

Design Patterns: Creating Evidence-centered Assessment Tasks

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Question(s) for Discussion: What is the best approach to guide the design of assessment tasks?

Session Description: This session will describe an interdisciplinary design methodology, design patterns, for improving the validity of inferences about the performance of students on science assessments. The presentations will describe the framework of evidence-centered assessment design (ECD) and focus, in particular, on the layer of ECD referred to as *domain modeling*. Design patterns are a conceptual tool to guide assessment designers through the complex decisions prerequisite to the development of assessment tasks. Findings are intended to speak to curriculum embedded, formative, and large-scale test developers, educational researchers, as well as those interested in building assessments that must serve students with special needs.

Architects and software engineers use the term *design pattern* for knowledge structures that characterize recurring problems and approaches for dealing with them. Design patterns organize experience across many particular situations in ways that help a designer recognize and tackle challenges, such as planning work flow in a kitchen or generating software objects. Design patterns for assessment design, likewise, help domain experts and assessment specialists “fill in the slots” of an assessment argument built around recurring themes in learning (Mislevy et al., 2003). This presentation will (1) present the structure of the assessment design patterns developed in the NSF-supported Principled Assessment Design for Inquiry (PADI) project; (2) relate the attributes of a design pattern to assessment arguments; (3) describe how design patterns set up a “design space” for various kinds of assessment tasks revolving around some aspect of knowledge, skill, or aptitude; and (4) provide examples of three practical assessment projects that describe how the design pattern concept has been extended and adapted to support the conceptualization of complex, multi-step assessment tasks.

We will present two papers. The first will be by Robert Mislevy and will introduce the audience to the concept of design patterns. Mislevy will provide a brief chronology of the conceptualization and development of design patterns over the past decade. Attributes of assessment design patterns will be specified, defined, and related to the components of an assessment argument (warrants, claims, backing, and the student, evidence, and task models). Knowledge representations that relate design patterns to the process of evidence-centered design will be presented. Mislevy will report what has been learned about the use of design patterns through project work over the past eight years. This presentation will conclude with a detailed description of the role that the patterns might play as more complex theories of learning emerge requiring modeling of more sophisticated, multidimensional knowledge and skills for complex, integrated, multi-step assessment performances. The second, presentation, by Dr. Geneva Haertel, will focus on three particular implementations of design pattern to support the development of assessment tasks in three ongoing science assessment projects. Opportunities will be provided for questions and answers. The presentation will include a demonstration of the process by which a design pattern is developed. Audience participation will be encouraged during the design pattern development.