

DF03: 4 PM Defining “Conceptual Understanding” Through Appropriate Constraints on a Knowledge Domain

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For an expert, “understanding” of a particular concept refers merely to an arbitrarily circumscribed portion of a broad array of tightly interconnected knowledge elements. In the expert’s mind, the domain of all knowledge elements is hierarchically organized and densely interlinked, with multiple access paths to any particular subdomain. When assessing student understanding one must select a subdomain of both elements and links, chosen as appropriate for a given level of student preparation. The extent to which the student demonstrates facility with ideas in this selected subdomain can serve as a definition of “conceptual understanding” in a particular context. Understanding so defined is always implicitly constrained by the boundary selected to define the subdomain. I will give concrete illustrations of these ideas with student response data related to concepts in electromagnetism and thermal physics, as well as other topics.

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