

# **Towards a Modeling Framework for Assessment of Scientific Reasoning**

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Ability in scientific thinking and reasoning has been emphasized as a core area of 21<sup>st</sup> century education. Although there is a rich literature on studies of various aspects of how this ability develops in students across grade levels, the research community has not reached consensus on its definition, modeling, or assessment. To advance research in this important area, a coherent and operational modeling framework is needed that can practically guide instruction and subsequent assessment. For decades, the only instrument available for large-scale application was Lawson's Classroom Test of Scientific Reasoning, but the instrument has demonstrated validity weaknesses and ceiling limitations. As a result, there is urgent need for the development of a valid and updated scientific reasoning assessment instrument that is based on a coherent model and targets the wide-ranging skills required for 21<sup>st</sup> century learners. This talk reports on the development of a comprehensive modeling framework for scientific reasoning along with a new assessment instrument. The modeling framework integrates research in scientific and causal reasoning and operationally defines the skills and subskills that underlie the reasoning necessary for the generation of knowledge through scientific inquiry. This framework is then used to guide the development of an assessment for scientific reasoning. The validity and reliability of the instrument, which have been established based on large-scale testing, will also be discussed.