

# Chapter 15

## Domain Theory for Instruction: Mapping Attainments to Enable Learner-Centered Education

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### Editors' Foreword

#### Vision

- Learner-centered, customized instruction that maps student progress
- A tool for mapping progressive attainments

#### Quantitative Domain Mapping (QDM)

- Is a subset of Domain Theory and of Validity-Centered Design
- Internal validity assures alignment of assessment and instruction.
- The goal is to map (describe pathways graphically for learning in) a domain of knowledge and expertise supported by theory and data.
- A domain map includes:
  - Major attainments with boundaries (easiest and hardest versions) of attainments
  - Categories of attainments (pathways)
  - Sequences of attainments along each pathway

#### Method for Quantitative Domain Mapping

1. Analyze a domain to identify its attainments.
  - Hierarchically structured domains with a strong prerequisite structure require different domain analysis methods.
2. Synthesize work models as the assessment blueprints.
  - Combine performance processes into work models to bring a sense of real-world relevance.
3. Create testlets or item bundles.
  - They should be linked to each work model and each constituent attainment.
4. Identify the dimensionality of the domain.
  - Dimensions or pathways are categories of expertise.
5. Create a testable theory of progressive attainments (domain story).
  - Confirm the hypothesized number of dimensions.
  - Hypothesize an order for how the attainments in each dimension are best learned.
  - Create a domain map with an interpretive story.
6. Confirm or disconfirm and correct the theory of progressive attainments.
  - Administer the testlets and revise the domain map and story as indicated by the data.
7. Design the next iteration and begin again.
  - Additional cycles of tryout and revision are performed as appropriate.

#### Implications for instructional design and technology

- Promises to significantly improve progress in educational research and practice
- Impacts instructional design specifically by providing scope and sequence for a domain
- Allows for learners to gain progress-sensitive feedback
- QDM lays the foundation for a fully articulated descriptive system.