**DOK and Degree of Dimensional Sense-Making in Science Assessments FAQ**

**Why is Dimensional Sense-Making more applicable to Science Assessments than DOK?**

The OAS-Science are 3-dimensional standards that pose a different definition of proficiency than that from previous versions of science standards. 3-dimensional standards reflect both how a student learns and how a student demonstrates proficiency combined with a meaningful application of the understanding. While assessing 3D standards, the assessment items are always phenomenon-driven, where a student is required to use their knowledge and understanding to make sense of a given scenario or phenomenon using common Science and Engineering Practices.

DOK tends to base the complexity solely on the degree of understanding needed from the DCI knowledge while ignoring the application of that knowledge to make sense of the phenomenon. The Degree of Dimensional Sense-Making not only accounts for the depth of understanding needed, but also additionally accounts for the complexity of using that knowledge to make sense of the given phenomenon. Many times in 3D assessments, the knowledge required can naturally be of a lower complexity while the task needed to demonstrate that knowledge is of a higher complexity, or vice-versa. Therefore, Dimensional Sense-Making is a better way to assess the overall complexity of items on the OSTP and CCRA Science.

**What is Depth of Knowledge (DOK)?**

Depth of Knowledge is a way to measure complexity of an assessment item ranging from basic recall to extended thinking. An item at lowest level of DOK only requires a student to perform tasks with basic recall of past knowledge, while each step up in a level requires further application of knowledge or concepts than the level prior. DOK has 4 levels that can each be classified by a simple question:

1. What is the knowledge?
2. How can the knowledge be used?
3. Why can the knowledge be used?
4. What else can be done with the knowledge?

**What is Degree of Dimensional Sense-making?**

Degree of Dimensional Sense-Making is a tool used to assess the cognitive complexity of an assessment item. Cognitive complexity refers to the kind of thinking required to complete a task. Unlike prior tools for assessing the complexity of items on an assessment, Dimensional Sense-Making does not relate to the verbs in the question, but rather the degree of sense-making required on the student’s behalf. Unlike DOK, the degree of Dimensional Sense-Making of 3D items measures the depth of engagement with each dimension of an assessed standard and the alignment to the assessed standard or performance expectation. Per the test and item specifications, all items on both the OSTP and CCRA Science require engagement with at least 2 dimensions. Additionally, Dimensional Sense-Making is limited by the amount of scaffolding present in an item, with items of a higher degrees of Dimensional Sense-Making having little to no scaffolding.

**How is Sense-Making defined in Cognitive Complexity?**

Sense-making or “making sense” is defined as students connecting their understanding and abilities to new information to develop understanding of the scenario presented. The student should be using their knowledge or understanding to develop further understanding, rather than representing prior knowledge. Sense-making should require the student to do at least one of the following:

* Identify and generate evidence
* Apply evidence to claims/ideas with reasoning
* Evaluate or critique claims
* Generate questions to guide exploration of a phenomenon or problem presented

**How does DOK differ from Dimensional Sense-making in Science Assessments?**

Depth of Knowledge defines complexity based on “knowing” and the extent to which that “knowing” is utilized by a task. At the lowest levels, DOK complexity only requires recalling of the knowledge, and at the highest levels, items require application of knowledge.

Dimensional Sense-Making defines not only the complexity of the item, but also the alignment to the standard by assessing the depth of engagement with the dimensions. This categorization of complexity lends itself more to 3D standards as proficiency requires more than just knowing or understanding the concepts.

**What are the different Degrees of Dimensional Sense-Making?**

Similar to DOK, Dimensional Sense-Making has 4 distinct levels of complexity based on the alignment with the dimensions, degree of sense-making required, and the amount of scaffolding present. The 4 levels are defined below, ranging from lowest to highest.

**Scripted** – Only one dimension relied upon; or one dimension foregrounded, with the other backgrounded

* Extensive scaffolding
* Little to no sense-making required

**Low Guided** – Multidimensional, with one dimension still heavily foregrounded over the other(s).

* Moderate scaffolding
* Low degree of sense-making required

**High Guided** – Multidimensional, with at least 2 dimensions being used equally, or foregrounded

* Minimal Scaffolding
* High degree of sense-making required

**Doing Science** – All 3 dimensions are foregrounded, centered on student-designed exploration of science

* Limited to no scaffolding
* Students required to “do science” as they develop or deepen understanding of a scientific idea as they explore a phenomenon

**What is the difference between Backgrounded and Foregrounded Dimensions?**

Backgrounded dimensions are categorized by the possibility for a student to use the dimension, but not necessarily required for all students or for every approach. A backgrounded dimension tends to have a very limited application and is not used in sense-making. Often a single component is drawn upon rather than multiple parts or even the entire dimension as is seen in foregrounded dimensions.

Foregrounded dimensions are categorized by their necessity in sense-making done by the student. Usually the dimension is used in a sophisticated way rather than just a basic connection or application as in backgrounded dimensions. Foregrounded dimensions are used to either bridge a gap in other dimensions (i.e. CCC used to bridge gap in DCI knowledge) or connect another dimension of the standard to the phenomenon (i.e. SEP used to connect DCI knowledge to the phenomenon).

Backgrounded and foregrounded refer to use of a dimension in a specific item or cluster and has nothing to do with the classification of the dimension in the standard itself. That being said, a dimension can change classifications – backgrounded, foregrounded, or even absent – from item to item within a cluster depending on its specific use within an item.

**What is scaffolding and how is it defined in cognitive complexity?**

Scaffolding refers to the information given to the student through the stimulus/items that could be used to guide the student in their sense-making. Scaffolding also limits the amount of background knowledge and skills that the student needs to access to correctly answer an item. As a result of the CCRA Science blueprint, clusters on that assessment will naturally have some degree of scaffolding present to make them accessible for all students, regardless of the science course path they may have taken prior to the assessment (Physical Science, Chemistry, or Physics).

Scaffolding has a large impact on the cognitive complexity of an item. Items that help to lead a student along in their sense-making tend to be of a lower cognitive complexity, whereas items requiring the student to do more of their own sense-making have a higher cognitive complexity. Cognitive complexity is based on a combination of the depth of engagement with the dimensions and the amount of scaffolding; however, scaffolding does have a bigger impact on the overall cognitive complexity.

**More information regarding the development and of the OSTP and CCRA Science Assessments can be found in the Test and Item Specifications.**

[**CCRA Test and Item Specifications**](https://sde.ok.gov/sites/default/files/documents/files/OSTP_2018-19_TIS_Sci_G11_web.pdf)

[**OSTP Science Test and Item Specifications – Grade 5**](https://sde.ok.gov/sites/default/files/documents/files/OSTP_2018-19_TIS_Sci_G5_web.pdf)

[**OSTP Science Test and Item Specifications – Grade 8**](https://sde.ok.gov/sites/default/files/documents/files/OSTP_2018-19_TIS_Sci_G8_web.pdf)