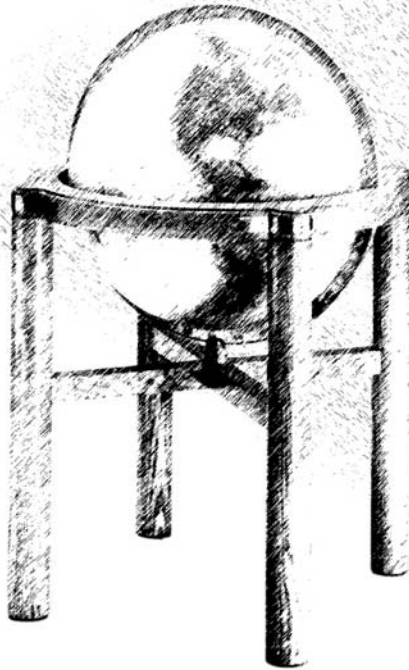


Dedication

This book is dedicated to Robert M. Gagné, in appreciation of his work and the contributions he has made to the field of Instructional Technology. We thank you.



Foreword

Ideas often take a substantial amount of time to be appreciated, and even for those few that attract attention quickly, there is an assumption that one needs the perspective of hindsight to determine their lasting value. Consequently, an intellectual inheritance is usually determined by the survivors rather than by the donor, and the labels that describe the merit of one's ideas are affixed by subsequent generations. While this may be the norm, it is not the case with respect to the contributions of Robert Gagné to the field of

Instructional Technology. While the field will more fully understand the extent of Gagné's genius as time passes, it is still easy to recognize that this field would be entirely different today if it were not for the work of Robert Gagné. His legacy can be determined now, at least in part. This volume is an attempt to highlight, discuss, and celebrate (even as we evaluate) the contributions of this one man.

Edward Thorndike once said that he expected a usual lag of 30 to 50 years between the time that research "discoveries" are made and their implementation in classrooms. There are many examples of situations that give credence to this observation. Yet much of Gagné's research has not only impacted practice in many settings, but it has established the norm during his lifetime.

Gagné's work is unique in the extent to which it has actually shaped an entire field. He has influenced theory and practice, teaching and research, school and non-school environments. Today we marvel at the emerging capabilities of technology and the possibility these technologies afford teaching and learning, and yet the mind of Robert Gagné has expanded the scope and contributions of this field in much the same fashion as has the computer.

This book has three major sections dealing with the ideas, the impact, and the future. The preface is a critical precursor to each of these sections, establishing a personal context for a discussion and analysis of Gagné's work by presenting a picture of Robert Gagné, the man. It is written by Walt Wager and Marcy Driscoll, who worked closely with Gagné in the same academic department, and who collaborated with him on major scholarly projects. They write as individuals who have known him as a friend as well as a co-worker.

Section One presents the core concepts of Gagné's theory. These are reprints of five journal articles that capture the essence of the ideas he has given to the field, and present Gagné's ideas in his own words. These articles and their foundational research span nearly four decades. The first papers describe early elements of his thinking which are currently part of standard practice and theory. The last paper was originally published in 1990 and was co-authored with another giant in the field—David Merrill. This work presents new ideas that have not yet become firmly established.

Section Two analyzes the influence of Gagné's ideas from a variety of perspectives. These chapters present reflections of his impact on instructional theory, on practice in a wide range of settings, on military training research and development, and on the applications of the new technologies. They are written by a new generation of instructional technologists who "grew up" professionally at different times and in different places with the ideas of Gagné. Smith was a Florida State student during Gagné's tenure. Smith and Ragan describe and analyze the theoretical aspects of Gagné's work. They are well qualified to undertake such a task given their own work in the field, always fully grounded in theory. Fields discusses the impact of Gagné's research on design practice from both a personal and scholarly point of view. Spector's examination of Gagné's role in military research and development comes from not only a historical perspective, but also from his own memories of working with Gagné on military projects. Finally, Nelson explores current design efforts that are maximizing the opportunities afforded by the new technologies. Even though Gagné was surely not a "techie," Nelson finds that here too his influence is considerable.

Front Matter (Pages v -- xxxviii)
Dedication, Foreword, Preface, Authors' Biographical Sketches

Finally, in Section Three, Chapter Ten, Richey speculates upon the extent to which Gagné's work will continue to influence the field of Instructional Technology in the future even in a world with growing influence of constructivist approaches to instruction.

These ten chapters are an attempt to summarize the contributions of Robert Gagné and to assess their continuing stability. These discussions have been written at a time of rapid change in both the theory and practice of instructional design. At this time there is a peculiar situation in which Gagné's ideas, in some quarters, are so entrenched in practice that many have ceased to associate them with Gagné and instead see them as simply "the way design is done." On the other hand, there are those today who undoubtedly see these same notions as *passé* and actually the antithesis of the directions instructional design should be taking. Hopefully, this book will encourage an analysis and reflection upon Gagné's theoretical contributions and at the same time provide some sense of Robert M. Gagné as a human being.

The idea for this book emerged over five years ago at an International Board of Standards of Training, Performance and Instruction (*ibstpi*) board meeting. This international group promotes high standards of professional practice in the areas of training, performance and instruction, especially with respect to competency definition and certification. Although *ibstpi* is primarily associated with practitioners and the establishment of instructional design standards in the workplace, it is also dedicated to promoting research and exploration of the field's theory. The board consists of persons representing corporate training, training consultants, and academe. As such, there is an appreciation of the interdependence of theory and practice. The board hopes that the publication of this book will not only pay tribute to a major figure in Instructional Technology, but will also promote the application of design theory and, in the process, advance design practice.

Rita C. Richey
Detroit, Michigan
October, 1999

Preface

Discussing the personal life and accomplishments of Robert M. Gagné presents a challenge. The list of accomplishments alone fills pages with bibliographic references. The personal dimension, however, is probably different for every one of us who know him—rich with stories of personal interactions. First, for anyone who has never met him, Bob Gagné is a physically big man. When you put his legacy behind him he becomes even bigger.

We both remember reading parts of early editions of *Conditions of Learning* while completing our respective doctoral programs. Walt Wager remembers meeting him for the first time at Florida State University and being somewhat in awe of a man who, along with his colleague Leslie Briggs, was defining the field of Instructional Systems. Marcy Driscoll's first encounter with Gagné came during her interview at Florida State. She recalls, "We were going to lunch, and Bob insisted on sitting in the back seat—of a small Toyota, no less. He climbed in and planted himself in the middle, with a hand on either front seat and his face squarely between. Then he asked me, 'What do you think people remember from television documentaries?' The question took me completely by surprise, and all I could think was, 'Is this a trick question?'"

However, we soon came to know both Les and Bob. Both were very receptive to discussions of their writings and ideas, and both were looking for better ways to spread their principles of instructional systems so that others could understand and use them in teaching and the design of instruction. Wager always thought of Bob as the theoretician and researcher and Les as the practitioner, but of course each was both. Driscoll came to expect Gagné's questions as a sign of his irrepressible curiosity about things, and Briggs' futurist attitudes greatly affected her own.

For Wager, mentoring defines the professional character of Bob Gagné. Wager's first experience in working with him on a publication came after the death of Leslie Briggs, when he and Bob wrote the third edition of *Principles of Instructional Design*. Wager remembers Gagné's constructive feedback and careful use of words. "I still can't read the text of *Principles of Instructional Design* without hearing his voice phrasing the passages," says Wager. "He is still open to listening to my thoughts and theories about learning and teaching, and quick to put them into his broader perspective."

Driscoll describes a similar experience working with Gagné on the second edition of *Essentials of Learning for Instruction*. "Bob wrote faster than anyone I had ever worked with before," she recalls. "He was always a chapter ahead of me. We traded chapters to

edit each other's work, and it always amazed me that he accepted most of my recommended changes. His writing is so elegant. But he was always open to my ideas."

Driscoll also had the experience of team teaching a graduate course in learning and instruction with Bob. It was a course that she would eventually take over as her own, but teaching it together with Bob Gagné was, in her words, "a rare treat." "We all loved listening to Bob talk, telling stories of how he developed his views of teaching and learning," says Driscoll. "I remember one day in particular when a student asked him how researchers develop theories or models. This was in reference to his instructional theory described in Chapter 12 in the fourth edition of *Conditions of Learning*. He thought for a minute, and then said, 'You just think it up!'"

Wager is quick to note another side of Robert Gagné, his non-vocational interests. Bob Gagné is a fine craftsman of clocks. One clock hangs in the department suite at FSU, one sits on a bookshelf in Wager's home, and one sits on the kitchen counter in Driscoll's home. Bob is also interested in computers and has solicited Wager's help in buying, setting up, and using the machines. Now, one doesn't have to be around Bob very long to learn that he has little tolerance for mechanical devices that don't work. We have seen phones fly along with expletives damning their creators and keepers. So you may imagine the task, for instance, of getting a modem connection to work with e-mail where anything can go wrong (and generally does). However, Bob is now surfing the Internet via delphi.com.

Robert M. Gagné is a no-gimmicks, down-to-earth, back-to-basics type of person. He believes that educational systems let their patrons down when they promote students from grade to grade, who can't read, write, or do arithmetic. The issue of teaching higher-order thinking skills and meta-cognitive skills, he believes, depends upon these basic building blocks. These are very emotional topics for Bob Gagné, and he has deep beliefs about what a good education is. Chapters in this book will go into these beliefs and principles in greater detail.

Certainly no documentary of Bob Gagné would be complete without recognizing the influence of his wife Pat. Pat is a trained biologist and a professional in her own right. She is also a steadying and supportive influence on Bob. Anyone visiting with both of them quickly sees a mutual love and respect that goes very deep.

The chronicle of the life and achievements of Bob Gagné may be found in Appendix A. This is a reprint of the American Psychological Association's 1982 scientific award for applications of psychology. Appendix B lists Gagné's publications. Gagné had so many publications, awards and recognitions, we are sure that these records may not be

complete. Any one of the awards mentioned would be lifetime achievements for most of us. To have amassed so many speaks to the unrelenting productivity of this great man and educator.

Robert M. Gagné received many awards during his career, including membership in Phi Beta Kappa, Sigma Xi, and the National Academy of Education. He was awarded an Eminent Lectureship Award by the Society of Engineering Education, American Educational Research Association (AERA)—Phi Delta Kappa Award for Distinguished Educational Research, the E. L. Thorndike Award in Educational Psychology and the John Smyth Memorial Award, Victorian Institute of Educational Research. He received Florida State University's highest award, the Robert O. Lawton Distinguished Professorship, and the American Psychological Association (APA) Scientific Award for Applications of Psychology.

Gagné left Tallahassee in 1992 to spend a year and a half at Armstrong Laboratories, Brooks Air Force Base, in Texas as a National Research Council Senior Fellow. There he developed and evaluated a computer-based program designed to teach a 32-step procedure used to check out the electrical system of the gun in the F-16 aircraft. He also developed an instructional videotape by applying his nine events of instruction. Application of the nine events to actual training problems at Armstrong Laboratories was Gagné's primary purpose in being there. In his words, "They [Armstrong Labs] had never used the nine events to develop instruction before. And I must say, it worked very well!"

More recent honorary awards include the *Educational Technology* Person of the Year Award, Professor Emeritus at Florida State University, and the AECT Outstanding Educator and Researcher Award. In addition, the Gagné-Briggs fellowship has been established at Florida State, and each year an outstanding doctoral and masters student in the Instructional Systems program are selected in the honor of Gagné and Briggs. Bob Gagné is now retired and living in Signal Mountain, Tennessee. His last project involved working with Dr. Karen Medsker on a new edition of *Conditions of Learning* specifically applied to workplace training. This was published in 1996.

Robert M. Gagné has had a profound influence on the fields of educational psychology and instructional systems. He has also had a profound effect on many of us as a colleague and mentor. His contributions and high standards have shaped this field and will continue to motivate us to do our best and to strive for even more.

Marcy P. Driscoll
Walter W. Wager
Tallahassee, Florida, 1999

Authors' Biographical Sketches

Marcy P. Driscoll is professor and department chair of Educational Research at Florida State University. Driscoll is the author or co-author of four textbooks in learning and instruction, including *Psychology of Learning for Instruction* (1995 Outstanding Book Award in Instructional Development from the Association of Educational Communications and Technology) and, with Robert M. Gagné, *Essentials of Learning for Instruction*. Driscoll has also published numerous articles in professional journals on learning, instructional theory, and educational semiotics. Professor Driscoll earned an A.B. magna cum laude degree from Mt. Holyoke College and a M.S. degree and a Ph.D. degree in Educational Psychology from the University of Massachusetts at Amherst.

Dennis C. Fields is professor of Information Media and director of Personnel and Program Development in the Learning Resources Services at St. Cloud State University. Fields earned a B.S. degree in Science and Education, a M.S. degree in Communication Media, a doctoral degree in Instructional Technology, and a post-doctoral major in Information Science. He has been a professional educator for 25 years in colleges and universities, as well as public schools. In addition, he has served as a consultant to numerous organizations in both the private and public sector. Currently, his work involves the design of technical skills training programs delivered via interactive technology. His publications focus upon technology administration and management. Fields is a member of the International Board of Standards for Training, Performance and Instruction.

Wayne A. Nelson is professor of Instructional Technology and chair of the Department of Educational Leadership at Southern Illinois University at Edwardsville. Nelson is currently a member of the editorial review board for the *Journal of Educational Multimedia and Hypermedia*, the *Journal of Research on Computing in Education*, and the *Journal of Educational Computing Research*. He has conducted research and published in the areas of learning with hypermedia systems, interface design, intelligent tutoring systems, and the processes of instructional design. Computer technology to support the development of reflective practice by teacher education students is his current research focus.

Tillman J. Ragan is professor in the Instructional Psychology and Technology program at the University of Oklahoma. Ragan earned a Ph.D. in Instructional Technology from Syracuse University in 1970. He is author of five books and numerous articles in the area of Instructional Technology, most recently the text, *Instructional Design*, with P. L.

Smith. He has served in countless offices and committees including President of the Research and Theory Division and of the Division of Instructional Development of AECT, Vice-President of IVLA, and Co-Chair of the Professors of Instructional Design Technology conference in 1992. His area of research and teaching is Instructional Technology, with specific interests in applications of computer technology to instruction, learner characteristics, and visual literacy.

Rita C. Richey is professor and program coordinator of Instructional Technology at Wayne State University. Richey earned a B.A. in English and M.Ed. in Psychology of Reading from the University of Michigan and a Ph.D. in Instructional Technology from Wayne State University. She has been at Wayne State in the College of Education since that time. She is the author of numerous publications including *The Theoretical and Conceptual Bases of Instructional Design* and *Designing Instruction for the Adult Learner* and co-author of *Instructional Technology: The Definition and Domains of the Field*. She is the recipient of the President's Award for Excellence in Teaching, the Board of Governor's Distinguished Faculty Fellowship, and the Outstanding Graduate Mentor Award at Wayne State University. She has also received the Outstanding Book Award in Instructional Development and the James W. Brown Publication Award from the Association of Educational Communications and Technology. Her current scholarly interests include the study of the role of context in design, the history of instructional technology thought, instructional design competency development, and instructional design research and theory. She is vice-president for Research and Development of the International Board of Standards for Training, Performance and Instruction.

Patricia L. Smith is associate professor of Education, University of Oklahoma. Smith earned a B.S. in Elementary Education from Texas Tech University in 1972, a M.S. in Elementary Education and Reading Education from Texas Tech University in 1976, and a Ph.D. in Instructional Systems from Florida State University in 1982. She has public school teaching experience and has worked as a consultant on training design projects for business, industry, and governmental agencies. Prior to joining the University of Oklahoma faculty, she was a member of the Instructional Technology faculty at the University of Texas at Austin. She is the author of two books, numerous articles, and research technical reports. She is active in many professional organizations such as the American Educational Research Association, for which she was president of the Instructional Technology Special Interest Group, 1993-1994, and the Association for Educational Communications and Technology, for which she has served on both the Board of Directors for the Research and Theory Division and the Division of Instructional Development.

J. Michael Spector is professor and chair of Instructional Design, Development and

Evaluation at Syracuse University and the Scientific Advisor for the Educational Information Science and Technology Research Program at the University of Bergen. From 1991 through 1997, Spector was the senior scientist for the United States Air Force Research Laboratory (Armstrong Laboratory) Instructional Systems Research Branch. He is a distinguished graduate of the United States Air Force Academy (1967) and earned a Ph.D. in Philosophy from the University of Texas at Austin in 1978. Before joining Armstrong Laboratory in 1991, Dr. Spector was an associate professor of Computer Science at Jacksonville State University specializing in Software Engineering and Artificial Intelligence. His recent research is in the area of intelligent performance support for instructional design and in system dynamics based learning environments. He has published numerous refereed journal articles and book chapters in the area of automated instructional design and has produced an edited volume about this emerging new area of research. He is active in professional associations and serves on the editorial boards of several international journals. He was awarded a Fulbright research fellowship (1995/1996) to work at the University of Bergen creating and testing an interactive simulation of the project dynamics for large courseware development efforts. Dr. Spector helped found and is the President of the International Consortium for Courseware Engineering. He is an adjunct member of Göteborg University's Pedagogy Faculty and Agder College's Faculty of Computer Engineering and a guest lecturer and member of the graduate faculty in the Department of Educational Psychology at the University of Minnesota. He is also the treasurer of the International Board of Standards for Training, Performance and Instruction.

Walter W. Wager is professor of Instructional Systems at Florida State University. Wager moved to Florida State University in 1972 after earning an Ed.D. degree in Instructional Technology from Indiana University. He currently teaches computer courseware, electronic performance support systems design, and instructional development. His present research interest is in the design of interdisciplinary thematic instruction, and collaborative learning. He has published numerous articles, book chapters, and three textbooks, including the *Principles of Instructional Design* with Robert Gagné and Leslie Briggs. In addition, he received the Provost's Outstanding Teacher Award at Florida State University, and the L. C. Larson Leadership Award from Indiana University. He is a member of Phi Delta Kappa, and Kappa Delta Pi honorary societies, as well as a number of other professional organizations.