development supports primarily address one language demand** (function; vocabulary/symbols; grammatical structures; written, visual, or verbal communication).	**General language development supports address use of two or more language demands** (function; vocabulary/symbols; grammatical structures; written, visual, or verbal communication).	**Targeted language development supports** address use of • **vocabulary/symbols,** • **language function, AND** • **one or more additional language demands** (grammatical structures; written, visual, or verbal communication).	**Level 4 plus:** **Language development supports are designed to meet the needs of students with different levels of language learning.**

[6] Language demands include language function; vocabulary/symbols; grammatical structures; and written, visual, or verbal communication (organizational structures, text structure, etc.).

[7] Language function refers to the learning outcome (verb) selected in prompt 4a (e.g., analyze, interpret…).

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Understanding Rubric Level Progressions: Rubric 4

The Guiding Question

The Guiding Question focuses on how the candidate describes the planned instructional supports that address the identified language demands for the learning task.

Key Concepts of Rubric:

Use the terms below and their definitions from the glossary as well as the Academic Language Appendix to further clarify concepts on Rubric 4.

- Language demands[8]
- Language functions
- Vocabulary/symbols
- Written, visual, or verbal communication
- Grammatical structures
- Language development supports

Primary Sources of Evidence:

Planning Commentary **Prompt 4a–d**

Strategic review of Lesson Plans

Scoring Decision Rules

Multiple Criteria	▪ N/A for this rubric
AUTOMATIC 1	▪ None

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3:

- General supports are planned and described, though not in specific detail, for students' application of any two or more of the language demands (function, vocabulary and/or symbols and grammatical structures or written, visual, or verbal communication.
    - Language development supports must go beyond providing opportunities for students to practice using the language demands either individually or with other students within the learning segment. Examples of general language development supports include describing and defining the function; modeling vocabulary/symbols, grammatical structures, or written, visual, or verbal communication; providing an example with little explanation, questions and

[8] Links to terms from the Secondary Science Glossary are included for quick access to the definitions. To navigate to the glossary definition, click the hyperlinked word(s). To navigate back to the page origin, use the "Previous View" command (or ALT+Left Arrow).

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answers about a language demand, whole group discussion of a language demand; or providing pictures to illustrate vocabulary/symbols.

- The candidate may inaccurately categorize a language demand (e.g., identifies grammatical structures as written, visual, or verbal communication), but does describe general supports for two of the language demands required of students within the learning task. For example:
  - "For written, visual, or verbal communication, I will model how to identify and substitute terms into the formula acceleration=velocity/time. To support vocabulary/symbols, we will review the terms (acceleration, -velocity, time) and solve several sample problems as a class." This example would be scored at a Level 3 because there are supports for two language demands, vocabulary/symbols, and grammatical structures, even though the candidate categorizes using formulas (a form of grammatical structures) as written, visual, or verbal communication.

Below 3

Evidence that demonstrates performance <u>below Level 3</u>:

- The candidate has a superficial view of academic language and provides supports that are misaligned with the demands or provides support for only one language demand (e.g., vocabulary/symbols; function; grammatical structures; or written, visual, or verbal communication).

What distinguishes a Level 2 from a Level 3: At Level 2,

- The primary focus of support is on only one of the language demands (vocabulary/symbols; function; grammatical structures; or written, visual, or verbal communication) with little attention to any of the other language demands.
- Support may be general, (e.g., discussing, defining, or describing a language demand), or it may be targeted (e.g., modeling a language demand while using an example with labels). Regardless, the support provided is limited to one language demand.

What distinguishes a Level 1 from a Level 2: At Level 1,

- There is a pattern of misalignment between the language demand(s) and the language development supports identified. For example, the language function is listed as explain, but the language task is that the students will describing the relationship between two variables with support from a sentence frame: As the mass increased, the speed (**stayed about the same, increased, decreased**).

OR

- Language development supports are completely missing.

Above 3

Evidence that demonstrates performance <u>above Level 3</u>:

- The supports specifically address the language function, vocabulary and/or symbols, and at least one other language demand (grammatical structures; written, visual, or verbal communication) in relation to the use of the language function in the context of the chosen task.

What distinguishes a Level 4 from a Level 3: At Level 4,

- The candidate identifies specific planned language development supports and describes how supports address each of the following: vocabulary/symbols, the

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language function, and at least one other language demand (grammatical structures; written, visual, or verbal communication).

- Supports are focused (e.g., provide structures or scaffolding) to address specific language demands, such as sentence starters (grammatical structures or function); modeling how to construct an argument, explanation, or paragraph using a think aloud (function; written, visual, or verbal communication); graphic organizers tailored to organizing text (written, visual, or verbal communication or function); identifying critical elements of a language function using an example; or more in-depth exploration of vocabulary development (vocabulary mapping that includes antonym, synonym, student definition and illustration).

What distinguishes a Level 5 from a Level 4: At Level 5, the candidate meets all of Level 4 AND

- The candidate includes and explains how one or more of the language development supports are either designed or differentiated to meet the needs of students with differing language needs.

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Rubric 5: Planning Assessments to Monitor and Support Student Learning

How are the informal and formal assessments selected or designed to monitor students' progress toward using science concepts and scientific practices during inquiry to explain or predict a real-world phenomenon?

Level 1	Level 2	Level 3	Level 4	Level 5
The assessments **only provide evidence** of students' ability to memorize and follow prescribed procedures. **OR** **Candidate does not attend to ANY ASSESSMENT requirements in IEPs and 504 plans.**	The assessments **provide limited evidence to monitor students' understanding of** • **science concepts,** • **the phenomenon, AND** • **the application of scientific practices during scientific inquiry** **during the learning segment**.	The assessments **provide evidence** to monitor students' understanding of • science concepts, • the phenomenon, **AND** • the application of scientific practices during scientific inquiry during the learning segment.	The assessments provide **multiple forms of evidence** to monitor students' **progress** toward developing understanding of • science concepts, • the phenomenon, **AND** • the application of scientific practices during scientific inquiry **throughout the learning segment**.	**Level 4 plus:** **The assessments are strategically designed to allow individuals or groups with specific needs to demonstrate their learning.**

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Understanding Rubric Level Progressions: Rubric 5

The Guiding Question

The Guiding Question addresses the alignment of the assessments to the standards and objectives and the extent to which assessments provide multiple forms of evidence to monitor student progress throughout the learning segment. It also addresses required adaptations from IEPs or 504 plans. The array of assessments should provide evidence of students' understanding of science concepts, phenomena, and the application of scientific practices during scientific inquiry to explain a real-world phenomenon.

Key Concepts of Rubric:

- Assessment (formal or informal)[9]

Primary Sources of Evidence:

Context for Learning Information (required supports, modifications, or accommodations for assessments)

Planning Commentary **Prompts 2 and 5**

Assessment Materials

Strategic review of Lesson Plans

Scoring Decision Rules

Multiple Criteria	▪ N/A for this rubric
AUTOMATIC 1	▪ None of the assessment adaptations required by IEPs or 504 plans are made. (If there are no students with IEPs or 504 plans, then this criterion is not applicable.)

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3:

- The planned assessments provide evidence of students' understanding of science concepts, phenomena, AND the application of scientific practices during scientific inquiry **at various points** within the learning segment. The assessments must provide evidence of all three (science concepts, a phenomenon, and application of scientific practices during scientific inquiry).
- Requirements from the IEP or 504 plan must be explicitly addressed in the commentary and/or the Planning Task 1 artifacts. List of assessment requirements and/or accommodations in the Context for Learning Information document is not sufficient by itself.

[9] Links to terms from the Secondary Science Glossary are included for quick access to the definitions. To navigate to the glossary definition, click the hyperlinked word(s). To navigate back to the page origin, use the "Previous View" command (or ALT+Left Arrow).

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Below 3

Evidence that demonstrates performance <u>below Level 3</u>:

- The planned assessments will yield insufficient evidence to monitor students' understanding of science concepts, phenomena, and the use of scientific practices during scientific inquiry (e.g., a single summative assessment).

What distinguishes a Level 2 from a Level 3: At Level 2,

- Assessments will produce evidence of student learning, but evidence is limited. Examples of limited assessments include a single assessment or assessments for only procedures or conceptual understanding and not the other areas.
- Although assessments may provide some evidence of student learning, they do not monitor all areas of learning across the learning segment.

What distinguishes a Level 1 from a Level 2: At Level 1,

- The assessments only focus on memorization of facts or following procedures without providing evidence of conceptual understanding or application of scientific inquiry skills.

Automatic Score of 1 is given when:

- If there is NO attention to ANY **assessment-related** IEP/504 plan requirements (e.g., more time; a scribe for written assignments) in either the commentary or the Planning Task 1 artifacts, the score of 1 is applied; otherwise the evidence for the other criteria will determine the score. **(If there are no students with IEPs or 504 plans, then this criterion is not applicable.)**

Above 3

Evidence that demonstrates performance <u>above Level 3</u>:

- The array of assessments provides consistent evidence of students' understanding of science concepts, phenomena, AND the application of scientific practices during scientific inquiry.
- Assessment evidence will allow the candidate to determine students' progress toward developing an understanding of science concepts and the use of scientific practices during inquiry (e.g., planned targeted, formative assessments).

What distinguishes a Level 4 from a Level 3: At Level 4,

- There are multiple forms of evidence, not just the same kind of evidence collected at different points in time or in different settings, to monitor student students' understanding of science concepts, phenomena, AND the application of scientific practices during scientific inquiry for the central focus. "Multiple forms of evidence" means that different types of evidence are used—e.g., written explanations, drawings or diagrams representing student understanding of a phenomenon, data-based laboratory reports with conclusions, applications of knowledge to novel situations—and not that there is only one type of evidence on homework, exit slips, and the final test.
- The array of assessments provides evidence to track student progress toward developing the understanding of science concepts and the phenomenon and use of scientific practices during inquiry defined by the standards and learning objectives.
- This evidence is collected for all three areas (science concepts, a phenomenon, and the application of scientific practices during inquiry) in every lesson OR the assessments correspond to a plan for the learning segment that builds

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understandings in one or more areas and uses that understanding to address other areas.

What distinguishes a Level 5 from a Level 4: At Level 5, the candidate meets all of Level 4 AND

- Describes how assessments are targeted and explicit in design to allow individuals or groups with specific needs to demonstrate their learning without oversimplifying the content. For example, the candidate differentiates the assessment to meet the needs of individuals or groups of students. The candidate explains how and why the assessment is differentiated to measure the progress of all students' toward developing an understanding of science concepts, the phenomenon, and the use of scientific practices during inquiry.
- Strategic design of assessments goes beyond, for example, allowing extra time to complete an assignment or adding a challenge question.

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Instruction Task 2: Instructing and Engaging Students in Learning

What Do I Need to Do?

- **Obtain required permission for video recording.** Before you record your video, ensure that you have the appropriate permission from the parents/guardians of your students and from adults who appear in the video. Adjust the camera angle to exclude individuals for whom you do not have permission to film.
- **Examine your plans for the learning segment** and identify challenging learning tasks in which you and students are actively engaged. The video clips you select for submission should provide a sample of how you interact with students to
  - analyze and interpret evidence and/or data they have collected or selected from a scientific inquiry and
  - use their analysis to construct and evaluate evidence-based explanations of or reasonable predictions about a real-world phenomenon.
- **Identify lessons to video record.**
- **Provide 2 video clips (each no more than 10 minutes in length, but not less than 3 minutes combined)** that demonstrate how you interact with students in a positive learning environment to develop their understanding of how to use evidence and/or data and science concepts to construct and evaluate explanations of or predictions about a real-world phenomenon.
  - The first clip should illustrate how you actively engaged students in **organizing and analyzing evidence and/or data from a scientific inquiry**. Students should be examining the evidence and/or data to look for patterns, identify outliers, and/or explore contradictory findings.
  - The second clip should illustrate how you facilitated your students' **use of scientific evidence and/or data AND concepts to construct and evaluate**
    - **evidence-based explanations** of a phenomenon or
    - **predictions of reasonable outcomes based on patterns in evidence and/or data.**
- **(Optional) Provide evidence of students' language use.** You may provide evidence of language use with your video clips from Instruction Task 2, as an additional video clip of one or more students using language within the learning segment (**no more than 5 minutes in length**), **AND/OR** through the student work samples analyzed in Assessment Task 3.
- Determine whether you will feature the whole class or a targeted group of students (**minimum of 4 students**) within the class.
- **Videorecord your classroom teaching.** Tips for video recording your class are available from your teacher preparation program.
- **Select video clips to submit** and verify that the clips meet the following requirements:

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- Ensure that you and your students can be seen in the video clips you submit. Also, ensure that your face appears at least once in the video for identification purposes.
- Check the sound quality to ensure that you and your students can be heard on the video clips you submit. If most of the audio in a clip cannot be understood by a scorer, **submit another clip**. If there are occasional audio portions of a clip that cannot be understood that are relevant to your commentary responses, do one of the following: 1) provide a transcript with time stamps of the inaudible portion and refer to the transcript in your response; 2) embed quotes with time-stamp references in the commentary response; or 3) insert captions in the video (captions for this purpose will be considered permissible editing).
- A video clip must be continuous and unedited, with no interruption in events.
- If you have inadvertently included individuals for whom you do not have permission to film in the video clip(s) you plan to submit, you may use software to blur the faces of these individuals. This is not considered editing. Other portions of the submitted video clip(s), including the classroom, your face, and the faces of individuals for whom you have obtained permission to film should remain unblurred.
- Do not include the name of the state, school, or district in your video. Use first names only for all individuals appearing in the video.

- **Respond to the prompts** listed in the Instruction Commentary template found in your account **after viewing the video clips** and submit the completed template.
- **Determine if additional information is needed to understand what you and the students are doing in the video clips.** For example, if there are graphics, texts, or images that are not clearly visible in the video, or comments that are not clearly heard, you may insert digital copies or transcriptions at the end of the Instruction Commentary (**no more than 2 pages in addition to the responses to commentary prompts**).

See the Instruction Task 2: Artifacts and Commentary Specifications in the Secondary Science Evidence Chart for instructions on electronic submission of evidence. This evidence chart identifies templates, supported file types, number of files, response length, and other important evidence specifications. Your evidence cannot contain hyperlinked content. Any web content you wish to include as part of your evidence must be submitted as a document file, which must conform to the file format and response length requirements.

Review the Instruction Task 2 Key Decisions and Key Points in the *Making Good Choices* document for supplementary advice for completing specific components of Instruction Task 2.

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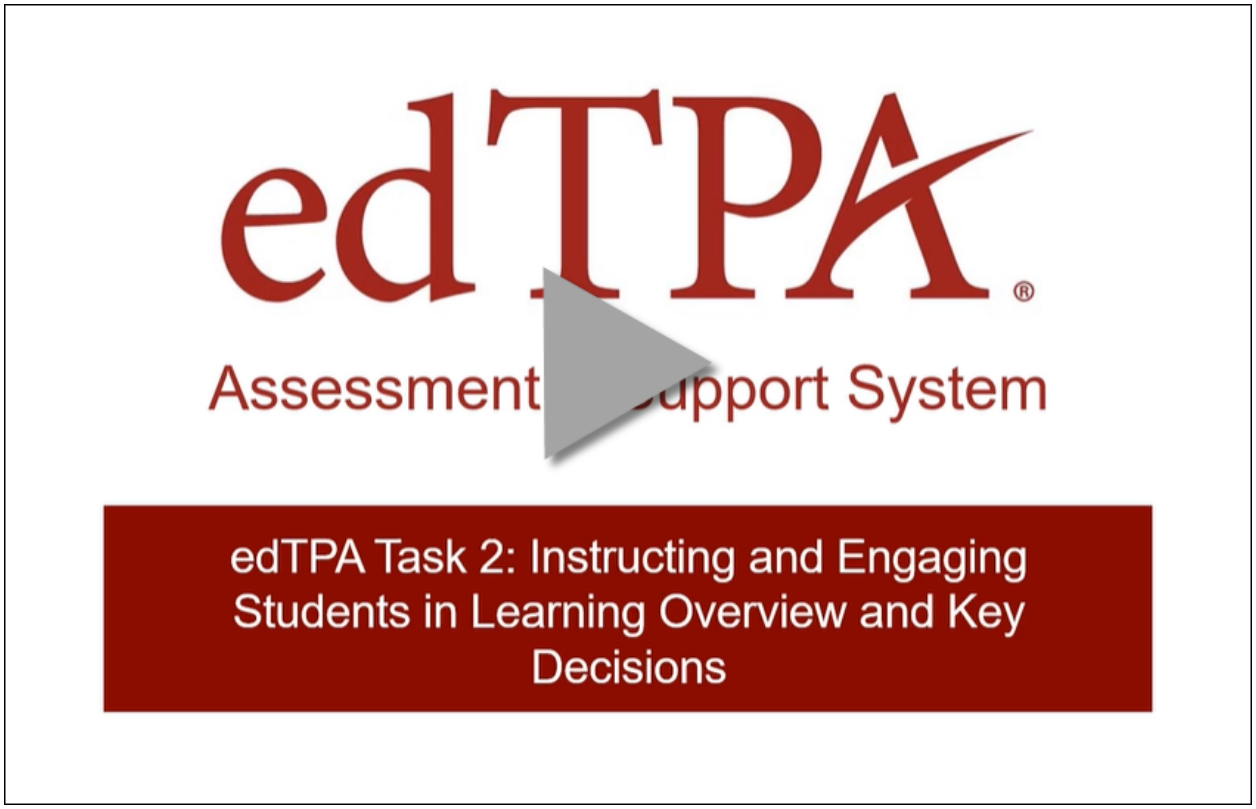
Candidate Support Webinar: Task 2: Instructing and Engaging Students in Learning Overview and Key Decisions



Video URL: https://vimeo.com/803471740/a2f6307f88

How Will the Evidence of My Teaching Practice Be Assessed?

For Instruction Task 2, your evidence will be assessed using rubrics 6–10, which appear on the following pages. When preparing your artifacts and commentaries, refer to the rubrics frequently to guide your thinking, instruction, and writing.

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Instruction Rubrics

Rubric 6: Learning Environment

How does the candidate demonstrate a safe and respectful learning environment that supports students' engagement in learning?

Level 1	Level 2	Level 3	Level 4	Level 5
The clips reveal evidence of **disrespectful interactions** between teacher and students or between students. **OR** **Candidate allows disruptive behavior to interfere with student learning.** **OR** There are **safety hazards seen in the clip that pose an immediate danger to students that are not addressed** by the candidate.	The candidate **demonstrates respect for students**. **AND** Candidate provides a **learning environment that serves primarily to control student behavior** and **minimally supports the learning goals**.	The candidate demonstrates **rapport with** and respect for students. **AND** **Candidate provides a positive, low-risk learning environment that reveals mutual respect among students.**	The candidate demonstrates rapport with and respect for students. **AND** Candidate provides a **challenging learning environment that promotes** mutual respect among students.	The candidate demonstrates rapport with and respect for students. **AND** Candidate provides a challenging learning environment that **provides opportunities to express varied perspectives** and promotes mutual respect among students.

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Understanding Rubric Level Progressions: Rubric 6

The Guiding Question

The Guiding Question addresses the type of learning environment that the candidate establishes and the degree to which it fosters respectful interactions between the candidate and students, and among students.

Key Concepts of Rubric:

- Respect[10]
- Rapport
- Learning environment

Primary Sources of Evidence:

Video clips

Instruction Commentary **Prompt 2**

Note that for the Instruction Task, the commentary is intended to provide context for interpreting what is shown in the video. Candidates sometimes describe events that do not appear in the video or conflict with scenes from the video—**such statements should not override evidence depicted in the video**.

Scoring Decision Rules

Multiple Criteria	▪ N/A for this rubric
AUTOMATIC 1	▪ Safety issues are seen in the clip(s) that pose an immediate danger to students that are not addressed by the candidate.

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3: In the clips:

- The candidate's interactions with students are respectful, demonstrate rapport (evidence of relationship between the candidate and students and/or ease of interaction that goes back and forth based on relevance or engaged conversation), and students communicate easily with the candidate.
- There is evidence that the candidate facilitates a positive learning environment wherein students are willing to answer questions and work together in task-related interactions and where criticism of responses does not inhibit discussion.

[10] Links to terms from the Secondary Science Glossary are included for quick access to the definitions. To navigate to the glossary definition, click the hyperlinked word(s). To navigate back to the page origin, use the "Previous View" command (or ALT+Left Arrow).

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- There is evidence of mutual respect among students. Examples include attentive listening while other students speak, respectful attention to another student's idea (even if disagreeing), working together with a partner or group to accomplish tasks.

Below 3

Evidence that demonstrates performance <u>below Level 3</u>: The clips:

- Do not exhibit evidence of positive relationships and interactions between the candidate and students.
- Reveal a focus on classroom management and maintaining student behavior and routines rather than engaging students in learning.

What distinguishes a Level 2 from a Level 3: At Level 2,

- Although clips reveal the candidate's respectful interactions with students, there is an emphasis on candidate's rigid control of student behaviors, discussions, and other activities in ways that limit and do not support learning. For example, in a "discussion", the students are saying a word or two followed by the candidate providing the detailed explanations so that students do not get practice in trying out their ideas or in discovering and correcting errors in thinking.

What distinguishes a Level 1 from a Level 2: At Level 1, there are **two different ways** that evidence is scored:

1. The clips reveal evidence of candidate-student or student-student interactions that discourage student contributions, disparage the student(s), or take away from learning.
2. The classroom management is so weak that the candidate is not able to or does not successfully redirect students, or the students themselves find it difficult to engage in learning tasks because of disruptive behavior. Disruptive behavior should be considered in relation to the intended classroom learning environment and classroom management approach.

Note: Classroom management styles vary. Video clips that show classroom environments where students are productively engaged in the learning task should not be labeled as disruptive. Examples of this may include students engaging in discussion with peers, speaking without raising their hands, or being out of their seats.

Automatic Score of 1 is given when:

- The clip(s) include situations with safety issues posing an immediate danger to students that are not addressed by the candidate.

Above 3

Evidence that demonstrates performance <u>above Level 3</u>: The clips:

- Reveal a positive learning environment that includes tasks/discussions that challenge student thinking and encourage respectful student-student interaction.

What distinguishes a Level 4 from a Level 3: At Level 4,

- The learning environment supports learning tasks that appropriately challenge students by promoting higher-order thinking or application to develop new learning. There must be evidence that the environment is challenging for students. Examples include: students cannot answer immediately but need to think to respond; the candidate asks higher-order thinking questions; students are trying to apply their initial learning to another context. The candidate may ask questions such as, "What do you mean by that?", "What evidence do you have?", "Does that always apply?",

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"How might that affect things?", "I don't understand, can you explain from the beginning?" or "Imagine if X was not the case, then what?"

- The learning environment encourages and supports mutual respect among students, e.g., candidate reminds students to discuss ideas respectfully with each other.

What distinguishes a Level 5 from a Level 4: At Level 5, the candidate meets all of Level 4 AND

- The learning environment encourages students to express, debate, and evaluate differing perspectives about content with each other. Perspectives could be from curricular sources, students' ideas, and/or lived experiences. For example, the candidate might ask, "Do you agree with the statement/answer made by…? Why/why not?" and students build off other students' responses and may challenge other students in a respectful way.

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Rubric 7: Engaging Students in Learning

How does the candidate actively engage students in analyzing and interpreting scientific data to construct evidence-based explanations of or predictions about a real-world phenomenon?

Level 1	Level 2	Level 3	Level 4	Level 5
Candidate **does not engage students in constructing an explanation of or predictions about the phenomenon**.	Candidate **engages** students in constructing explanations of or predictions about the phenomenon**.** **AND** **Students do not support an explanation or prediction with reference to acceptable science concepts OR evidence and/or data.**	Candidate **supports** students **in constructing evidence-based explanations of or predictions about the phenomenon.** **AND** Students **refer** to evidence and/or data **AND/OR** acceptable science concepts **but do not explain how they support an explanation or prediction**.	Candidate supports students in constructing evidence-based explanations of or predictions about the phenomenon. **AND** Students **explain** how evidence and/or data **AND** acceptable science concepts support an explanation or prediction.	Candidate supports students in constructing evidence-based explanations of or predictions about the phenomenon. **AND** Students use evidence and/or data and acceptable science concepts **to support or refute alternative explanations or predictions.**
There is **little or no evidence that the candidate links students' prior academic learning and/or prerequisite skills or personal or community assets with new learning**.	Candidate makes **vague or superficial links** between prior academic learning and/or prerequisite skills and new learning.	Candidate **links** prior academic learning and/or prerequisite skills to new learning.	Candidate links **both** prior academic learning and/or prerequisite skills **and personal or community assets** to new learning.	Candidate **prompts students to link** prior academic learning and/or prerequisite skills and personal or community assets to new learning.

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Understanding Rubric Level Progressions: Rubric 7

The Guiding Question

The Guiding Question addresses how the candidate provides video evidence of engaging students in meaningful tasks and discussions to develop their abilities to construct scientific explanations or make predictions based on science concepts and data.

Key Concepts of Rubric:

- Engaging students in learning[11]
- Assets (personal, community)

Science Terms Central to the edTPA:

- Evidence-based explanation
- Making predictions

Primary Sources of Evidence:

Video clips

Instruction Commentary **Prompt 3**

Note that for the Instruction Task, the commentary is intended to provide context for interpreting what is shown in the video. Candidates sometimes describe events that do not appear in the video or conflict with scenes from the video—**such statements should not override evidence depicted in the video**.

Scoring Decision Rules

Multiple Criteria	▪ Criterion 1 (**primary**): Engagement in learning tasks ▪ Criterion 2: Connections between students' academic learning **AND/OR** assets (personal, community) and new learning ▪ Place greater weight or consideration on the criterion 1 (engagement in learning tasks).
AUTOMATIC 1	▪ None

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3:

- **Primary Criterion:** The clips show that the students are engaged in learning tasks that focus on analyzing and interpreting scientific data or using relevant science concepts to construct or engage in an evidence-based explanation or prediction. Note that the claim in the explanation or prediction may or may not be accurate but should be consistent with the data from the inquiry and/or with student understanding

[11] Links to terms from the Secondary Science Glossary are included for quick access to the definitions. To navigate to the glossary definition, click the hyperlinked word(s). To navigate back to the page origin, use the "Previous View" command (or ALT+Left Arrow).

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of relevant science concepts. Although the students make references to data and/or acceptable science concepts the connection between the explanation or prediction and the data and/or acceptable science concept is implicit. For example, students answer the candidate's question while looking at predator-prey interaction graph, "What happens to the number of prey as the predator numbers decrease?" Student(s) answer, "Down," but do not explain how they arrived at that conclusion.

- **Secondary Criterion:** The clips show the candidate making connections to students' prior academic learning and/or prerequisite skills to help them develop the new content or skills.

Below 3

Evidence that demonstrates performance <u>below Level 3</u>:

- Students are participating in tasks that do not involve either a scientific explanation or a prediction about a real-world phenomenon or references to data from the inquiry.

What distinguishes a Level 2 from a Level 3: At Level 2,

- Students are engaged in tasks to construct explanations of or predictions about the phenomenon but are not using data or science concepts to support their claims or predictions due to the structure of the learning task or the way in which it is implemented. For example, students may be seen collecting temperatures during a phase change laboratory experiment, and may even create a time versus temperature graph, but students do not refer to data while answering questions posed by candidate.
- In addition, the candidate may refer to students' learning from prior units, but the references are indirect or unclear and do not facilitate new learning.

What distinguishes a Level 1 from a Level 2: At Level 1,

- There is no evidence seen in the video clips of any attempt by candidate to engage students to construct an explanation of or prediction about the phenomenon. For example, data were collected in a lab inquiry, but there is no discussion or reference to the data collected in the video clip(s), just students' unsupported opinions.
- In addition, the candidate is not using either students' prior academic learning and/or prerequisite skills or assets (personal, community) to build new learning.

Above 3

Evidence that demonstrates performance <u>above Level 3</u>:

- The learning tasks as seen in the clip are structured to engage students to explain how data and relevant science concepts support a claim or prediction about the phenomenon. Note that the claim in the argument may or may not be accurate but should be consistent with the data from the inquiry and with student understanding of relevant science concepts.
- Connections between students' prior academic learning and/or prerequisite skills and assets (personal, community) are made to support the new learning.

What distinguishes a Level 4 from a Level 3: At Level 4,

- The learning tasks in the clips include structures or scaffolding that promotes the learning of how to engage in constructing evidence-based explanations of or predictions about the phenomenon using data from the inquiry AND relevant science concepts.

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- In addition, the candidate draws upon not only prior academic learning and/or prerequisite skills, but also students' assets (personal, community) to develop new learning. For example, the candidate may tie the athletes' weightlifting experiences to lactic acid build up in the muscles or the students' driving experience to a lesson on the Doppler Effect heard when an ambulance drives by them parked along the roadside.

What distinguishes a Level 5 from a Level 4: At Level 5,

- Candidate supports students in constructing evidence-based explanations of or predictions about the phenomenon AND students use evidence and/or data and acceptable science to support or refute alternative explanations or predictions. For example, candidate would scaffold students to arrive at the conclusion that most cleaning products are in the basic range on the pH scale upon completion of a scientific inquiry using common household items, during which soaps, detergents, and ammonia-based cleaning products resulted in high pH values (above 7) **AND** the students would use the data to support a statement such as, food items are prominently in the acidic range of the pH scale (if orange juice, soda, and lemonade were used in inquiry).
- In addition, the candidate encourages students to connect and use their prior knowledge and assets (personal, community) to support new learning. For example, to help students interpret the pH paper, the candidate would ask the students to relate the pH color chart to a rainbow (ROYGBIV) and make a connection between a stop sign being red and the slowest a car could go is zero mph or being stopped with the lowest number on the pH scale represented with the pH paper turning red to show a very low pH value. A second connection to previous knowledge could be made with the sky being blue and the sky's position relative to the classroom (high), likewise the blue pH color range is the higher values on the pH scale.

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Rubric 8: Deepening Student Learning

How does the candidate elicit responses to promote thinking and understanding of science concepts and abilities to apply scientific practices during scientific inquiry?

Level 1	Level 2	Level 3	Level 4	Level 5
Candidate does most of the talking and students provide few responses. **OR** Candidate responses include **significant content inaccuracies** that will lead to student misunderstandings.	Candidate **primarily asks surface-level questions and** evaluates student responses as **correct or incorrect**.	Candidate **elicits student responses related to understanding** • science concepts, • scientific practices through inquiry, **AND/OR** • the phenomenon being investigated.	Candidate elicits **and builds on students' own ideas about** • science concepts, • scientific practices through inquiry, **AND/OR** • the phenomenon being investigated.	**Level 4 plus:** **Candidate facilitates interactions among students so they can evaluate their own** • **data collection,** • **procedures,** • **interpretations, OR** • **evidence-based explanations or predictions.**

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Understanding Rubric Level Progressions: Rubric 8

The Guiding Question

The Guiding Question addresses how, in the video clips, the candidate brings forth and builds on student responses to guide learning; this can occur during whole class discussions, small group discussions, or consultations with individual students.

Key Concepts of Rubric:

- Evidence-based explanation[12]
- Making predictions
- Significant content inaccuracies
    - For Rubric 8, the candidate exhibits a pattern of presenting and/or referencing information to students that does not align with correct and current scientific knowledge. These are not minor misstatements or incomplete metaphors, but serious errors that will mislead and/or misinform students unless corrected in the future.

Primary Sources of Evidence:

Video clips

Instruction Commentary **Prompt 4a**

Note that for the Instruction Task, the commentary is intended to provide context for interpreting what is shown in the video. Candidates sometimes describe events that do not appear in the video or conflict with scenes from the video—**such statements should not override evidence depicted in the video**.

Scoring Decision Rules

Multiple Criteria	▪ N/A for this rubric
AUTOMATIC 1	▪ Pattern of **significant content inaccuracies** that are core to the central focus or a key learning objective for the learning segment

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3:

- The candidate prompts students to offer responses that require thinking related to science concepts, scientific practices through inquiry, **AND/OR** the phenomenon being investigated, e.g., by using "how" and "why" questions. Some instruction may be characterized by initial questions focusing on facts to lay a basis for later higher-order questions in the clip.

[12] Links to terms from the Secondary Science Glossary are included for quick access to the definitions. To navigate to the glossary definition, click the hyperlinked word(s). To navigate back to the page origin, use the "Previous View" command (or ALT+Left Arrow).

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Below 3

Evidence that demonstrates performance <u>below Level 3</u>:

- In the clips, classroom interactions provide students with limited or no opportunities to think and learn.

What distinguishes a Level 2 from a Level 3: At Level 2,

- The candidate asks questions that elicit right/wrong or yes/no answers and do little to encourage students to think about the content being taught. The students are answering the candidate, but with one-word answers that demand no follow up or reasoning to be explained. The candidate is focused on recalling facts. For example, students are asked, "What happens to the atomic number as we examine elements on the Periodic Table from left to right across a row?" Student(s) answer, "It gets bigger." There is no tie into the number of protons increasing, nor to the size of the atom decreasing due to an increase in nuclear charge.

What distinguishes a Level 1 from a Level 2: At Level 1,

- There are few opportunities shown in the clips that students were able to express ideas. For example, the candidate is presenting information using a PowerPoint presentation and asks students who are taking notes, "Is everyone done with this slide?"

Automatic Score of 1 is given when:

- There is a pattern of **significant content inaccuracies** that will lead to student misunderstandings.
- The candidate makes a significant error in content that is core to the central focus or a key standard for the learning segment. (For example, the candidate introduces an inaccurate definition of a central concept before students work independently or presents that electrons are located in the nucleus or that green plants are primary consumers and continues to reference and teach this information, with no correction throughout the video clip(s).

Above 3

Evidence that demonstrates performance <u>above Level 3</u>:

- In the clips, the candidate uses student ideas and thinking to develop students' science thinking or their abilities to evaluate their own thoughts about science concepts, scientific practices through inquiry, AND/OR the phenomenon.

What distinguishes a Level 4 from a Level 3: At Level 4,

- The candidate follows up on student responses to encourage the student or his/her peers to explore or build on the ideas expressed.
- The candidate uses this strategy to develop students' understanding of science concepts, scientific practices through inquiry, AND/OR the phenomenon.
- Examples of "building on student responses" includes referring to a previous student response in developing a point or an argument; calling on the student to elaborate on what s/he said; posing questions to guide a student discussion; soliciting student examples and asking another student to identify what they have in common; asking a student to summarize a lengthy discussion or rambling explanation; and asking another student to respond to a student comment or answer a question posed by a student to move instruction forward. As a specific example, one student might respond that the number of earthquakes in an area where the fracking drilling

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process is currently being used is increasing. The candidate would follow with, "Why do you say that?" as a way to encourage that student or a classmate to tie in the geological data that the students are using in class inquiry and discussion.

What distinguishes a Level 5 from a Level 4: At Level 5, the candidate meets all of Level 4 AND

- There is evidence in the clips that the candidate structures and supports student-student conversations and interactions that facilitate students' ability to evaluate and self-monitor their own data collection, procedures, interpretations, or evidence-based explanations.

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Rubric 9: Subject-Specific Pedagogy: Analyzing Evidence and/or Data

How does the candidate facilitate students' analysis of the evidence and/or data based on scientific inquiry?

Level 1	Level 2	Level 3	Level 4	Level 5
Candidate **does not ask students to present or record their evidence and/or data**. **OR** There is **no analysis of data**.	Candidate **asks students to present or record evidence and/or data**. **AND** **Candidate takes the primary role in analyzing the data.**	Candidate asks students to present or record evidence and/or data **in tables, maps, diagrams, or other graphical or statistical displays**. **AND** **Candidate guides students to find patterns AND/OR inconsistencies in the data.**	Candidate asks students to present or record evidence and/or data in tables, maps, diagrams, or other graphical or statistical displays. **AND** Candidate **facilitates a data analysis discussion where students demonstrate the ability to find patterns AND/OR inconsistencies in the data**.	**Level 4 plus:** Candidate leads students to **consider limitations of the evidence and/or data, methods used to collect evidence and/or data, or analysis**.

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Understanding Rubric Level Progressions: Rubric 9

The Guiding Question

The Guiding Question addresses how the candidate guides students in examining and drawing conclusions about the evidence and/or data collected.

Key Concepts of Rubric:

- N/A

Primary Sources of Evidence:

Video clips

Instruction Commentary **Prompt 4b**

Note that for the Instruction Task, the commentary is intended to provide context for interpreting what is shown in the video. Candidates sometimes describe events that do not appear in the video or conflict with scenes from the video—**such statements should not override evidence depicted in the video**.

Scoring Decision Rules

Multiple Criteria	▪ N/A for this rubric
AUTOMATIC 1	▪ None

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at <u>Level 3</u>:

- In the clips, the candidate asks student to present or record evidence and/or data in tables, maps, diagrams, or other graphical or statistical displays AND candidate guides students to find patterns and/or inconsistencies in the data. For example, the candidate asks students specific questions regarding the color changes that are occurring with litmus solution and students present data by responding that the litmus solution starts blue but turns pink in some solutions but is remaining blue in cleaning products. Then the candidate would ask, "What does this mean?" or "What can you conclude from this data?"

Below 3

Evidence that demonstrates performance <u>below Level 3</u>:

- In the clips, candidate does not engage students in an analysis of data.

What distinguishes a Level 2 from a Level 3: At Level 2,

- The candidate asks students to present or record evidence and/or data AND the candidate takes the lead in analyzing the data. For example, during the video clip(s) the candidate asks a set of lab partners what the volumes of base were needed to titrate the acid of unknown concentration. The students respond with volume amounts that are smaller than the amount of base used, and the candidate begins to

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sum up the idea that the acid must have a lower concentration than that of the base used during the titration.

What distinguishes a Level 1 from a Level 2: At Level 1,

- Candidate does not ask students to present or record their evidence and/or there is essentially no data analysis. For example, the video clip(s) show students actively engaged in a lab situation during which the students are using molecular model kits to create 3-D molecules, but the students are not drawing the structures in a lab notebook or on a sheet for later use and comparison.

Above 3

Evidence that demonstrates performance above Level 3:

- In the clips, the candidate supports the students in specifically **looking for patterns AND/OR inconsistencies in the data**.

What distinguishes a Level 4 from a Level 3: At Level 4,

- In the clips, the candidate guides students to organize the data to better identify relationships—in a graph, table, map, or diagram. The candidate then engages students in a discussion during which s/he supports the students to **find patterns AND/OR inconsistencies in the data**. For example, the candidate would ask, "So what does the trend in the period of oscillation for the spring seem to be as we add weight to the system?" The students would say, "the oscillations lengthen" or "take longer." Then the candidate would point to data that does not seem to fit, "How about this number? What should we consider with this data point?" and then a discussion could ensue regarding outliers, or data that will not be used or considered.

What distinguishes a Level 5 from a Level 4: At Level 5, the candidate meets all of Level 4 AND

- In the clips, the candidate supports the students in considering limitations of evidence and/or data, methods used to collect evidence and/or data, or analysis. For example, the candidate may ask students to consider their use of a triple beam balance and compare the data's accuracy to masses that are taken using an electronic single pan balance to collect mass measurements. This comparison could lead to an extension into using mass to calculate force and the precision and accuracy of calculations that follow based on mass measurements.

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Rubric 10: Analyzing Teaching Effectiveness

How does the candidate use evidence to evaluate and change teaching practice to meet students' varied learning needs?

Level 1	Level 2	Level 3	Level 4	Level 5
Candidate suggests **changes unrelated to evidence of student learning**.	Candidate **proposes changes to teacher practice that are superficially related to student learning needs** (e.g., task management, pacing, improving directions).	Candidate proposes changes that address **students' collective learning needs related to the central focus**. **Candidate makes superficial connections to research and/or theory.**	Candidate proposes changes that address **individual and collective learning needs** related to the central focus. Candidate makes **connections** to research and/or theory.	**Level 4 plus:** Candidate **justifies changes using principles from** research and/or theory.

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Understanding Rubric Level Progressions: Rubric 10

The Guiding Question

The Guiding Question addresses how the candidate examines the teaching and learning in the video clips and proposes what s/he could have done differently to better support the needs of all students. The candidate justifies the changes based on student needs and references to research and/or theory.

Key Concepts of Rubric:

- N/A

Primary Sources of Evidence:

Video clips (for evidence of student learning)

Instruction Commentary **Prompt 5**

Scoring Decision Rules

Multiple Criteria	▪ Criterion 1 (**primary**): Proposed changes ▪ Criterion 2: Connections to research/theory ▪ Place greater weight or consideration on criterion 1 (proposed changes).
AUTOMATIC 1	▪ None

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at <u>Level 3</u>:

- **Primary Criterion:** The proposed changes address the central focus, and the candidate explicitly connects those changes to the learning needs of the class as a whole.
  - Proposed changes noted by the candidate should be related to the lessons that are seen or referenced in the clips, but do not need to be exclusively from what is seen in the clips alone. This means that since only portions of the lessons will be captured by the clips, candidates can suggest changes to any part of the lesson(s) referenced in the clips, even if those portions of the lesson(s) are not depicted in the clips but were part of the lesson plans in Task 1.
- **Secondary Criterion:** The candidate refers to research and/or theory in relation to the plans to support student learning. The connections between the research/theory and the tasks are vague/not clearly made.
- If evidence meets the primary criterion at Level 3, the rubric is scored at Level 3 **regardless of the evidence for the secondary criterion**.
- If evidence meets the primary criterion at Level 4, and candidate has NO connection to research/theory, the rubric is scored at Level 3.

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Below 3

Evidence that demonstrates performance <u>below Level 3</u>:

- The changes proposed by the candidate are not directly related to student learning.

What distinguishes a Level 2 from a Level 3: At Level 2,

- The changes address improvements in teaching practice that mainly focus on how the candidate structures or organizes learning tasks, with a superficial connection to student learning. There is little detail on the changes in relation to either the central focus or the specific learning that is the focus of the video clips. Examples include asking additional higher-order questions without providing examples, improving directions, repeating instruction without making significant changes based on the evidence of student learning from the video clips, or including more group work without indicating how the group work will address specific learning needs.
- If a candidate's proposed changes have nothing to do with the central focus, this rubric cannot be scored beyond a Level 2.

What distinguishes a Level 1 from a Level 2: At Level 1,

- The changes are not supported by evidence of student learning from lessons seen or referenced in the clips.

Above 3

Evidence that demonstrates performance <u>above Level 3</u>:

- The proposed changes relate to the central focus and explicitly address individual and collective needs that were within the lessons seen in the video clips.
- The changes in teaching practice are supported by research and/or theory.

What distinguishes a Level 4 from a Level 3: At Level 4,

- The changes clearly address the learning needs of individuals in addition to the learning needs of the whole class in the video clips by providing additional support and/or further challenge in relation to the central focus. Candidate should explain how proposed changes relate to each individual's needs. The candidate explains how research or theory is related to the changes proposed. Candidates may cite research or theory in their commentary or refer to the ideas and principles from the research; either connection is acceptable, as long as the candidate clearly connects the research/theory to the proposed changes.
- Scoring decision rules: To score at Level 4, the candidate must meet the primary criterion at Level 4 and make at least a fleeting, relevant reference to research or theory (meet the secondary criterion at least at Level 3).

What distinguishes a Level 5 from a Level 4: At Level 5, the candidate meets all of Level 4 AND

- Explains how principles of research or theory **support or frame the proposed changes**. The justifications are explicit, well-articulated, and demonstrate a thorough understanding of the research/theory principles that are clearly reflected in the explanation of the changes.

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Assessment Task 3: Assessing Student Learning

What Do I Need to Do?

- **Select <u>one</u> assessment from your learning segment you will use** to evaluate your students' developing knowledge and skills. It should be an assessment that is completed by the whole class featured in the learning segment. (If you are teaching only a group within the class for the learning segment, that group will be "the whole class.") The assessment should reflect the work of individuals, not groups, but may be individual work from a group task. The assessment should provide opportunities for students to demonstrate
  - conceptual understanding
  - use of scientific practices during inquiry
  - the development and evaluation of evidence-based explanations of or reasonable predictions about a real-world phenomenon based on patterns of evidence and/or data
- **Define and submit the evaluation criteria you will use to analyze student learning** related to the science understandings described above.
- **Collect and analyze student work** from the selected assessment **to identify quantitative and qualitative** patterns of learning within and across learners in the class. You may submit text files with scanned student work, a video or audio file of a student's oral work, **OR** a student-created video or multimedia file. For each focus student, a video or audio work sample must be no more than 5 minutes total running time.
- **Select 3 student work samples** that represent the patterns of learning (i.e., what individuals or groups generally understood and what a number of students were still struggling to understand) you identified in your assessment analysis. These students will be your **focus students** for this task. **At least one of the focus students must have an identified learning need** (for example, an English learner, a student with an IEP [Individualized Education Program] or 504 plan, a struggling reader, an underperforming student or a student with gaps in academic knowledge, and/or a gifted student needing greater support or challenge).
- **Document the feedback** you gave to each of the **3 focus students** on the work sample itself, as an audio clip, or as a video clip. You must submit evidence of the actual feedback provided to each focus student, and not a description of the feedback.
- If you submit a student work sample or feedback as a video or audio clip and comments made by you or your focus student(s) cannot be clearly heard, do one of the following: 1) attach a transcription of the inaudible comments (**no more than 2 additional pages**) to the end of the Assessment Commentary; 2) embed quotes with time-stamp references in the commentary response; or 3) insert captions in the video (captions for this purpose will be considered permissible editing).
- If you submit a student work sample or feedback as a video or audio clip and additional students are present, clearly identify which students are your focus students in the relevant prompts (1d and 2a) of the Assessment Commentary (**in no more than 2 sentences**).

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- **Respond to the prompts** listed in the Assessment Commentary template found in your account **after analyzing student work from the selected assessment** and submit the completed template.
- **Include and submit the chosen assessment, including the directions/prompts provided to students.** Attach the assessment (**no more than 5 additional pages**) to the end of the Assessment Commentary.
- **Provide evidence of students' understanding and use of the targeted academic language function and other language demands**. You may choose evidence from video clips submitted in Instruction Task 2, an additional video clip of one or more students using language within the learning segment (**no more than 5 minutes in length**), **AND/OR** student work samples submitted in Assessment Task 3.

See the Assessment Task 3: Artifacts and Commentary Specifications in the Secondary Science Evidence Chart for instructions on electronic submission of evidence. This evidence chart identifies templates, supported file types, number of files, response length, and other important evidence specifications. Your evidence cannot contain hyperlinked content. Any web content you wish to include as part of your evidence must be submitted as a document file, which must conform to the file format and response length requirements.

Review the Assessment Task 3 Key Decisions and Key Points in the *Making Good Choices* document for supplementary advice for completing specific components of Assessment Task 3.

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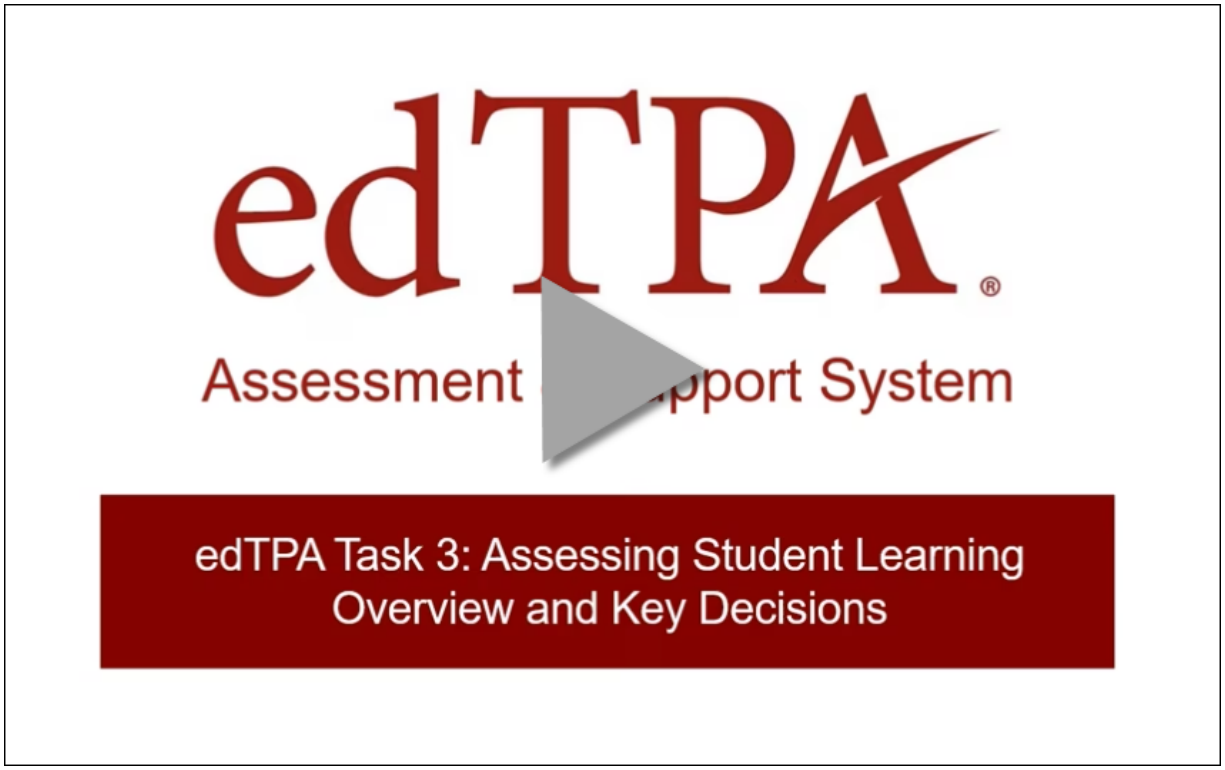
Candidate Support Webinar: Task 3: Assessing Student Learning Overview and Key Decisions



Video URL: https://vimeo.com/803917885/55799d6eb7

How Will the Evidence of My Teaching Practice Be Assessed?

For Assessment Task 3, your evidence will be assessed using rubrics 11–15, which appear on the following pages. When preparing your artifacts and commentaries, refer to the rubrics frequently to guide your thinking, planning, instruction, assessment, and writing.

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Assessment Rubrics

Rubric 11: Analysis of Student Learning

How does the candidate analyze evidence of student learning related to conceptual understanding, the use of scientific practices during inquiry, and evidence-based explanations or reasonable predictions about a real-world phenomenon?

Level 1	Level 2	Level 3	Level 4	Level 5
The analysis **is superficial or not supported** by either student **work samples or the summary of student learning**. **OR** The evaluation criteria, learning objectives, and/or analysis are **not aligned with each other**.	The analysis **focuses on what students did right OR wrong**.	The analysis focuses on what students did right **AND** wrong. **AND** **Analysis includes some differences in whole class learning.**	Analysis uses **specific examples** from work samples to **demonstrate patterns of learning consistent with the summary**. **AND** **Patterns of learning are described for whole class.**	Analysis uses specific evidence from work samples to **demonstrate the connections between quantitative and qualitative patterns of learning for individuals or groups**.

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Understanding Rubric Level Progressions: Rubric 11

The Guiding Question

The Guiding Question addresses the candidate's analysis of student work to identify patterns of learning across the class.

Key Concepts of Rubric:

- Aligned[13]
- Evaluation criteria
- Patterns of learning

Primary Sources of Evidence:

Evaluation criteria

Student work samples

Assessment Commentary **Prompt 1a–d**

Scoring Decision Rules

Multiple Criteria	▪ N/A for this rubric
AUTOMATIC 1	▪ Significant misalignment between evaluation criteria, learning objectives, and/or analysis

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3:

- The analysis is an accurate listing of what students did correctly and incorrectly.
- The analysis is aligned with the evaluation criteria and/or assessed learning objectives.
- Some general differences in learning across the class are identified.

Below 3

Evidence that demonstrates performance below Level 3:

- The analysis is superficial (e.g., primarily irrelevant global statements) or focuses only right or wrong answers.
- The analysis is contradicted by the work sample evidence.
- The analysis is based on an inconsistent alignment with evaluation criteria and/or standards/objectives.

[13] Links to terms from the Secondary Science Glossary are included for quick access to the definitions. To navigate to the glossary definition, click the hyperlinked word(s). To navigate back to the page origin, use the "Previous View" command (or ALT+Left Arrow).

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What distinguishes a Level 2 from a Level 3: At Level 2:

- Although aligned with the summary, the analysis presents an incomplete picture of student learning by only addressing either successes or errors.

What distinguishes a Level 1 from a Level 2: There are **two different ways** that evidence is scored at Level 1:

1. The analysis is superficial because it ignores important evidence from the work samples, focusing on trivial aspects.
2. The conclusions in the analysis are not supported by the work samples or the summary of learning.

Automatic Score of 1 is given when:

- There is a significant lack of alignment between evaluation criteria, learning objectives, and/or analysis. A lack of alignment can be caused by a lack of relevant evaluation criteria to assess student performance on the learning objectives.

Above 3

Evidence that demonstrates performance above Level 3: The analysis:

- Identifies patterns of learning (quantitative and qualitative) that summarize what students know, are able to do, and still need to learn.
- Describes patterns for the whole class, groups, or individuals.
- Is supported with evidence from the work samples and is consistent with the summary.

What distinguishes a Level 4 from a Level 3: At Level 4,

- The analysis describes consistencies in performance (patterns) across the class in terms of what students know and are able to do and where they need to improve.
- The analysis goes beyond a listing of students' successes and errors, to an explanation of student understanding in relation to their performance on the identified assessment. An exhaustive list of what students did right and wrong, or the % of students with correct or incorrect responses, should be scored at Level 3, as that does not constitute a pattern of student learning. A pattern of student learning goes beyond these quantitative differences to identify specific content understandings or misunderstandings, or partial understandings that are contributing to the quantitative differences.
- Specific examples from work samples are used to demonstrate the whole class patterns. For example, the candidate would state, "In general, the class as a whole can identify the dorsal and ventral sides of the starfish, but during the dissection, at least half of the students had difficulty locating the vascular system. As seen in both Student 1's (large-type format per IEP requirements) and Students 2's (no IEP, representing the class average students) submitted lab sheet, both students were able to complete Section A identifying the ventral and dorsal sides, but in Part B, both Student 1 and 2 could not complete the vascular system parts. The work submitted by Student 3 represents the six-student gifted and talented group, and both sections A and B were completed with only minor spelling errors."

What distinguishes a Level 5 from a Level 4: At Level 5,

- The candidate uses specific evidence from work samples to demonstrate qualitative patterns of understanding. The analysis uses these qualitative patterns to interpret

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the range of similar correct or incorrect responses from individuals or groups (e.g., quantitative patterns); and to determine elements of what students learned and what would be most productive to work on. The qualitative patterns may include struggles, partial understandings, and/or attempts at solution. An example would be, "Most students could use correct stoichiometric procedures to solve for the volume of a gas produced (See problems 1–10), as illustrated by Students A and B. But most students were like Student B, who could not set up the equation on any of the word problems missing either a reactant or a product, while Student A's work sample represented the few students who could. Even though Student A made a procedural error on Problem 8, the balanced chemical equation for the reaction was correct. While Student B found the correct solution to problems 1–10 while solving for the volume of gas produced, he was unable to construct the correct equation for any of the word problems (problems 11–13.) This suggests that most of my students understood the procedures and how to use them, but most had difficulty with writing the balanced chemical equations when the reactions were written in words and appeared in a real-world context. They appeared to be really confused by the additional descriptors in the word equations that represented the states of matter of the reactants and products, because like Student B, these confused students included or left out part of the reaction. So in Problem 11, the students wrote a compound's formula (N2O) instead the gas's diatomic molecule representation, N2 (g). In Problem 12, the atomic representation for the evolution of oxygen gas is shown as just an O, and in Problem 13, a combustion reaction requires oxygen on the reactant side and these students did not include O2 (g) which means that they did not understand that CO2 (g) and H2O (g) cannot be produced straight from the burning of ethanol as a fuel."

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Rubric 12: Providing Feedback to Guide Learning

What type of feedback does the candidate provide to focus students?

Level 1	Level 2	Level 3	Level 4	Level 5
Feedback is unrelated to the learning objectives OR is developmentally inappropriate. **OR** Feedback **contains significant content inaccuracies**. **OR** **No feedback is provided to one or more focus students.**	Feedback is **general** and **addresses needs AND/OR strengths related to the learning objectives**.	Feedback is **specific and addresses either** needs **OR** strengths **related to the learning objectives**.	Feedback is specific and **addresses both strengths AND needs** related to the learning objectives.	**Level 4 plus:** **Feedback for one or more focus students** • **provides a strategy to address an individual learning need OR** • **makes connections to prior learning or experience to improve learning.**

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Understanding Rubric Level Progressions: Rubric 12

The Guiding Question

The Guiding Question addresses the evidence of feedback provided to the focus students. Feedback may be written on the three student work samples or provided in a video/audio format. The feedback should identify what students are doing well and what needs to improve in relation to the learning objectives.

Key Concepts of Rubric:

- Significant content inaccuracies[14]
  - For Rubric 12, significant content inaccuracies include content flaws in the feedback that are significant and systematic and interfere with student learning.
- Developmentally inappropriate feedback

Primary Sources of Evidence:

Evidence of feedback (written, audio/video)

Assessment Commentary **Prompts 1a, 2a–b**

Scoring Decision Rules

Multiple Criteria	▪ N/A for this rubric
AUTOMATIC 1	▪ One or more content errors in the feedback that will mislead student(s) in significant ways ▪ No evidence of feedback for one or more focus students
Preponderance of Evidence	▪ You must apply the preponderance of evidence rule when the focus students receive varying types of feedback. For example, when the candidate provides feedback on both strengths and needs for 2 out of the 3 focus students, this example would be scored at a level 4 according to the preponderance of evidence rule.

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3:

- The feedback identifies **specific** strengths OR needs for improvement. At Level 3, the candidate MUST provide the focus students with qualitative feedback about their performance that is aligned with the learning objectives. Specific feedback includes such things as pointing to successful use of a strategy ("I like how you are using colored pencils to write the units beside each value in your conversion factors"), naming a type of problem successfully solved ("your percentage error problems are all correct"), pointing to and naming errors ("in each of these 5 problems, you forgot

[14] Links to terms from the Secondary Science Glossary are included for quick access to the definitions. To navigate to the glossary definition, click the hyperlinked word(s). To navigate back to the page origin, use the "Previous View" command (or ALT+Left Arrow).

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to change from C to Kelvin temperatures"), suggesting information that would help solve the problem successfully ("why don't you write Avogadro's number at the top of the worksheet, then when you need it in a conversion factor, it will be right there for you to reference"). Checkmarks, points deducted, grades, or scores do not meet the Level 3, even when they distinguish errors from correct responses.

Below 3

Evidence that demonstrates performance below Level 3:

- Evidence of feedback is general, unrelated to the assessed learning objectives, developmentally inappropriate, inaccurate, or missing for one or more focus students.

What distinguishes a Level 2 from a Level 3: At Level 2,

- Although the feedback is related to the assessed learning objectives, it is also vague and does not identify specific strengths or needs for improvement. At Level 2, general feedback includes identifying what each focus student did or did not do successfully with little detail, e.g., checkmarks for correct responses, points deducted, and comments such as, "Watch out for negative signs when you look up the entropy values!" that are not linked to a specific strength or need. General feedback does not address the specific error or correct solution (e.g., "Check your work" or "Yes!").

What distinguishes a Level 1 from a Level 2: There are **two different ways** that evidence is scored at Level 1:

1. Feedback is not related to the learning objectives. Feedback that is limited to a single statement or mark, such as identifying the total percent correct (86%), an overall letter grade (B), or one comment like "Nice work!" with no other accompanying comments or grading details does not meet the Level 2 requirement and should be scored at a Level 1. These examples of a single piece of feedback do not provide any general feedback to focus students that is related to the learning objectives.
2. Feedback is not developmentally appropriate.

Automatic Score of 1 is given when:

- Feedback includes content inaccuracies that will misdirect the focus student(s). For example, "Remember that the atomic number is ALWAYS the one at the top of the square, in red, on the Periodic Table."
- There is no evidence of feedback for the analyzed assessment for one or more focus students. This includes when there is only a description of feedback in the commentary rather than actual feedback (video, audio or written) presented to the focus student(s) as presented on the work samples, an audio file, or in a video clip from Task 2 with time-stamp reference.

Above 3

Evidence that demonstrates performance above Level 3:

- Feedback is specific and is related to assessed learning objectives and addresses students' strengths AND needs.

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What distinguishes a Level 4 from a Level 3: At Level 4,

- Specific feedback addresses both strengths and needs. For example, the candidate would write, "The objectives for the lab experiment are written well, but you need to justify your predictions using science concepts or data collected."

What distinguishes a Level 5 from a Level 4: At Level 5, the candidate meets all of Level 4 AND

- The feedback for at least one focus student includes:
  - A strategy to address a specific learning need, including the need for a greater challenge. For example, "You got the right answer. Make sure you slow down and show all of your work so that if you don't get the right answer, I'll be able to help you figure out where you went wrong."

  OR

  - A meaningful connection to experience or prior learning. For example, the candidate refers back to a prior physics lesson: "I want you to visualize the new situation as you did in the problem you solved yesterday, to be able to compare the two different scenarios. Then sketch the situation and label all the forces present before you work on solving it. This will help you see the problem as you solve it."

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Rubric 13: Student Understanding and Use of Feedback

How does the candidate support focus students to understand and use the feedback to guide their further learning?

Level 1	Level 2	Level 3	Level 4	Level 5
Opportunities for understanding or using feedback are not described. **OR** Candidate **provides limited or no feedback to inform student learning**.	Candidate **provides vague description of how focus students will understand or use feedback**.	Candidate **describes** how focus students will understand or use feedback **related to the learning objectives**.	Candidate describes how **s/he will support** focus students to understand **and** use feedback **on their strengths OR weaknesses** related to the learning objectives.	Candidate describes how s/he will support focus students to understand and use feedback on their strengths **AND** weaknesses related to the learning objectives.

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Understanding Rubric Level Progressions: Rubric 13

The Guiding Question

The Guiding Question addresses how the candidate explains how s/he will help focus students understand and use the feedback provided in order to improve their learning.

Key Concepts of Rubric:

- N/A

Primary Sources of Evidence:

Evidence of feedback (written, audio/video)

Assessment Commentary **Prompt 2c**

Scoring Decision Rules

Multiple Criteria	▪ N/A for this rubric
AUTOMATIC 1	▪ None

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3:

- Candidate describes **how** the focus students will understand OR use feedback related to the learning objectives. This description needs to relate to the feedback given to one or more of the focus students.
- The description should be specific enough that you understand what the candidate and/or students are going to do. Otherwise, it is vague, and the evidence should be scored at Level 2.
    - Example for **understanding** feedback: Candidate reviews work with whole class focusing on common mistakes that explicitly includes content that one or more focus students were given feedback on.
    - Example for **using** feedback: Candidate asks focus students to revise work using feedback given and resubmit revised work.

Below 3

Evidence that demonstrates performance below Level 3:

- Opportunities for understanding or using feedback are superficially described or absent.

What distinguishes a Level 2 from a Level 3: At Level 2,

- The description of **how** focus students will understand or use feedback is very general or superficial. Details about how the focus students will understand or use the feedback are missing. For example, candidate will state that the focus students will use the feedback in preparation for an upcoming quiz on this lesson, or that "The

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students will use the feedback on their next assignment," or, e.g., the description discusses whole class understanding or use of feedback without explicit attention to feedback given to one or more focus students.

- The use of feedback is not clearly related to the assessed learning objectives.

What distinguishes a Level 1 from a Level 2: At Level 1,

- Opportunities for understanding or using feedback are not described **OR**
- There is NO evidence of feedback for two or more focus students.

Above 3

Evidence that demonstrates performance above Level 3:

- Support for the focus students to understand **AND** use feedback is described in enough detail to understand how the focus students will develop in areas identified for growth and/or continue to deepen areas of strength.

What distinguishes a Level 4 from a Level 3: At Level 4,

- The candidate describes planned or implemented support for the focus students to understand and use feedback on their strengths OR weaknesses to further develop their learning in relation to the learning objectives. For example, a candidate may work with focus students in a small group and reteach several concepts they struggled with on their assessment (as noted by feedback given), using a graphic organizer to further develop understanding of each concept (such as a T-chart or concept map). Next, students would be given an opportunity to revise their responses involving those concepts, using the graphic organizer to support their revisions. This example shows how a candidate can help focus students understand their feedback in relation to misunderstandings and support them in using that feedback to enhance learning in relation to objectives assessed. This type of planned support could take place with the whole class as long as explicit attention to one or more of the focus student's strengths or weaknesses is addressed in relation to the feedback given.

What distinguishes a Level 5 from a Level 4: At Level 5,

- The candidate describes planned or implemented support for the focus students to understand and use feedback on their strengths AND weaknesses related to the learning objectives. For example, the candidate would state, "Students are to review feedback when I return homework sheets and are to look for the steps given to solve the empirical formula problems in their notes. Student A represents the group of students who mastered setting up the conversions from grams to moles, but who will need to practice adding up molecular masses for molecules that have parentheses in the formula, i.e., (NH4)2SO4. And so I will write five similar formulas on the Smart Board so student can copy the formulas and can master the concept of molecular masses prior to moving back to the empirical formula problems, which Student A was able to set up correctly, except for the molecular masses. As students work on the formula problems, I will monitor them so I can see if they are still having trouble and intervene with questions based on what they already know to help them identify and correct any errors."

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Rubric 14: Analyzing Students' Language Use and Science Learning

How does the candidate analyze students' use of language to develop content understanding?

Level 1	Level 2	Level 3	Level 4	Level 5
Candidate identifies student language use that is superficially related or unrelated to the language demands (function, vocabulary and/or symbols, and additional demands). **OR** **Candidate's description or explanation of language use is not consistent with the evidence submitted.**	**Candidate describes how students use only one language demand (vocabulary and/or symbols; function; grammatical structures; written, visual, or verbal communication).**	Candidate **explains and provides evidence** of students' use of • **the language function AND** • **one or more additional language demands** (vocabulary and/or symbols; grammatical structures; written, visual, or verbal communication).	Candidate explains and provides evidence of students' use of • the language function, • **vocabulary and/or symbols, AND** • additional language demand(s) (grammatical structures; written, visual, or verbal communication) **in ways that develop content understandings**.	**Level 4 plus:** **Candidate explains and provides evidence of language use and content learning for students with varied needs.**

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Understanding Rubric Level Progressions: Rubric 14

The Guiding Question

The Guiding Question addresses how the candidate explains students' use of the identified language demands and how that use demonstrates and develops science understanding.

Key Concepts of Rubric:

Use the terms below and their definitions from the glossary as well as the Academic Language Appendix to further clarify concepts on Rubric 14.

- Language demands[15]
- Language functions
- Vocabulary/symbols
- Written, visual, or verbal communication
- Grammatical structures
- Language development supports

Primary Sources of Evidence:

Assessment Commentary **Prompt 3**

Evidence of Student Language Use (student work samples and/or video evidence)

Scoring Decision Rules

Multiple Criteria	▪ N/A for this rubric
AUTOMATIC 1	▪ None

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at Level 3:

- The candidate explains and identifies evidence that the students used or attempted to use the language function AND one additional language demand (vocabulary/symbols; grammatical structures; or written, visual, or verbal communication). Note: The language demands discussed in the Assessment Commentary do not have to be the same as those discussed in Task 1.
- It is not sufficient for the candidate to reference an artifact and make a general statement that, for example, "As seen in the work samples, the students used the vocabulary/symbols as they analyzed data." The candidate must **explain** how the students used the identified language and reference or identify an example of that use from the artifact, e.g., "Students 1 and 2 used the vocabulary/symbols and also

[15] Links to terms from the Secondary Science Glossary are included for quick access to the definitions. To navigate to the glossary definition, click the hyperlinked word(s). To navigate back to the page origin, use the “Previous View” command (or ALT+Left Arrow).

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explicitly incorporated both data and science concepts (the two components of analysis identified) in their analyses. Student 3 used a mixture of vocabulary/symbols and everyday language in the analysis."

Below 3

Evidence that demonstrates performance <u>below Level 3</u>:

- The candidate's identification of student's language use is not aligned with the language demands or limited to one language demand.

What distinguishes a Level 2 from a Level 3: At Level 2,

- The candidate's description and/or evidence of students' language use is limited to only one language demand (vocabulary/symbols; function; grammatical structures; or written, visual, or verbal communication). For example, the candidate would state, "As seen in Student B's lab sheet, he correctly used the symbols to transcribe the RNA with C T A and G in the right spots to represent cytosine, thiamine, adenine and guanine."

What distinguishes a Level 1 from a Level 2: At Level 1,

- The candidate identifies language use that is unrelated or not clearly related to the language demands (function; vocabulary/symbols; grammatical structures; written, visual, or verbal communication) addressed in the Assessment commentary.
- The candidate's description or explanation of language use is not consistent with the evidence provided.

Above 3

Evidence that demonstrates performance <u>above Level 3</u>:

- Candidate identifies specific evidence of student use of the language function and vocabulary/symbols along with at least one other language demand (grammatical structures or written, visual, or verbal communication).
- Candidate explains how evidence of student language represents their development of content understandings, which may include growth and/or struggles with both understanding and expressing content understandings.
- Candidate explains and provides evidence of language use and content learning for students with distinct language needs.

What distinguishes a Level 4 from a Level 3: At Level 4,

- The candidate identifies and explains evidence that students are able to use the language function, vocabulary and/or symbols AND associated language demands (grammatical structures and/or written, visual, or verbal communication). The explanation uses specific evidence from the video and/or work samples.
- The candidate's analysis includes how evidence of student language use demonstrates growth and/or struggles in developing content understandings. For example, the candidate notes that, "All students could give a complete explanation of parts of a wave using some commonly used vocabulary words, like crests and troughs. Most of the students could produce detailed explanations (the language function) in terms of general concepts and procedures for determining the difference between longitudinal and transverse waves. However, other students' explanations were incomplete. As seen in video clip 2, (time 3:42), Student X was showing how the slinky would be manipulated for a transverse or compressional wave, but could not put the actions into words, suggesting that some students still need support to

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develop in the area of explaining the characteristics of waves in laboratory-based activities."

What distinguishes a Level 5 from a Level 4: At Level 5, the candidate meets all of Level 4 AND

- Explains and provides evidence that students with distinct language needs are using the language for content learning. For example, the candidate would state, "The three ELL students mastered the difference between a food chain and a food web as evidenced in the work sample labeled Student A, who represents that group of students. Student A provides a succinctly written and labeled food chain showing first a producer (cabbage plant), a primary consumer (a slug), a secondary consumer (a robin), and a tertiary consumer (a hawk) with each connected correctly, showing the flow of energy from the producer to the primary consumer with an arrow pointing to the consumer. Student A expanded that same food web to create a food web while including another producer (kale) which was also connected to the slug, but then included another secondary consumer (a blue jay) that is similarly connected, as the robin is, to the hawk. Student A also explained (language function) that the amount of energy at each level of the food chain and food web would be less, resulting in fewer hawks than cabbage plants."

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Rubric 15: Using Assessment to Inform Instruction

How does the candidate use the analysis of what students know and are able to do to plan next steps in instruction?

Level 1	Level 2	Level 3	Level 4	Level 5
Next steps **do not follow** from the analysis. **OR** Next steps are **not relevant to the learning objectives** assessed. **OR** Next steps are **not described in sufficient detail** to understand them.	Next steps primarily **focus on changes to teaching practice that are superficially related to student learning needs,** for example, repeating instruction, pacing, or classroom management issues.	Next steps **propose general support that improves student learning related to assessed learning objectives**. Next steps are **loosely connected with research and/or theory**.	Next steps **provide targeted support to individuals or groups to improve their learning relative to** • **conceptual understanding,** • **use of scientific practices during inquiry, AND/OR** • **construction of evidence-based explanations of or reasonable predictions about a real-world phenomenon**. Next steps are **connected** with research and/or theory.	Next steps provide targeted support to individuals AND groups to improve their learning relative to • conceptual understanding, • use of scientific practices during inquiry, **AND/OR** • construction of evidence-based explanations of or reasonable predictions about a real-world phenomenon. Next steps are **justified with principles from** research and/or theory.

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Understanding Rubric Level Progressions: Rubric 15

The Guiding Question

The Guiding Question addresses how the candidate uses conclusions from the analysis of student work and research and/or theory to propose the next steps of instruction. Next steps should be related to the standards/objectives assessed and based on the assessment that was analyzed. The next steps should also address the whole class, groups with similar needs, and/or individual students.

Key Concepts of Rubric:

- N/A

Primary Source of Evidence:

Assessment Commentary **Prompts 1 and 4**

Scoring Decision Rules

Multiple Criteria	▪ Criterion 1 (**primary**): Next steps for instruction ▪ Criterion 2: Connections to research/theory ▪ Place greater weight or consideration on criterion 1 (next steps for instruction).
AUTOMATIC 1	▪ None

Unpacking Rubric Levels

Level 3

Evidence that demonstrates performance at <u>Level 3</u>:

- **Primary Criterion:** The next steps focus on support for student learning needs, as identified in the analysis of student work that is general for the whole class, not specifically targeted for individual students. The support addresses learning related to the learning objectives that were assessed.
- **Secondary Criterion:** The candidate refers to research or theory when describing the next steps. The connections between the research/theory and the next steps are vague/not clearly made.
- If evidence meets the primary criterion at Level 3, the rubric is scored at Level 3 **regardless of the evidence for the secondary criterion**.
- If evidence meets the primary criterion at Level 4, and candidate has NO connection to research/theory, the rubric is scored at Level 3.

Below 3

Evidence that demonstrates performance <u>below Level 3</u>:

- The next steps are not directly focused on student learning needs that were identified in the analysis of the assessment.
- Candidate does not explain how next steps are related to student learning.

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What distinguishes a Level 2 from a Level 3: At Level 2,

- The next steps are related to the analysis of student learning and the standards and learning objectives assessed. For example, the candidate would state, "As seen in the submitted student work samples (comparison worksheet and lab reports), the students have mastered the difference between meiosis and mitosis and so the next logical step would be a quiz over these concepts."
- The next steps address improvements in teaching practice that mainly focus on how the candidate structures or organizes learning tasks, with a superficial connection to student learning. There is little detail on the changes in relation to the assessed student learning. Examples include repeating instruction or focusing on improving conditions for learning such as pacing or classroom management, with no clear connections to how changes address the student learning needs identified.

What distinguishes a Level 1 from a Level 2: There are **three different ways** that evidence is scored at Level 1:

1. Next steps **do not follow from** the analysis.
2. Next steps are **unrelated to the standards and learning objectives** assessed.
3. Next steps are **not described in sufficient detail** to understand them, e.g., "more practice" or "go over the test."

Above 3

Evidence that demonstrates performance above Level 3:

- Next steps are based on the assessment results and provide scaffolded or structured support that is directly focused on specific student learning needs related to conceptual understanding, use of scientific practices during inquiry, and evidence-based argument about a scientific phenomenon.
- Next steps are supported by research and/or theory.

What distinguishes a Level 4 from a Level 3: At Level 4,

- The next steps are clearly aimed at supporting specific student needs for either individuals (2 or more students) or groups with similar needs related to one or more of the three areas of science learning (conceptual understanding, use of scientific practices during inquiry, AND/OR evidence-based explanations of or reasonable predictions about a real-world phenomenon). Candidate should be explicit about how next steps will strategically support individuals or groups and explain how that support will address each individual or group's needs in relation to the area of science learning (conceptual understanding, use of scientific practices during inquiry, AND evidence-based explanation of or reasonable prediction about a real-world phenomenon).
- The candidate discusses how the research and/or theory is related to the next steps in ways that make some level of sense given the students and central focus. They may cite the research or theory in their discussion, or they may refer to the ideas from the research. Either is acceptable, as long as they clearly connect the research/theory to their next steps. For example, the candidate would state, "The five students who have mastered lighting the Bunsen burner will use this skill to demonstrate for their classmates a study of convection currents in our geology class. The students will heat water in a beaker, add pepper flakes, and all will record the motion that the pepper flakes follow (rising with the less dense, heated water from the bottom of the beaker, close to the heat source to the top of the beaker where the water cools and becomes more dense, and sinking, again, along with the more

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dense water) thus applying the theory of active learning (Bonwell, 1991). This bonus activity will support the students' lab proficiency and will reinforce the skill that the others will need to master as we move into the follow unit that is more chemistry-based and will definitely use more lab equipment."

- Scoring decision rules: To score at Level 4, the candidate must meet the primary criterion at Level 4 and make at least a fleeting, relevant reference to research and/or theory (meet the second criterion at least at Level 3).

What distinguishes a Level 5 from a Level 4: At Level 5,

- The next steps are clearly aimed at supporting specific student needs for individuals AND groups with similar needs related to one or more of the three areas of science learning (conceptual understanding, use of scientific practices during inquiry AND evidence-based explanations of or reasonable predictions about a real-world phenomenon). Candidate should be explicit about how next steps will strategically support individuals AND groups and explain how that support will address each individual’s AND group’s needs in relation to the areas of science learning.
- The candidate explains how principles of research and/or theory support the proposed changes, with clear connections between the principles and the next steps. The explanations are explicit, well-articulated, and demonstrate a thorough understanding of the research or theoretical principles involved. For example, a candidate would write, "For the four gifted students who have mastered balancing equations with coefficients, I will review balancing chemical equations and then introduce the five types of reactions while modeling the use of the types of reactions to predict the products in reactions. For example, once the students understand that a synthesis reaction will always be a combination of two small reactants into one product, the students can then use the generic form of a synthesis reaction, along with the previously learned oxidation numbers, to combine the elements into real compounds with the correct molecular formula, thus writing the completed reaction. Vgotsky's Zone of Proximal Development (ZPD) describes the area between a child's level of independent performance (what he/she can do alone) and the child's level of assisted performance (what he/she can do with support). Skills and understandings contained within a child's ZPD are the ones that have not yet emerged but could emerge if the child engaged in interactions with knowledgeable others (peers and adults) or in other supportive contexts. The small group of students who have mastered balancing the equations, along with recognizing the types of reactions, will be able to work cooperatively to predict products in reactions where the reactants only are provided within their ZPD, while I continue to challenge the others who have not completely mastered balancing chemical equations."

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Secondary Science Evidence Chart

Your evidence must be submitted to the electronic portfolio management system used by your teacher preparation program. Your submission must conform to the artifact and commentary specifications for each task. This section provides instructions for all evidence types as well as a description of supported file types for evidence submission, number of files, response lengths, and other information regarding format specifications. Note that your evidence cannot contain hyperlinked content. Any web content you wish to include as part of your evidence must be submitted as a document file, which must conform to the file format and response length requirements. If you have materials that must be translated into English as per the *edTPA Submission Requirements*, those translations should be added to the original materials as part of the same file or, if applicable, to the end of the commentary template. There is no page limit for required translations into English.

Planning Task 1: Artifacts and Commentary Specifications

What to Submit	Supported File Types	Min # of Files	Max # of Files	Response Length	Additional Information
Part A: Context for Learning Information (template provided)	.doc; .docx; .odt; .pdf	1	1	**No more than 4 pages,** including prompts	▪ Use Arial 11-point type. ▪ Single space with 1-inch margins on all sides.
Part B: Lesson Plans for Learning Segment	.doc; .docx; .odt; .pdf	1	1	**No more than 4 pages per lesson**	▪ Submit 3–5 lesson plans in 1 file. ▪ Within the file, label each lesson plan (Lesson 1, Lesson 2, etc.). ▪ **All rationale or explanation for plans should be written in the Planning Commentary and removed from lesson plans.**
Part C: Instructional Materials	.doc; .docx; .odt; .pdf	1	1	**No more than 5 pages** of **KEY** instructional materials per lesson plan	▪ Submit all materials in 1 file. ▪ Within the file, label materials by corresponding lesson (Lesson 1 Instructional Materials, Lesson 2 Instructional Materials, etc.). ▪ Order materials as they are used in the learning segment.
Part D: Assessments	.doc; .docx; .odt; .pdf	1	1	No limit	▪ Submit assessments in 1 file. ▪ Within the file, label assessments by corresponding lesson (Lesson 1 Assessments, Lesson 2 Assessments, etc.). ▪ Order assessments as they are used in the learning segment.
Part E: Planning Commentary (template provided)	.doc; .docx; .odt; .pdf	1	1	**No more than 9 pages** of commentary, including prompts	▪ Use Arial 11-point type. ▪ Single space with 1-inch margins on all sides. ▪ Respond to prompts before teaching the learning segment.

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Instruction Task 2: Artifacts and Commentary Specifications

What to Submit	Supported File Types	Min # of Files	Max # of Files	Response Length	Additional Information
Part A: Video Clips[16]	asf, qt, mov, mpg, mpeg, avi, wmv, mp4, m4v	2	2	Running time **no more than 10 minutes each** (but not less than 3 minutes combined)	▪ Before you record your video, obtain permission from the parents/guardians of your students and from adults who appear on the video. ▪ Refer to Instruction Task 2, What Do I Need to Do? for video clip content and requirements. ▪ When naming each clip file, include the number of the lesson shown in the video clip.

Part B: Instruction Commentary
(template provided)
	.doc; .docx; .odt; .pdf	1	1	**No more than 6 pages** of commentary, including prompts
				
				If needed, **no more than 2 additional pages** of supporting documentation
					▪ Use Arial 11-point type.
					▪ Single space with 1-inch margins on all sides.
					
					IMPORTANT:
					▪ Insert documentation at the end of the commentary file if
					  ▪ you or the students are using graphics, texts, or images that are not clearly visible in the video
					  ▪ you chose to submit a transcript for occasionally inaudible portions of the video
					▪ If submitting documentation, include the video clip number, lesson number, and explanatory text (e.g., "Clip 1, lesson 2, text from a whiteboard that is not visible in the video," "Clip 2, lesson 4, transcription of a student response that is inaudible").

[16] **Video file size requirements:** The target file size is 200–300 MB or less. The Pearson ePortfolio System file size limit is 500 MB. Please note that each integrated platform provider portfolio system may have additional constraints or requirements regarding video formats and file sizes. You may need to use video tools to compress or transcode your video into smaller file sizes to facilitate uploading of the video. Refer to Recommended Video Formats and Settings on www.edtpa.com for the current requirements.

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Assessment Task 3: Artifacts and Commentary Specifications

What to Submit	Supported File Types	Min # of Files	Max # of Files	Response Length	Additional Information
Part A: Student Work Samples[17]	**For written work samples:** .doc; .docx; .odt; .pdf **For audio work samples:** asf, wmv, qt, mov, mpg, avi, mp3, wav, mp4, wma **For video work samples:** asf, qt, mov, mpg, mpeg, avi, wmv, mp4, m4v	3	3	No page limit for written work samples **No more than 5 minutes per focus student** for video or audio student work samples	▪ Use correction fluid, tape, or a felt-tip marker to mask or remove students' names, your name, and the name of the school before copying/scanning any work samples. If your students' writing is illegible, write a transcription directly on the work sample. ▪ On each work sample, indicate the student number (Student 1 Work Sample, Student 2 Work Sample, or Student 3 Work Sample). If more than one focus student appears in a video or audio work sample, upload the same work sample separately for each focus student who is seen/heard and label appropriately. Describe how to recognize each of the focus students in the clip and provide the label associated with the clip in prompt 1d of the Assessment Commentary. ▪ When naming each work sample file, include the student number. ▪ If you submit a student work sample or feedback as a video or audio clip and comments made by you or your focus student(s) cannot be clearly heard, do one of the following: 1) attach a transcription of the inaudible comments (**no more than 2 additional pages**) to the end of the Assessment Commentary; 2) embed quotes with time-stamp references in the commentary response; or 3) insert captions in the video (captions for this purpose will be considered permissible editing).

(Continued on next page)

[17] **Video file size requirements:** The target file size is 200–300 MB or less. The Pearson ePortfolio System file size limit is 500 MB. Please note that each integrated platform provider portfolio system may have additional constraints or requirements regarding video formats and file sizes. You may need to use video tools to compress or transcode your video into smaller file sizes to facilitate uploading of the video. Refer to Recommended Video Formats and Settings on www.edtpa.com for the current requirements.

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Assessment Task 3: Artifacts and Commentary Specifications (continued)

What to Submit	Supported File Types	Min # of Files	Max # of Files	Response Length	Additional Information
Part B: Evidence of Feedback[18] And, if included, video evidence of academic language use	**For written feedback not written on the work samples:** .doc; .docx; .odt; .pdf **For audio feedback:** asf, wmv, qt, mov, mpg, avi, mp3, wav, mp4, wma **For video clips (feedback and/or language use):** asf, qt, mov, mpg, mpeg, avi, wmv, mp4, m4v	0	4	No page limit for written feedback **No more than 3 minutes per focus student** for video or audio feedback **No more than 5 minutes** for video evidence of student language use	▪ Document the location of your evidence of feedback in the Assessment Commentary. ▪ If feedback is not included as part of the student work samples or recorded on the video clip(s) from Instruction Task 2, submit only 1 file for each focus student—a document, video file, **OR** audio file—and label the file with the corresponding student number (Student 1 Feedback, Student 2 Feedback, or Student 3 Feedback). ▪ If more than one focus student appears in a video or audio clip of feedback, upload the same clip separately for each focus student who is seen/heard and label appropriately. ▪ When naming each feedback file, include the student number. ▪ If you submit a student work sample or feedback as a video or audio clip and comments made by you or your focus student(s) cannot be clearly heard, do one of the following: 1) attach a transcription of the inaudible comments (**no more than 2 additional pages**) to the end of the Assessment Commentary; 2) embed quotes with time-stamp references in the commentary response; or 3) insert captions in the video (captions for this purpose will be considered permissible editing). ▪ For Academic Language – If you choose to submit a video clip of student language use, it should be **no more than 5 minutes**. You may identify a portion of a clip provided for Instruction Task 2 or submit an entirely new clip.

(Continued on next page)

[18] **Video file size requirements:** The target file size is 200–300 MB or less. The Pearson ePortfolio System file size limit is 500 MB. Please note that each integrated platform provider portfolio system may have additional constraints or requirements regarding video formats and file sizes. You may need to use video tools to compress or transcode your video into smaller file sizes to facilitate uploading of the video. Refer to Recommended Video Formats and Settings on www.edtpa.com for the current requirements.

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Assessment Task 3: Artifacts and Commentary Specifications (continued)

What to Submit	Supported File Types	Min # of Files	Max # of Files	Response Length	Additional Information
Part C: Assessment Commentary (template provided)	.doc; .docx; .odt; .pdf	1	1	**No more than 10 pages** of commentary, including prompts Plus ▪ **no more than 5 additional pages** for the chosen assessment, ▪ if necessary, **no more than 2 additional total pages of** transcription of video/audio evidence for a work sample and feedback, and/or video evidence of language use	▪ Use Arial 11-point type. ▪ Single space with 1-inch margins on all sides. **IMPORTANT:** Insert a copy of the chosen assessment, including directions/prompts provided to students.
Part D: Evaluation Criteria	.doc; .docx; .odt; .pdf	1	1	No limit	

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Secondary Science Glossary

Source citations for glossary entries are provided as footnotes in this section.

academic language: Oral and written language used for meaning making. AL is the "language of the discipline" used to engage students in learning and includes the means by which students develop and express content understandings. When completing their edTPA, candidates must consider the AL (i.e., **language demands**) present throughout the learning segment in order to support student learning and language development. The **language demands** include **language functions**; **vocabulary/symbols**; **grammatical structures**; and **written, visual, or verbal communication**.

- **language demand:**[19] Specific ways that academic language (function; vocabulary/symbols; grammatical structures; and written, visual, or verbal communication) is used by students to participate in learning tasks through reading, writing, listening, and/or speaking to demonstrate their disciplinary understanding and language development.
- **language development:** The process through which learners come to understand and communicate language. It is with and through language that students learn, think, and express information, ideas, perspectives, and questions orally and in writing. In Science, language development is characteristic patterns of interaction, ways of speaking, and modes of representing ideas when engaged in scientific practices.[20]
- **language functions:** The literacy-based skill that is being used for the learning task, typically represented by active verbs within the learning outcomes. Common language functions include Common language functions in science include analyzing scientific data; interpreting written investigative procedures, diagrams, figures, tables, graphs, and dense authoritative text; explaining models of scientific phenomena; predicting from models and data from scientific inquiries; justifying conclusions with scientific evidence; and so on.
- **vocabulary/symbols:** Words and phrases with subject-specific meanings that differ from meanings used in everyday life; general academic vocabulary used across disciplines; subject-specific words and/or symbols defined for use in the discipline[21]
- **written, visual, or verbal communication:** How members of the discipline talk, write, and participate in knowledge construction, using the structures of written and oral language; discipline-specific discourse has distinctive features or ways of structuring oral or written language (text structures) or representing knowledge visually.[22]

[19] O'Hara, S., Pritchard, R., & Zwiers, J. (2012). Identifying academic language demands in support of the common core standards. *ASCD Express, 7*(17).

[20] Cassata-Widera, A., Kato-Jones, Y., Duckles, J. M., Conezio, K., & French, L. (2008). Learning the Language of Science. *Journal of Learning*, 15(8) m142-149.

[21] Quinn, H., Lee, O., & Valdés, G. (2012). Language demands and opportunities in relation to next generation science standards for English language learners: What teachers need to know.

[22] Quinn, H., Lee, O., & Valdés, G. (2012). Language demands and opportunities in relation to next generation science standards for English language learners: What teachers need to know.

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- **grammatical structures (syntax):** The rules for organizing words or symbols together into phrases, clauses, sentences, or visual representations; to organize language in order to convey meaning [23]
- **language development supports:** The scaffolds, representations, and pedagogical strategies teachers provide to help learners understand, use, and practice the concepts and language they need to learn within disciplines (Santos, Darling-Hammond, Cheuk, 2012).[24] The language supports planned within the lessons in edTPA should directly support learners to understand and use identified language demands (vocabulary/symbols; language function; grammatical structures; and written, visual, or verbal communication) to deepen content understandings.

aligned: Standards, objectives, instructional strategies and learning tasks are "aligned" when they consistently address the same/similar learning outcomes for students.

artifacts: Authentic work completed by you and your students including lesson plans, copies of instructional and assessment materials, video clips of your teaching, and student work samples. Artifacts are submitted as part of your evidence.

assessment (formal and informal): "[R]efer[s] to all those activities undertaken by teachers and by their students . . . that provide information to be used as feedback to modify the teaching and learning activities."[25] Assessments provide evidence of students' prior knowledge, thinking, or learning in order to evaluate what students understand and how they are thinking. Some examples of informal assessments are student questions and responses during instruction and teacher observations of students as they work or perform. Some examples of formal assessments are quizzes, homework assignments, lab reports, journals, projects, and performance tasks.

assets (knowledge of students):

- **personal:** refers to specific background information that students bring to the learning environment. Students may bring interests, knowledge, everyday experiences, family backgrounds, and so on, which a teacher can draw upon to support learning.
- **community:** refers to common backgrounds and experiences that students bring from the community where they live, such as resources, local landmarks, community events and practices, and so on, that a teacher can draw upon to support learning.

central focus: A description of the important understandings and core concepts that you want students to develop within the learning segment. The central focus should go beyond a list of facts and skills or procedures, align with content standards and learning objectives, and address the subject-specific components in the learning segment. For example, the subject-specific components for secondary science are conceptual understanding, use of scientific practices during inquiry, and evidence-based explanations of or reasonable predictions about a real-world phenomenon. A central focus for the learning segment might be inheritance of traits. The learning segment would focus on conceptual understandings of genotypes, phenotypes, dominant genes, and so on, an investigation of how relationships

[23] Zwiers, J. (2008). *Building academic language: Essential practices for content classrooms.* San Francisco, CA: Jossey-Bass.

[24] Santos, M., Darling-Hammond, L., & Cheuk, T. (2012). Teacher development to support English language learners in the context of common core state standards. Stanford University Understanding Language.

[25] Black, P., & Wiliam, D. (1998). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan, 80*(2), 139–148.

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between genotypes are expressed in phenotypes, and an explanation of how these relationships would affect distributions of phenotypes in a population.

commentary: Submitted as part of each task and, along with artifacts, make up your evidence. The commentaries should be written to explain the rationale behind your teaching decisions and to analyze and reflect on what you have learned about your teaching practice and your students' learning.

data: Information that is collected during an experiment or investigation to better understand a real-world phenomenon or to evaluate a prediction. This includes quantitative data—such as temperature values, numbers of offspring, calculated relationships between variables from empirical investigations or mathematical models—or qualitative data—such as color changes, descriptions of crystal formation, and descriptions of relationships between variables based on models or maps.

deficit thinking: Thinking that is revealed when candidates explain low academic performance based primarily on students' backgrounds, the challenges they face outside of school or from lack of family support. When this leads to a pattern of low expectations, not taking responsibility for providing appropriate support, or not acknowledging any student strengths, this is a deficit view

developmentally inappropriate feedback: Feedback addressing concepts, skills, or procedures well above or below the content assessed (without clearly identified need) OR feedback that is not appropriate for the developmental level of the student (e.g., lengthy written explanations for English learners or feedback to a student with an explanation that references a concept later in the curriculum).

engaging students in learning: Using instructional and motivational strategies that promote students' active involvement in learning tasks that increase their knowledge, skills, and abilities related to specific learning objectives. Engagement in learning contrasts with student participation in learning tasks that are not well designed and/or implemented and do not increase student learning.

evaluation criteria: Evaluation criteria should indicate differences in level of performance, e.g., a rubric, a checklist of desired attributes, points assigned to different parts of the assessment. Summative grades are not evaluation criteria. Evaluation criteria must be relevant to the learning objectives, though they may also include attention to other desired features of the assessment response, e.g., neatness, spelling

evidence-based explanation: An evidence-based explanation of a phenomenon includes a claim (statement) about the underlying cause using scientific concepts or principle(s), consistent with scientific evidence or data.

evaluation criteria: Performance indicators or dimensions that are used to assess evidence of student learning. They indicate the qualities by which levels of performance can be differentiated and that anchor judgments about the learner's degree of success on an assessment. Evaluation criteria can be represented in various ways, such as a rubric, a point system for different levels of performance, or rules for awarding full versus partial credit. Evaluation criteria may examine correctness/accuracy, cognitive complexity, sophistication or elaboration of responses, or quality of explanations.

evidence (candidate): Consists of **artifacts** that document how you planned and implemented instruction **AND commentaries** that explain your plans and what is seen in the

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video recording(s) or examine what you learned about your teaching practice and your students' learning. Evidence should demonstrate your ability to design lesson plans with instructional supports that deepen student learning, use knowledge of your students to inform instruction, foster a positive learning environment that promotes student learning, monitor and assess student progress toward learning objectives, and analyze your teaching effectiveness. Your evidence must be submitted electronically using the electronic portfolio management system used by your teacher preparation program.

evidence-based explanation: An evidence-based explanation of a phenomenon includes a claim (statement) about the underlying cause using scientific concepts or principle(s), consistent with scientific evidence and/or data.

evidence (scientific): Information about the phenomenon from systematic observations or models (conceptual, mathematical, physical, and empirical). Evidence can be generated by the students or provided from a trustworthy source that provides some assurance that the evidence collected meets scientific standards. If mathematical models are used, the analysis should focus on patterns of relationships between variables and not solutions for problem sets. Examples of a variety of evidence include: geological maps; pressures and temperatures collected via computer simulation in gas law experimentation; photographs used in food web organization; length measurements of bacteria, nuclei, and mitochondria using electron micrographs.

learning environment: The designed physical and emotional context, established and maintained throughout the learning segment to support a positive and productive learning experience for students.

learning objectives: Student learning outcomes to be achieved by the end of the lesson or learning segment.

learning segment: A set of 3–5 lessons that build one upon another toward a central focus, with a clearly defined beginning and end.

learning task: Includes activities, discussions, or other modes of participation that engage students to develop, practice, and apply skills and knowledge related to a specific learning goal. Learning tasks may be scaffolded to connect prior knowledge to new knowledge and often include formative assessment.

making predictions: Making predictions is constructing a claim (statement) about the phenomenon based on the gathered scientific data and/or evidence.

meaning making: The process by which learners make connections with prior knowledge and experiences (i.e., interpreting texts; composing texts; engaging in research; participating in discussions; speaking with others; and listening to, viewing, and giving presentations) and actively construct knowledge by engaging with content in a meaningful and relevant way.

patterns of learning: Includes **both** quantitative and qualitative patterns (or consistencies) for different groups of students or individuals. Quantitative patterns indicate in a numerical way the information understood from the assessment (e.g., 10 out of 15 students or 20% of the students). Qualitative patterns include descriptions of understandings, misunderstandings, and/or partial understandings that could explain the quantitative patterns (e.g., "given that most students were able to . . . it seems that they understand").

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planned supports: Instructional strategies, learning tasks and materials, and other resources deliberately designed to facilitate student learning of the central focus.

preconceptions: Student ideas about the physical and biological worlds and how they work or about the nature of science, based on their observations, experiences, and what they have heard.

prior academic learning and/or prerequisite skills: Includes students' content knowledge and skills as well as academic experiences developed prior to the learning segment.

rapport: A close and harmonious relationship in which the people or groups understand each other's feelings or ideas and communicate well.

respect: A positive feeling of esteem or deference for a person and specific actions and conduct representative of that esteem. Respect can be a specific feeling of regard for the actual qualities of the one respected. It can also be conduct in accord with a specific ethic of respect. Rude conduct is usually considered to indicate a lack of respect, ***disrespect***, whereas actions that honor somebody or something indicate respect. Note that respectful actions and conduct may be context dependent.

rubrics: Subject-specific evaluation criteria used to score your performance on edTPA. These rubrics are included in the handbook, following the directions for each task. The descriptors in the five-level rubrics address a wide range of performance, beginning with the knowledge and skills of a novice not ready to teach (Level 1) and extending to the advanced practices of a highly accomplished beginner (Level 5).

scientific practices through inquiry: The practices, as defined by the Next Generation of Science Standards, focus on eight key components:

- Asking questions
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

significant content inaccuracies: Content flaws in commentary explanations, lesson plans, or instructional materials that will lead to student misunderstandings and the need for reteaching.

scientific practices through inquiry: Scientific practices, as defined by the *Next Generation Science Standards,* focus on eight key components:

- Asking questions
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data

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- Using mathematics and computational thinking
- Constructing explanations
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

variety of learners: Students in your class who may require different strategies or support. These students include but are not limited to students with IEPs or 504 plans, English learners, struggling readers, underperforming students or those with gaps in academic knowledge, and/or gifted students.

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Appendix: Academic Language

Language Demands

I. Functions

Definition	Examples (bolded and underlined within learning objectives)
▪ Purposes for which language is used. ▪ Content and language focus of learning tasks often represented by the **active verbs within the learning outcomes**.	Learning Objectives: ▪ Students will be able to **compare** the densities of various objects in the classroom. ▪ Students will be able to **explain** the difference between a food chain and a food web. ▪ Students will be able to **describe** processes and procedures used in an experiment.

II. Vocabulary/Symbols—Includes words, phrases, and symbols used within disciplines

Definition	Examples
Words and phrases with subject-specific meanings that differ from meanings used in everyday life	table, control, alcohol, balance, cell, producer
General academic vocabulary used across disciplines	compare, contrast, analyze, evaluate, summarize, justify, explain, interpret, classify
Subject-specific vocabulary/symbols defined for use in the discipline	proton, food web, photosynthesis, density, acceleration due to gravity (g) , hypothesis, K = potassium, atomic number

III. Written, Visual, or Verbal Communication

Definition	Examples
▪ How members of the discipline talk, write, and participate in knowledge construction, using the structures of written and oral language ▪ Discipline-specific written, visual, or verbal communication has distinctive features or ways of structuring oral or written language (text structures) or representing knowledge visually.	▪ Completing lab reports ▪ Writing analysis & conclusions sections of lab reports ▪ Interpreting graphic representations (e.g., graphs, diagrams) ▪ Explaining materials lists ▪ Analyzing tabular representations

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IV. Grammatical Structures (Syntax)

Definition	Examples

▪ The rules for organizing words or symbols together into phrases, clauses, sentences, or visual representations
▪ One of the main functions of grammatical structures is to organize language in order to convey meaning.
	▪ **Mathematical sentences (using words or symbols) including**
	  ▪ Formulas, D = m/V or Density equals mass divided by volume
	▪ **Symbols replacing reactants and products in chemical reactions**
	  ▪ Write the symbolic representation for the combustion of methane.
	▪ **Punnett Squares.**
	  ▪ If a heterozygous, black-furred male rabbit is crossed with a homozygous recessive, white-furred female rabbit, what resultant offspring genotypes could occur?

Example of Planned Language Development Supports

To help programs and candidates begin to develop their understanding of language development supports, **start by examining a key standard or learning objective.**

The chart below identifies sample language demands with related examples of supports based on one selected science standard.

Example standard from NGSS for Chemistry (HS-PS1-5): Students will ***apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which the reaction occurs.***

Identified Language Demands	Planned Language Development Supports
Explain (Function)	Model an explanation that includes data gathered from school's ski team to account for the slope conditions that are best for fast downhill runs while skiing or snowboarding
Molarity, [R] = concentration of reactant in *M*, temperature in °C, reaction rate (Vocabulary/Symbols)	Review symbols and vocabulary from guided notes
Constructing analyses (Grammatical Structures)	Provide sentence stems to help students explain the relationship observed for temperature to reaction rate. For example: When the concentration of NaOH (aq) was ___ *M* the reaction started in _____s and when the concentration of the reactant was ____*M* the reaction started in ____s which shows a(n) direct/indirect relationship (circle one of the underlined words). As concentration increases/decreases the reaction rate _____.

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