

Unit 4

Tools for Building a Common Knowledge Base

Unit Foreword

Unit 4 addresses what we feel are some of the more promising conceptual tools for advancing the field of instructional-event theory. The variety of cognitive tools we outline here is, of course, by no means exhaustive of all the tools that may be useful for advancing a common knowledge base, but we find these to be the most compelling, as we outline below.

In chapter 14, Andrew Gibbons and Clint Rogers offer us layers as a tool. Because of its great value in understanding instructional theories (as well as for building them), we briefly summarized this in chapter 1. Layering is a tool that builds more flexibility into improving our instructional designs by making it easier to change one layer without having to change the entire instructional design. Understanding the different layers also helps instructional theorists to not overlook important layers in their theories. We believe that it would be helpful for instructional theories to address each layer, either individually or in congregation. It seems likely that when advice is given for one layer, it would be helpful to address strategies for additional layers that may be impacted. We agree with Gibbons that this is a far more nuanced and complex understanding of instructional design, and this avoids monolithic theoretical constructs. We also agree with Gibbons's point that understanding the architecture of instructional theory will lead to better designs, more consistent and efficient results, clearer mutual understandings among designers, and a stronger ability to effectively communicate among designers. This last point, in particular is very much in our broader service of moving toward a common knowledge base and a common language. Thus, chapter 14 advances a set of tools, language, and methods which we believe have great promise for advancing instructional-event theory.

In chapter 15, C. Victor Bunderson, David A. Wiley, and Reo H. McBride examine domain theory in general, and in particular the methods associated with quantitative domain mapping (QDM). QDM is defined by Bunderson and Wiley as a method by which we describe a specific domain supported by both theory and research data. Domain theory is a particularly powerful tool because it can help us to customize the learning experience for different learners because we can map domains for their diverse competencies and levels of competency.

QDM helps us to figure out what is really happening in the process of learning and helps us to go beyond instinct or inference to have a better measurement of an abstract field. This proposal by Bunderson and Wiley, that there be standard measures, holds out the hope of significant cumulative long-term progress for educators. We believe that this tool, therefore, is a particularly powerful one, being large in scope and specific in method.

In chapter 16 David Wiley addresses the now popular notion of learning objects. The basic idea here, as Wiley shows, is the creation of instruction from existing components. The primary reason that we believe learning objects are an important tool for advancing instructional-event theory is that they hold the promise of more facile reusability. This has the potential to revolutionize the instructional design and development processes. Therefore, instructional-event theories should take into account considerations for reusability. This is related to the notion of layers, and we believe that a keener connection between the components in our designs, be they through learning objects or layers, would help to advance instructional-event theory significantly. Wouldn't it be optimal if we could design learning objects or instructional components in a layered fashion such that they could, at different chronological times, become obsolete and easily replaced? Both layers and learning objects facilitate the notion of melding old and new into single systems. One caution here, however, is that we are not in favor of so isolating components in instruction that they are seen as wholly independent or interchangeable without concern for systemic coherence. We do not believe there will be a time when we can simply walk to a shelf (be it real or virtual) and pull down several bits of instruction and simply plug 'n play them together in a lesson. Rather, the promise of learning objects is the potential for knowledgeable designers to reuse existing proven objects of learning.

In chapter 17, Charles Reigeluth and Yun-Jo An address different approaches to generating theory. They identify distinctions between descriptive and design knowledge and encourage the development of both for the furthering of instructional theory, but focus on design knowledge for the purposes of this book. After Reigeluth and An point to eclectic frameworks for building design research on preferability rather than validity, they recommend an ongoing agenda of design-based research that will formatively inform our common knowledge base. They then turn their attention to four approaches to building design theory, including data-based, values-based, methods-based, and practitioner-driven theory development. These approaches are then explored further through research methods, including grounded theory development, design-based research, and formative research. Chapter 17 closes with a recommendation that is key to this entire volume: the importance of using a common language and knowledge base by linking future research efforts to the general language and common knowledge base. In this way, we very much agree with Reigeluth and An that we will advance the entire field with this disciplined approach to research and development. We feel this is very important as our field continues to evolve and

develop new instructional act theories and therefore has a proper place here, near the end of this book.

In chapter 18, Reigeluth extends out from the book's focus on building a common language and common knowledge base to look at how this common language and knowledge base should serve the needs of the broader educational system. Reigeluth describes the systemic nature of schooling, pointing out that instruction must serve the instructional needs of the educational systems, which, in turn, must serve the larger needs of their communities and society. He points to the ways that society's educational needs have been changing and continue to change, and therefore require significantly different things of their educational systems than they did in earlier eras when we were focused on agrarian- or industrial-age educational needs. Reigeluth goes on to draw a vision of an information-age educational system founded on principles of customization and diversity, initiative and self-direction, collaboration and emotional development, and holism and integration that are at the core of information-age educational needs. He lays out the main features of the system as well as the roles technology can play in such a system. And he invites us, as instructional theorists, to engage in the creation of a common knowledge base that will aid development of the new paradigm of education. Understanding the importance of learning experiences and environments to meet the larger needs of schools and societies ties together many of the goals we have shared through the years and weaves in the further development of instructional theory that is the main purpose of this book, calling us to even larger goals of shared knowledge.

—CMR & ACC