ROLE OF INSTRUCTIONAL DESIGN IN PROFESSIONAL DEVELOPMENT OF TEACHERS

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ABSTRACT
Instructional Design (also called Instructional Systems Design (ISD)) is the practice of maximizing the effectiveness, efficiency and appeal of instruction and other learning experiences. The process consists broadly of determining the current state and needs of the learner, defining the end goal of instruction, and creating some "intervention" to assist in the transition. Ideally the process is informed by pedagogically and andragogically (adult learning) tested theories of learning and may take place in student-only, teacher-led or community-based settings. The outcome of this instruction may be directly observable and scientifically measured or completely hidden and assumed. There are many instructional design models but many are based on the ADDIE model with the phases analysis, design, development, implementation, and evaluation. As a field, instructional design is historically and traditionally rooted in cognitive and behavioral psychology.
Keywords: Instructional Design, ISD, ADDIE, Component Display Theory

INTRODUCTION
Much of the foundation of the field of instructional design was laid in World War II, when the U.S. military faced the need to rapidly train large numbers of people to perform complex technical tasks, from field-stripping a carbine to navigating across the ocean to building a bomber—see "Training Within Industry (TWI)". Drawing on the research and theories of B.F. Skinner on operant conditioning, training programs focused on observable behaviors. Tasks were broken down into subtasks, and each subtask treated as a separate learning goal. Training was designed to reward correct performance and remediate incorrect Performance. Mastery was assumed to be possible for every learner, given enough repetition and feedback. After the war, the success of the wartime training model was replicated in business and industrial training, and to a lesser extent in the primary and secondary classroom. The approach is still common in the U.S. military.

In 1956, a committee lead by Benjamin Bloom published an influential taxonomy of what he termed the three domains of learning: Cognitive (what one knows or thinks), Psychomotor (what one does, physically) and Affective (what one feels, or what attitudes one has). These taxonomies still influence the design of instruction. During the latter half of the 20th century, learning theories began to be influenced by the growth of digital computers.

In the 1970s, many instructional design theorists began to adopt an information-processing-based approach to the design of instruction. David Merrill for instance developed Component Display Theory (CDT), which concentrates on the means of presenting instructional materials (presentation techniques).

Later in the 1980s and throughout the 1990s cognitive load theory began to find empirical support for a variety of presentation techniques. Cognitive load theory and the design of instruction Cognitive load theory developed out of several empirical studies of learners, as they interacted with instructional materials. Sweller and his associates began to measure the effects of working memory load, and found that the format of instructional materials has a direct effect on the performance of the learners using those materials. While the media debates of the 1990s focused on the influences of media on learning, cognitive load effects were being documented in several journals. Rather than attempting to substantiate the use of media,

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these cognitive load learning effects provided an empirical basis for the use of instructional strategies. Mayer asked the instructional design community to reassess the media debate, to refocus their attention on what was most important: learning.

By the mid- to late-1990s, Sweller and his associates had discovered several learning effects related to cognitive load and the design of instruction (e.g. the split attention effect, redundancy effect, and the worked-example effect). Later, other researchers like Richard Mayer began to attribute learning effects to cognitive load. Mayer and his associates soon developed a Cognitive Theory of Multimedia Learning.

In the past decade, cognitive load theory has begun to be internationally accepted and begun to revolutionize how practitioners of instructional design view instruction. Recently, human performance experts have even taken notice of cognitive load theory, and have begun to promote this theory base as the science of instruction, with instructional designers as the practitioners of this field. Finally Clark, Nguyen and Sweller published a textbook describing how Instructional Designers can promote efficient learning using evidence-based guidelines of cognitive load theory.

Instructional Designers use various instructional strategies to reduce cognitive load. For example, they think that the onscreen text should not be more than 150 words or the text should be presented in small meaningful chunks. The designers also use auditory and visual methods to communicate information to the learner.

Learning Design

The IMS Learning Design specification supports the use of a wide range of teaching methods in online learning. Rather than attempting to capture the specifics of many strategies of instruction, it does this by providing a generic and flexible language. This language is designed to enable many different styles of instruction to be expressed. The approach has the advantage over alternatives in that only one set of learning design and runtime tools need to be implemented in order to support the desired wide range of teaching styles. The language was originally developed at the Open University of the Netherlands (OUNL), after extensive examination and comparison of a wide range of pedagogical approaches and their associated learning activities, and several iterations of the developing language to obtain a good balance between generality and pedagogic expressiveness.

A criticism of Learning Design theory is that learning is an outcome. While instructional theory Instructional Design focuses on outcomes, while properly accounting for a multi-variate context that can only be predictive, it acknowledges that (given the variabilities in human capability) a guarantee of reliable learning outcomes is improbable. We can only design instruction. We cannot design learning (an outcome). Automotive engineers can design a car that, under specific conditions, will achieve 50 miles per gallon. These engineers cannot guarantee that drivers of the cars they design will (or have the capability to) operate these vehicles according to the specific conditions prescribed. The former is the metaphor for instructional design. The latter is the metaphor for Learning Design. Instructional design models ADDIE process.

Perhaps the most common model used for creating instructional materials is the ADDIE Process. This acronym stands for the 5 phases contained in the model:

Analyze – analyze learner characteristics, task to be learned, etc.

Design – develop learning objectives, choose an instructional approach

Develop – create instructional or training materials

Implement – deliver or distribute the instructional materials

Evaluate – make sure the materials achieved the desired goals

Most of the current instructional design models are variations of the ADDIE process. Rapid

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prototyping sometimes utilized adaptation to the ADDIE model is in a practice known as rapid prototyping.

Proponents suggest that through an iterative process the verification of the design documents saves time and money by catching problems while they are still easy to fix. This approach is not novel to the design of instruction, but appears in many design-related domains including software design, architecture, transportation planning, product development, message design, user experience design, etc.

In fact, some proponents of design prototyping assert that a sophisticated understanding of a problem is incomplete without creating and evaluating some type of prototype, regardless of the analysis rigor that may have been applied up front. In other words, up-front analysis is rarely sufficient to allow one to confidently select an instructional model. For this reason many traditional methods of instructional design are beginning to be seen as incomplete, naive, and even counter-productive.

However, some consider rapid prototyping to be a somewhat simplistic type of model. As this argument goes, at the heart of Instructional Design is the analysis phase. After you thoroughly conduct the analysis—you can then choose a model based on your findings. That is the area where most people get snagged—they simply do not do a thorough-enough analysis. (Part of Article By Chris Bressi on LinkedIn)

Dick and Carey

Another well-known instructional design model is The Dick and Carey Systems Approach Model. The model was originally published in 1978 by Walter Dick and Lou Carey in their book entitled The Systematic Design of Instruction.

Dick and Carey made a significant contribution to the instructional design field by championing a systems view of instruction as opposed to viewing instruction as a sum of isolated parts. The model addresses instruction as an entire system, focusing on the interrelationship between context, content, learning and instruction. According to Dick and Carey, "Components such as the instructor, learners, materials, instructional activities, delivery system, and learning and performance environments interact with each other and work together to bring about the desired student learning outcomes". The components of the Systems Approach Model, also known as the Dick and Carey Model, are as follows:

Identify Instructional Goal(s)
Conduct Instructional Analysis
Analyze Learners and Contexts
Write Performance Objectives
Develop Assessment Instruments
Develop Instructional Strategy
Develop and Select Instructional Materials
Design and Conduct Formative Evaluation of Instruction
Revise Instruction
Design and Conduct Summative Evaluation

With this model, components are executed iteratively and in parallel rather than linearly.

Instructional Development Learning System (IDLS) Another instructional design model is the Instructional Development Learning System (IDLS).The model was originally published in 1970 by Peter J. Esseff, PhD and Mary Sullivan Esseff, PhD in their book entitled IDLS—Pro Trainer 1: How to Design, Develop, and Validate Instructional Materials.

Peter (1968) & Mary (1972) Esseff both received their doctorates in Educational Technology from the Catholic University of America under the mentorship of Dr. Gabriel Ofiesh, a Founding Father of the Military Model mentioned above. Esseff and Esseff contributed synthesized existing theories to develop their approach to systematic design, "Instructional Development Learning System" (IDLS). The components of the IDLS Model are:

Design a Task Analysis
Develop Criterion Tests and Performance Measures
Develop Interactive Instructional Materials
Validate the Interactive Instructional Materials

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Other Models

Some other useful models of instructional design include: the Smith/Ragan Model, the Morrison/Ross/Kemp Model and the OAR model, as well as, Wiggins theory of backward design.

Learning theories also play an important role in the design of instructional materials. Theories such as behaviorism, constructivism, social learning and cognitivism help shape and define the outcome of instructional materials.

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