

Component Display Theory

M. David Merrill

Prepared by: Andy Casiello

There is no one-sentence “description” of CDT, it is a complex, complete, interrelated, rule driven set of concepts and methods toward design of instruction. M. David Merrill devised a two-prong theory of instruction known as “Component Display Theory” (CDT). The first part is a descriptive theory, and the second part is prescriptive theory. The driving force for the development of this theory was learner-driven, computer based instruction, although the theory applies to all forms of instruction. This theory only looks at the cognitive domain. The theory deals with the micro-levels of instruction (teaching individual concepts or ideas). The theory works to separate content from instructional strategy, with an overarching result of providing a process by which content could be “plugged in” to appropriate strategies aligned with certain content types and performances. Heavily influenced by Gagne’s Conditions for Learning, Merrill felt strongly that different learning outcomes require different instructional strategies. He also felt that the optimal instruction included multiple forms of information presentation. CDT is an early effort toward providing instructional designers with a theory for designing instruction, based on instruction type, and independent of content. This does not dismiss content – it plays an important role in mapping the development of the instruction, according to a set of rules/guidelines.

M. David Merrill may well be one of the founding fathers of the “learning object”. Very early on in Merrill’s academic career he came to grasp some fundamental notions. One (helped along by sitting in on a presentation by B.F. Skinner in which Skinner exclaimed that he “didn’t agree with everything he ever wrote”) was that theories were simply ideas or concepts based on research that attempt to explain what we observe in the real world. They were not cast in stone, but moving targets. Another was that “most of the available learning theories tended to explain how persons acquire and store knowledge, but they have little to say about how an instruction should structure and sequence knowledge to promote efficient and effective learning (Merrill 1994). While these issues moved Merrill toward his research, it wasn’t until he began work on a specific CBT project that his ideas for Component Display Theory began to come to life.

The CBT project, “Time-shared Interactive Computer Controlled Information Television”, (TICCIT), brought Merrill together with Victor Bunderson of the University of Texas, and with MITRE Corporation. Merrill and Bunderson would go on to be one of the greatest intellectual partnerships in the history of educational technology (Kovalchick & Dawson, 2002). The CBT was designed to be largely learner controlled, and Merrill and a small group of graduate students set to work on the learner control subsystem of the project. This proved to be quite challenging. According to Kovalchick and Dawson they worked from an “algebra” metaphor in which different types of instruction could be represented as variables to be “added together” or concatenated to effect specific learning outcomes. This meant devising a taxonomy of choices: between what alternatives or

categories of strategy building block would learners choose when exercising learner control?”

Critical to the work done by Merrill at that time is a model for separation of content and instructional strategy. Merrill identified four “Primary Presentation Forms” (Fig. 1), which are: expository generality, expository instance, inquisitory generality and inquisitory instance. “Expository” roughly translates to “talk”, and “inquisitory” roughly translates to “ask”. Generality relates to “general concepts” and instances relates to “specific examples”. So, the notion of content falls under the categories of displaying generalities and displaying specific examples. The notion of strategy falls under “talking about” and “asking about”. Seems overly simple, but Merrill felt that all of the primary ways of dealing with instruction fell into those categories.

Merrill specifies “secondary presentation forms” that include important, but not critical forms of information display. These secondary forms include prerequisite information, contextual information, mnemonics, attention focusing, and alternative representation. In addition, Merrill specifies a number of what he calls “Interdisplay relationships”. These specify the relationships *between* the display forms in which one display in a set is affected by another display. These relationships include: *divergent, range, matching, fading, random order, chunking, response delay, isolation* and *learner control*. All of these relationship types are prescribed under certain circumstances where they will be most effective.

An important component of Merrill’s theory is the Performance-Content Matrix (Fig. 2). This matrix is used to determine the “performances” and “contents” that will be addressed by the instruction. Performance is indicated by the Y-axis, and content by the X-axis. Once the instruction is pinpointed to fall into one of these categories, specific rules and processes are then applied to the development of that instruction.

Merrill was highly influenced by Gagne’s teaching that types of learner outcomes required different conditions of learning. Merrill attempted to develop a theory as to the application of the conditions of learning with regard to the learning outcomes that could be applied in a straightforward manner by instructional designers within a CBT (or other) development environment.

Critical to Merrill’s theory is that “macro strategies” those that deal with delivery strategies such as the way the information will be carried to the student, the instructional media, etc. and the management strategies, such as motivational techniques, individual schemes, scheduling, resource allocation, etc., have much less to do with the effectiveness of the instruction than do the micro strategies, which are concerned with the individual displays, including their characteristics, interrelationships and sequence. Therefore Merrill primarily focused on the micro strategies.

Hopefully this brief outline has whetted your appetite to learn more about the structure and application of Merrill’s Component Display Theory. It’s not a quick read – it’s equivalent to learning large sections of the Dick and Carey method, or any other holistic

method of instructional design. But, an instructional designer's toolbox is incomplete without a thorough understanding of Component Display Theory.

Figure 1. The Primary Presentation Forms

Content Mode	Generality	<i>Rule</i>	<i>Recall</i>
	Instance	<i>Example</i>	<i>Practice</i>
		Expository	Inquisitory
		Presentation Mode	

Figure 2. The Performance-Content Matrix

P E R F O R M A N C E	<i>FIND</i>				
	<i>USE</i>				
	<i>REMEMBER GENERALITY</i>				
	<i>REMEMBER INSTANCE</i>				
		<i>FACT</i>	<i>CONCEPT</i>	<i>PROCEDURE</i>	<i>PRINCIPLE</i>
CONTENT					

References

Merrill, M.D. (1994). *Instructional Design Theory*. Englewood Cliffs, NJ: Educational Technology Publication.

Kovalchick, A. & Dawson, K. (2002) *Educational Technology: An Encyclopedia*. Santa Barbara, CA: ABC-CLIO

Memorize Information	Apply Skills
Understand Relationships	Apply Generic Skills

Type of Learning



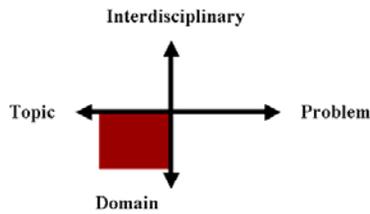
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Control of Learning



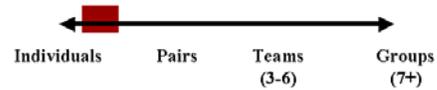
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Focus of Learning



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Grouping for Learning



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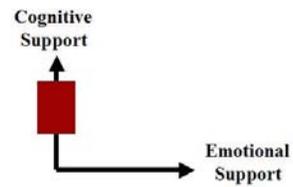
Interactions for Learning

Human			Nonhuman			
Student-Teacher	Student-Student	Other	Student-tools	Student-information	Student-environments/manipulative	Other



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Support for Learning



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