

Developing Prescriptive Taxonomies for Distance Learning Instructional Design

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*There are simple answers to all complex problems ...
and they are uniformly wrong.*

-- H.L. Mencken

INTRODUCTION

One of the central problems and corresponding challenges facing the multidisciplinary fields of distance learning and instructional design has been in the construction of theory-grounded, research-based taxonomies for prescribing what particular strategies and approaches should be employed when, how, and in what combination to be most effective and efficient for teaching specific knowledge domains and performance outcomes. While numerous scholars and practitioners across a wide range of associated instructional design fields have created a rich variety of effective, efficient, and very current prescriptions for obtaining specific learning outcomes in specific situations (Anderson & Elloumi, 2004; Marzano, 2000; Merrill, 2002a; Nelson & Stolterman, 2003; Reigeluth, 1999a; Shedroff, 1999; Wiley, 2002), to date, no single theory-grounded and research-verified unifying taxonomic scheme has successfully emerged to address all existing and potential educational problems across the phenomena of human learning and performance.

BACKGROUND

Descriptive taxonomies developed in educational theory and practice have provided rich organizational schema for classifying the structure of conditions for learning describing the approaches, types, events, methods, and goals of instruction (Gagne, 1977). While affective and psychomotor capabilities have gained increasing importance (Krathwohl, Bloom & Masia, 1964; Martin & Briggs, 1986), classic instructional design theory has tended to focus on the cognitive domain, as exempli-

fied by the widely adopted hierarchical taxonomies of Bloom (1956) and Gagne, Briggs, and Wager (1992). There have been serious efforts to revise and update *Bloom's Taxonomy* with the applied focus towards more specific and pragmatic "best practice" teaching strategies in instruction (Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich, et al., 2000). However, few correspondingly robust prescriptive taxonomies have emerged to encompass the optimal design solutions for distance education and online e-learning professions. This article examines the critical issues involved with understanding the nature and function of prescriptive educational taxonomies for improving the efficiency and effectiveness of rigorous instructional design solutions adaptable and applicable to the burgeoning field of online learning, user-centered design, and technologically distributed distance learning environments.

MAIN FOCUS: INSTRUCTIONAL TAXONOMIES - WHAT THEY ARE AND WHY THEY MATTER

In his hallmark narrative work on the complexities of successfully building a learning environment, media pioneer Edgar Dale identified important considerations for the development of any prescriptive taxonomy for instruction, as well as this encyclopedia broadly conceived:

Indeed product and process must not be separated, any more than we would separate form and content ... A major issue in all learning deals with the processes by which learning experiences become structured, organized, mapped, patterned, clustered, and systemized. We group experiences, using some kind of framework, paradigm ... schema, summary, matrix, model, unit, brief, diagram, category, concept, hierarchy, grid, or outline. We use hierarchies, superordination and subordination ... All these terms indicate a linking, a

relating of experience on the basis of their differences and likenesses. Process and product, form and content become fused, structured. (pp. 82-83)

Human learning and the collateral formation, representation, acquisition, generation, and creation of knowledge in the mind of the learner are unquestionably immensely ill-structured and complex human problems (Reigeluth, 1999b). Philosophers and scholars have explored, for ages, questions of ontology and epistemology, and numerous competing schools of thought (i.e., instructional design paradigms) have developed across a wide array of knowledge domains (Richey, 1986; Visscher-Voerman & Gustafson, 2004). The enactive, intentional, unifying higher-order problem-solving endeavor is *design* itself, and numerous universal principles, exemplars, and epitomes of design have emerged (Lidwell, Holden, & Butler, 2003). “Designing is, therefore, more than ordering and arranging, more than constructing. It is composing. It is using the codes and pattern languages of a domain to create wholes with not only parts and relationships but also ordering-underlying principles (Rowland, 2004, p. 40).” Critical in this human design process for instruction are systems thinking, creativity and evaluative judgment, metacognitive awareness, and the seemingly paradoxical nurturance for an eclectic, broad-minded tolerance for ambiguity while simultaneously possessing a pragmatically strong drive towards tangible closure (i.e., deliverables) in the design activity (Lasnik, 2003b). To illustrate the relative complexity of this phenomenon, an easy-to-grasp architectural analogy is provided in Table 1.

First Principles of Prescriptive Theory: The Taxonomic Function

The critical problem of taxonomic formulation is to provide a cogent, comprehensive, conceptual model of phenomena that is (a) dynamic (capable of change), and robust (representing all relevant attributes) without being reductionist, and (b) parsimonious (graspable, usable) without being an oversimplification. Two broadly adopted exemplars are the classification schemes of Carl Linnaeus (i.e., his 1735 System Naturae that evolved into modern biology’s kingdom, phylum, class, order, family, genus, and species schema) and Dmitrii Mendeleev (i.e., his 1889 Periodic Law of the Chemical Elements that evolved into today’s Periodic Table). Mendeleev’s perspicacious insights into the nature of atomic structure arguably rank him with Albert Einstein as the paradigm-shifting geniuses of modern science. Moreover, the Periodic Table has provided a unified scaffolding between the detailed description of matter and the effective prediction about how that matter will behave. In other words, a single, well-organized, seemingly simple diagram in fact illustrates a highly sophisticated metageography literally encompassing the known universe and simultaneously explaining how all matter within that universe will interact (Atkins, 1995). This is the fundamental character of prescriptive theory: the power to explain and to predict. It is arguable whether a verifiable unified theory of learning and instruction can be found, is even desirable, and ultimately whether learning, instruction, and the active construction of knowledge are even truly capable of a single, complete prescriptive taxonomic classification. It is the premise of this article that such a comprehensive architecture will one day emerge.

Table 1. Simple analogical model of e-learning environments

BUILDING ARCHITECTURE	E-LEARNING ARCHITECTURE
Buildings, structures, bridges	Courses, scope & sequence (curricula)
Macrodesign form, leitmotif, treatment	Instructional design approaches/models
Purpose & function of building	Information design
Properties of materials	Media design
Patterns of interior/exterior space	Interactivity design
Structure lifecycle (repair, modification)	Iterative courseware design (improvement)
Settlements, zones, cities	Lesson activities, modules, units
Power, water, air, transportation	Courseware management infrastructure

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