Unwrapping Depth-of-Knowledge

Cognitive complexity refers to the cognitive demand one would need to complete a task. Norman Webb's (2002) Depth-of-Knowledge (**DOK**) framework is one way to measure cognitive complexity and analyze various aspects of teaching and learning. Webb's DOK framework is divided into four levels. DOK levels relate the cognitive demand relative to what the student is doing by differentiating the amount of reasoning and the type and level of thinking required to complete the task.

Level	Description of Level	Characteristics of Level
DOK 1	**Recall and Reproduction**: Requires students to receive or recite facts or to use simple skills or abilities to recall and reproduce data, definitions, details, facts, information, and procedures	• A single right answer • Basic Calculations • Can Google the Answer • Recall of Facts • Highly Procedural
DOK 2	**Skills and Concepts:** Includes the engagement of some mental processing and requires students to use academic concepts and cognitive skills to answer questions, address problems, accomplish tasks, and analyze texts and topics.	• Usually involves multiple steps • One right answer/routine • Applying knowledge • It is not simply more than one step; it's applying more than one concept or process
DOK 3	**Strategic Thinking** Requires reasoning, planning, and use of evidence to explain how and why concepts, ideas, operations, and procedures can be used to attain and explain answers, conclusions, decisions, outcomes, reasons, and/or results.	• Usually more than one way to get an answer • Multiple correct answers exist • Involves planning, evidence, and some aspect of open-endedness • Asks for justification or support • Non-routine, integrating multiple concepts
DOK 4	**Extended Thinking** Requires thinking extensively about what else can be done, how else can learning be used, and how could the student personally use what they have learned in different academic and real-world contexts.	• Usually spans across time • Project based with multiple resources and extensive planning • Innovation and creativity drawing from multiple resources

Although Webb's levels are labeled one to four, they are not linear and should not be interpreted as steps. In other words, a student does not have to start with level one before they can engage with a task at level four. However, there are level-one tasks that we just need to know and be able to recall (i.e., automaticity of math facts).

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DOK Considerations

- **DOK is not the same as difficulty.**
  Difficulty refers to the likelihood that the student will respond correctly and examines how much effort is needed (i.e., easy or hard) and/or how many people can answer the question correctly. In contrast, *complexity* refers to the mental processes required to complete the task. **Complexity** measures the kind of thinking (i.e., routine, non-routine), action, or knowledge that must be demonstrated and/or how many different ways a question can be answered, a problem can be addressed, or a task can be accomplished. DOK allows us to differentiate complexity from difficulty.

- **DOK** is a reflective lens used to foster intentionality in teachers' practices, to help ensure
  - that the complexity of learning expectations is clearly understood,
  - that formative/summative/etc. assessments provide opportunities to make reasonable inferences about the student's attainment of learning expectations, and
  - that educational opportunities allow students to engage at the level(s) of complexity intended.

- **DOK** is not a value judgment and does not reflect importance. In other words, there is no idea inherent to DOK that any level of DOK is "better" than any other. The academic standards or other learning objectives specify what is important.

- **Guiding questions to consider when determining the cognitive complexity of a question, standard objective, or classroom activity may include the following:**

  - How many steps must students take to answer the question?
  - Are the steps procedural or decisional?
  - What is the complexity of the thought process needed to answer the question?
  - Is this more of a unique situation or does it mimic a practiced situation?
  - How many possible responses could be considered correct?
  - Does the question merely require identification or a definition?
  - Does the question require the application of a skill to a unique situation?
  - Does the question require analysis of a situation and decisions about what method(s) to use for solving?

References

Webb, N., (2002) Depth-of-knowledge for four content areas.
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