

PRINCIPLES OF INSTRUCTIONAL DESIGN

- Robert M. Gagné
- Walter W. Wager
- Katharine C. Golas
- John M. Keller



FIFTH EDITION

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Principles of Instructional Design

FIFTH EDITION

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Principles of Instructional Design

This edition of *Principles of Instructional Design* is dedicated to the memory of Robert M. Gagné and Leslie J. Briggs, for their many contributions to educational psychology and instructional systems design.
—WW, KG, JK

Preface

Dr. Robert Gagné (1916–2002) was truly a giant in the field of instructional systems design. His theories about conditions of learning and principles derived from information processing theory are still employed in numerous design models today. Many educators have classified Gagné as a behaviorist, because his early training in animal psychology and his work with Skinner is mentioned in many of his early writings. However, Gagné was one of the early cognitive psychologists. He recognized the shortcomings of behavioral psychology when explaining human behavior, and he broke away strict behaviorist principles to consider what was going on inside the brain. At that time, information processing theories of learning were popular topics of research. From this early research a large number of concepts like short-term memory, working memory, cognitive-load capacity, encoding, retrieval, and schemata became common jargon terms in the field. Gagné was very interested in K–12 school learning, especially reading, and he participated in many curriculum development projects. He was also in high demand by the military for his knowledge and experience with simulations design. It would not be an overstatement say that Robert M. Gagné, and his colleague Leslie Briggs, initiated the direction of contemporary instructional systems design with the first edition of this book.

Subsequent editions expanded on how the information-processing model and conditions-of-learning model formed the foundation for understanding learning environments and designing learning materials. The popular Dick and Carey model of instructional design was derived from the early work of Gagné and Briggs, for example. Wager developed the technique of instructional curriculum mapping to integrate intellectual skills with supporting objectives from different domains, and Briggs expanded on prescriptions for media based on desired instructional functions.

This edition takes another step forward in looking at principles associated with instructional design. Two new authors, Katharine Golas, and John M. Keller, add their knowledge, experiences, and perspectives. Golas, Vice President of the Training, Simulation & Performance Improvement Division at Southwest Research Institute (SwRI), was a student of Gagné. She received her Ph.D. from Florida State University in 1982 and has worked in the instructional systems field since 1977. Her work at SwRI included the development of a new instructional design

model for the U.S. Air Force. She has experience with emerging technologies, including multisensory virtual reality, and distributed mission simulations. She has worked with many contemporary instructors of instructional design including David Merrill, Robert Tennyson, and Michael Spector. Dr. Golas's experience with technology and military training adds a new dimension to the text.

John M. Keller developed the Attention, Relevance, Confidence, and Satisfaction (ARCS) model of motivational design. In Chapter 6, he adds his perspectives on the nature of the learner, and how it affects instructional design decisions. Dr. Keller is a professor of instructional systems and educational psychology at Florida State University and is a well-known consultant on large-scale instructional design and electronic-performance design projects. Two recent clients include Citibank and the Federal Aviation Association. He is an expert on design models and assessment models. He has completely rewritten two chapters of this book, and his expertise in motivational design will give new insights into how to make instruction more effective.

Walter Wager was one of the early coauthors of this text, and was a colleague of Leslie Briggs and Robert Gagné. He is now coordinator of instructional development services for Florida State University. Wager works extensively with faculty to integrate technology into instruction, promote active learning, and develop effective courses. He commonly employs principles from this text in helping faculty to define course outcomes, and assessments.

NEW TO THIS EDITION

The authors have rewritten much of the text to make the writing style less formal and more approachable. We have also included new examples from the military and training venues, and addressed issues associated with constructivist philosophy and practices. All of the chapters have been updated and most contain minor to moderate revisions; four of them have been completely revised. Chapter 2, *Designing Learning Environments*, addresses the differences between systems design and instructional design models. Chapter 6 includes a discussion of the APA learner-centered principles and how they relate to instructional design. Chapter 11 has been completely rewritten to reflect emerging technologies and their impact on learning. Chapter 15, *Online Learning*, is a new chapter, replacing a chapter on individualized instruction. However, the conditions of learning and information processing model, as they relate to instructional design, are still the foundations of the text.

ACKNOWLEDGMENTS

We wish to acknowledge Drs. John Dempsey, James Applefield and Rodney Earle for their contributions to the *Learner's Guide for the Principles of Instructional Design*. The *Learner's Guide* is no longer in print, but readers of this book will be able to access an online learner's guide developed by Dr. Dempsey and his students at the University of South Alabama. The link to this site is <http://www.southalabama.edu/coe/idbook>. We also wish to acknowledge the many publishers and authors who have given us permission to use graphic images from their publications and Web sites.

We also wish to thank the following reviewers of the fifth edition revision plan for their thoughtful guidance and constructive criticism:

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INTRODUCTION TO INSTRUCTIONAL DESIGN

The purpose of instruction is to help people learn. Can learning occur without instruction? Certainly. We are continuously encountering and interpreting our environment and the events in it. Learning is a natural process that leads to changes in what we know, what we can do, and how we behave. However, one function of an educational system is to *facilitate intentional learning*, in order to accomplish many goals that would take much longer without instruction. Schools teach knowledge and skills that the community feel are desirable, even if they are not of immediate personal interest to the student, and even if they would not be encountered naturally in nonschool environments. The federal government and commercial industries provide both initial skills training and continuing refresher training to help employees acquire the skills and learning needed to succeed in a changing workplace. Training is the vehicle through which the military is transforming itself to better prepare U.S. forces from all services to engage in joint operations. The purpose of this book is to describe how principles of learning inform the design of effective instruction for intentional learning.

We define instruction as a set of events embedded in purposeful activities that facilitate learning. Normally, we think of these events as being external to the learner, for example, events embodied in the display of printed pages, an instructor's lecture, or the activities of a group of students. However, there are also internal mental events, such as directing attention, rehearsing, reflecting, and monitoring progress. Educational psychologists hypothesize about the nature of these internal events, and from that research derive principles about the learning process. Instructional designers apply these principles to the design of the external events we call instruction. For example, it is a generally accepted principle that short-term memory has limited capacity. With this principle in mind, organizing information into clusters or categories has been found to facilitate learning.

Why talk about instruction rather than teaching? Because teaching is only one part of instruction. The word *teach* infers that a person is lecturing or demonstrating something to the learner. However, the teacher or trainer's role includes many different tasks, such as selecting materials, gauging student readiness to learn, managing class time, monitoring instructional activities, and finally serving as a content resource and a learning facilitator. So the broader term, *instruction*, puts

the emphasis on a whole range of activities the teacher uses to engage the students. An instructor who has knowledge of the principles of instructional design has a broader vision of what it takes to help students learn: when it would benefit students to be put into groups, when practice and feedback will be most effective, and the prerequisites for problem-solving and higher-order learning skills, for example.

Who else would benefit from applying principles of instructional design? We believe that anyone in the business of producing instructional materials, such as textbook writers, curriculum materials developers, Web-based course designers and even knowledge-management system designers will benefit from these principles.

In summary, instruction is much more likely to be effective if it is planned to engage students in those events and activities that facilitate learning. Using principles of instructional design, the teacher or trainer can select, or plan and develop activities to best help students learn.

BASIC ASSUMPTIONS ABOUT INSTRUCTIONAL DESIGN

It would be a mistake to think that there is a single best model of instructional design. In actuality, there are as many models as there are designers and design situations. Each designer brings to the process his or her understanding of the principles and events that affect learning, and how to best structure instruction. There are, however, basic common assumptions that we bring to the process of design.

First, we adopt the assumption that instructional design must be aimed at aiding the process of learning rather than the process of teaching. Instructional design is also aimed at “intentional” learning as opposed to “incidental” learning. This implies that the target goals and desired learning outcomes guide the design and selection of learning activities. Meaningful learning outcomes are a starting and ending point for most design processes, because it is against the accomplishment of the objectives that the effectiveness of the design is assessed. We believe this is true whether the desired outcomes are information learning or problem-solving skills, because the learning activities that are chosen depend upon the type of outcome desired.

Second, we recognize that learning is a complex process affected by many variables. John Carroll (1963) in his Model of School Learning defined at least five major variables that affect the degree of learning attained by a student: (1) learner perseverance, (2) time allowed, (3) quality of instruction, (4) aptitude, and (5) student’s ability to learn. These variables are not unrelated, however, and an effective model of instructional design cannot focus on just one of these variables. For instance, high-quality instruction is not likely to be effective if it does not take into account learner motivation and learner aptitude for the task.

Third, instructional design models can be applied at many levels. Principles of instructional design can be of immediate value to a teacher or trainer who is planning a lesson for a day’s activity, a trainer preparing a three-day workshop, or a curriculum developer designing a course of study. Instructional design can be an individual effort, or at another level, can involve a team of designers, subject-