The Art of Educating with V Diagrams

Educating is complex. It takes a long time to educate for powerful and significant changes in the growth of human experience. This book explains how educating works. **V** diagrams, K-12 and beyond, can be effectively used by teachers and students, parents and their children, administrators and their staffs, publishers and curriculum makers, researchers and evaluators. Important aspects of educating are organized coherently in the theory of educating. A computer-formatted program, developed and tested for more than eight years in the Exploring Minds Project, at Tennessee State University, simplifies the complexity while extending the range of possibilities electronically.

D. Bob Gowin has taught at Cornell University for 30 years. He earned his Ph.D. from Yale University and was granted a post-doctoral fellowship in Philosophy at Yale in 1958. He has authored 15 books and monographs and co-authored *Learning How to Learn* (with Joseph Novak) and *Appraising Educational Research* (with Jason Millman).

Marino C. Alvarez is a professor in the Department of Teaching and Learning of the College of Education at Tennessee State University. He received his M.A. and Ed.D. from West Virginia University. His interest in content literacy stems from his years of teaching Social Studies in middle and secondary schools. He is the recipient of both the Teacher-of-the-Year and Distinguished Researcher-of-the-Year Awards at Tennessee State University.

The Art of Educating with V Diagrams

D. BOB GOWIN
Cornell University

MARINO C. ALVAREZ
Tennessee State University

CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo

Cambridge University Press
40 West 20th Street, New York, NY 10011-4211, USA

www.cambridge.org
Information on this title: www.cambridge.org/9780521843430

First published 2005

Printed in the United States of America

A catalog record for this publication is available from the British Library.

Library of Congress Cataloging in Publication Data

Gowin, D. B.
The art of educating with **V** diagrams / D. Bob Gowin, Marino C. Alvarez.
p. cm.
Includes bibliographical references and index.
ISBN 0-521-84343-x (casebound) – ISBN 0-521-60414-1 (pbk.)
1. Learning. 2. Self-knowledge, Theory of. 3. Education – Philosophy.
I. Gowin, D. B. II. Title.
LB1060.G69 2005
370.15′23 – dc22 2004023977

ISBN-13 978-0-521-84343-0 hardback
ISBN-10 0-521-84343-x hardback

ISBN-13 978-0-521-60414-7 paperback
ISBN-10 0-521-60414-1 paperback

I dedicate this work to my children: Sarah Gowin, Robin Gowin, and John Gowin. I thank them for their love, support, and patience through the many years I was working on my writing.

D.B.G.

This work is dedicated to my wife, Victoria J. Risko Alvarez, and son, Christopher M. Alvarez, who are daily inspirations in my life.

M.C.A.

Education, like invention, is primarily concerned, not with what is, but with what may be.

– Boyd Henry Bode

Contents

Foreword

Why Would Any Reader Desire to Read This Book??? Educating with **V** Diagrams

Dear Reader:

Have you ever wondered how it is that you can grasp a new meaning, a meaning not your own? Grasping a meaning not our own is necessary to the very act of reading. Readers do it easily. Their minds just fly down the pages as they read. Meanings come easily when the writing is clear to us, but what happens when we read and fail to grasp the meaning? What do we do then? We just stop reading. If the puzzling meaning is important to us, then we reread.

Suppose you were to receive a note from your spouse that read, "I'm here marking time for the delivery." The meaning you grasp is, "Why is she leaving me a message about marking the time for the delivery?" This message stops you. You are not reading any more; instead, you are wondering, "What does she mean? Does she mean that she wants to tell me the time of the delivery? If so, why didn't she write it on the note? Or does she mean she wants me to meet the delivery person? Or does she mean that she is waiting for the delivery?" You stop and try to figure out which meaning you want to take from the note. You will act very differently depending on the meaning you grasp.

Reflect for a minute on feelings. Your feelings of being stopped cause many questions to pop up. In the space of one second your mind can flick through seven or eight meanings. Does she want to notify me of the time and/or whether or not to meet the delivery person? Or, is the delivery person late and she is waiting for an arrival? What's the key question? You begin sorting out the possibilities. Maybe then you begin to question the questions – Am I thinking straight? What other possible meanings can I think of? Your mind can fly to the quick awakening of troublesome unease. *Feelings embrace thinking*. These brief moments can be of intense focus. You are stopped, and you pay attention to the stoppage. Total subjectivity dominates. Until you work through your feelings and your thinking, your acting is on hold.

What does this writing mean? What's the meaning for me? In this search for meaning we have the beginnings of learning. We must grasp the meaning before we can learn. Why? Our answer should surprise you. Our answer would surprise even prestigious theorists of learning. The importance of grasping a meaning for learning is that what you learn is the grasped meaning. Put another way, we humans possess language and use meanings as the materials for learning. We literally learn the grasped meaning. Meaning and learning are connected, and closely connected, but they are not the same thing. We learn meanings. Meaning is the stuff of learning.

Educating changes the meaning of human experience. Educating simplifies complexity without denying it. This book, *The Art of Educating with* ***V*** *Diagrams*, explains how educating works.

Teachers make lesson plans using the Telling Questions to cause teaching events to happen. Students study and learn using Focus Questions to make learning events happen. Subject matter disciplines are organized to reveal their Telling Questions to make knowledge-making events happen. Administrators, especially, find their control over educative events enhanced by this theory of educating.

This well-seasoned theory of educating has worked in many practical places of educating – colleges, universities, and public and private elementary and secondary schools. Many graduate students have used this theory to guide their scholarly research. Preparation for the Ph.D. and Ed.D. oral examinations is complete when aspiring doctoral students know their way around the **V**. One department of physics has gone all out and uses the theory to guide research in physics, as well as research in teaching physics. Faculty members publish their research guided by Gowin's **V**.

Who in education wouldn't want to read this book?

Our years of experience with Gowin's **V**, with concept maps, with the Q-5 technique (five questions to ask about any document) gives us strong evidence to support the theory of educating. Using our conception of knowledge, we know that students learn and also know how to learn. Using our conception of knowledge, we know students can analyze and construct knowledge claims. We know our students grasp the most Telling Questions about learning and knowing. The **V** becomes an anchor for all their organized meanings.

Human experience comes to us in a jumble of qualities. In an educative environment we take the pains to begin to sort out multiple meanings. In the preceding note example we see a jumble of possible qualities. In educative events we also begin in the midstream of mixed meanings. A process of clarification moves from immediate events directly perceived, to meanings clarified by thinking, on to learning the meaning we have selected, and then on to making knowledge tested and recorded in our deliberately mediated experience.

Getting clear about the meanings we take from our immediate experience is of central importance in this book. The precise connections of meaning and learning are also centrally important. We use a coherent theory of meaning to guide our thinking about the psychology, the philosophy, and the quality of educating in all our lives.

We know how people get smart. One parent, when asked why she liked what her children were doing with the **V**, said, " . . . if you start to take it apart it all comes together. . . . " Yogi Berra could not have said it better.[1]

Thank you for your attention.
D. Bob Gowin, San Carlos, California
Marino C. Alvarez, Nashville, Tennessee

[1] Yogi Berra was a catcher with the New York Yankees and is known for his "Yogi-isms." The titles of his books provide the unacquainted reader with the gist of his quotations: *The Yogi Book: "I Really Didn't Say Everything I Said!," "When You Come to a Fork in the Road Take It,"* and *"What Time Is It? You Mean Now?"*

Preface

This book uses a coherent theory of meaning that goes deep enough to combine philosophy, psychology and, educating. All of the principles of educating are expressions of a deep underlying idea of how meaning comes to us and how we shape and reshape meaning as we learn and grow through life. Shared meaning is the greatest human good. Educating changes the meaning of experience. Like art, educating also changes the experience of meaning. To tell a person he or she is ignorant is usually taken to be an insult of sorts, but if you think about ignorance you can also see that not knowing opens the possibility of new knowing. Being ignorant is a good ground for getting smart. Being smart – knowing and really understanding that you know – is a good thing.

Educating is grounded in shared meaning. In talking things over with each other we come to test our agreements and our differences. We can come to a point of deeply felt significance. The injection of computers into almost all aspects of contemporary life gives us ways to share meaning that were never before possible in human history. Alas, the widespread flood of spam and computer viruses of various sorts is a problem. Mere information is not enough. Information can lead to solid knowledge and cherished wisdom. The value of information for educating us is a supreme test of mere information.

This book addresses the complexities of educating by simplifying the process through the use of a theory that specifically applies to thinking, feeling, and then acting on these thoughts and feelings. School reform will not emerge simply from documenting the problems of schools. Until we understand the phenomena of educating, we will never understand how to reform schooling. The same holds for individuals who desire to become educated. In order to become self-empowered in the learning process we need to have a theory of educating that acts as a map to guide us in the quest for learning about and making new knowledge. In far too many instances,

miseducating substitutes for educating, resulting in misconceptions and misunderstandings.

These ideas about simplicity-complexity are examples of the subject matter named "philosophy." This book is an example of using a philosophic maxim to guide thinking, research, and writing. In Chapter 4, you will find an example of philosophic work of "definition." Here we give the defining characteristics of the structure of knowledge. Most of this chapter is a philosophic effort to analyze meanings, to clarify meanings, to give examples of how we intend to use words with a certain meaning.

Philosophy is one epistemic element on the **V**. The academic field of philosophy contains many philosophies in rich array. Every academic subject carries a philosophy of that subject matter. Science carries philosophy of science. A science (e.g., physics, biology) carries its philosophy of science and in the teaching of any science that science's philosophy is relevant for the science teacher. Philosophy is a significant part of the structure of knowledge. Philosophy has a significant role in educating.

Significantly, however, most textbooks in use in today's schools and colleges do not give philosophy much space. Apparently, the educative uses of philosophy are not simple or easy or convenient or popular. We have found, however, that when teachers and students come to this element on the **V** they begin a search for "philosophy" and subsequently learn of the significant value philosophy has for teaching and learning. The more experience students and teachers have with **V** diagrams, the more valuable and useful philosophy becomes. Philosophy of Education, as a field of study, supports some specialists who focus on the functions of philosophy in educative events.

In this book, philosophy is both framework and content. The framework supports the analysis and clarification of the structure of knowledge. Content appears in different places: Definitions of key terms, such as Fact-as-record-of-an-event. Principles are found heading each chapter. Initial assumptions appear early in this book. Giving arguments that raise questions are a central feature of educating. Sharing meaning is a human good of the first order, and when definitions of meanings are clear and compelling, philosophy contributes to the human good in a significant way.

Since its inception, *Educating* (Gowin, 1981), as a theory, has served as a guide for numerous doctoral dissertations, masters theses, and published research investigations. Professor Gowin received a year-long fellowship grant from the U.S. Office of Education based on a national competition. At Stanford University, he pioneered a seminar on philosophy and research. Students were asked every week to analyze a piece of research in their field of specific knowledge. The pages that follow reiterate and expand upon this theory. The **V** diagram is a centering device for the theory of educating. The **V** is a method designed to plan, carry out, and finalize research investigations, analyze documents, and aid teachers when planning

lessons; it is also for students to learn and understand the aims of the lessons and assignments. The four commonplaces of educating (teaching, learning, curriculum, and governance) have been expanded to include societal influences and are examined and evidenced in the components arrayed on the **V** diagram. Educating, as a theory, focuses on the educative event and its related concepts and facts as they pertain to a topic of inquiry. The theory is useful in classifying the relevant aspects of the educative event. In an educative event, teachers and learners share meanings and feelings to bring about a change in human experience. This theory stresses the centrality of the learners' experience in educating.

The **V** diagram is a tool designed to unlock the structure of knowledge of a given document, program, or event. The **V** diagram unearths information in ways that cultivate the mind to think and critically examine the structure of knowledge of a work. Its purpose is to evoke thought so that new ideas connect to past information and can be learned. Most of what we read, view, and hear is reflected in records of some past event. The same holds in school situations, where students are required to learn records of events that have already happened; seldom are they asked to engage in learning that takes them beyond what is known to what is either new learning or what is possible to imagine.

The **V** is a symbol of knowledge that is constructed. It emerged as a heuristic device for analyzing knowledge claims of science. The main point is the act of pointing at event reality, with the point of the knowledge **V**. Events and objects of science are the main concern of knowledge claims about reality. Science is about reality that is not science. Science is about understanding reality, the events and objects that make up universal realities.

In our work, more than two decades of critical research has been achieved in the area of science. Science is much more than the scientific method assiduously applied. Some have held that if scientific method is to be improved, the use of the scientific method will improve itself. This view is a failed one. Our view: Critical analysis of works of science, like critical analysis of poems, or novels, or movies, or paintings, will produce the criteria of excellence each field needs. We read art critics, movie critics, and literary critics almost daily. We have science critics also but they seem much less popular.

Science is less popular than entertainment and edification of the arts. But both the arts and the sciences are mainstream in advanced education. Literary criticism, done well, is difficult, technical, and necessary. Science criticism can be well done. Philosophy of science is a field unto itself, dealing more with issues of philosophy than with specific experimental–empirical cases of scientific research.

In our critical analysis we examine clear cases and counterexamples. From these results we gradually formulate specific criteria of excellence.

Then, from these criteria we examine new cases. In our work, analyses of more than 3,000 scientific research works have been conducted. For years, students in seminars analyzed a piece of science every week. We criticized scientific methodology studies, empirical research papers, articles and essays of science, scientific books, science laboratory guides, teaching science essays, and curriculum materials for instruction in the sciences. In addition, philosophic criticism was done on logical positivism, pragmatism, analytic philosophy, philosophy of education, and educational theory. One powerful issue concerns this question: "Is knowledge discovered?" versus "Is knowledge constructed?" Today we find Foundationalists versus Constructivists writing about each other on this basic issue. Other powerful issues relate to these questions: Is science value-free? Do theories in science guide scientific research practices? Does scientific methodology fail because research is method-driven rather than theory-guided?

The **V** diagram was invented in 1977 in a seminar on science education at Cornell University. It was the result of years of analysis of specific works. The heuristic was invented by Professor D. Bob Gowin and published as "Gowin's **V**" (1981). Generations of advanced students used the **V** in their theses and dissertations. Other faculty taught the **V** and helped to develop and refine its uses. Professor Marino Alvarez was one of the first to adopt, adapt, and expand the uses of the concept maps and **V** diagrams.

The **V** heuristic was developed to enable students to understand the structure of knowledge (e.g., relational networks, hierarchies, and combinations) and to understand the process of knowledge construction. Our fundamental assumption is that knowledge is not absolute, but rather it is dependent upon the concepts, theories, and methodologies by which we view the world. To learn meaningfully, individuals relate new knowledge to relevant concepts and propositions they already know. The **V** diagram aids learners in this thinking process by acting as a metacognitive tool that requires users to self-monitor their progress by making explicit connections between previously learned and newly acquired information.

The **V** is a tool that helps us to understand and learn. Since knowledge is not discovered, but is constructed by people, it has a structure that can be analyzed. The **V** helps us to identify the components of knowledge, clarify their relationships, and present them in a visually compact and clear way. Several of the many possible applications of the **V** to education include using it to guide the design of research, to analyze research reports, textbooks, and curriculum material that you may be using when developing and improving the design of educative events. It also helps your audience understand the meaning of a piece of research. The exciting aspect of using the **V** is that it does help us to see more clearly how knowledge is constructed, an insight that is empowering, useful, and lasting.

Examples of **V** diagrams are shown together with instructions for their use and development. It is the intention of this book to serve as a resource

for one to implement his or her own constructions using **V** diagrams. A primary intent of the **V** is to stimulate thinking and imagination when confronted with problem-oriented tasks. Although primarily a pencil-and-paper tool, an interactive **V** diagram, explained in Chapter 9, has been developed and is described with examples of students' work using this electronic communication. **V**s shown that have plus (+) symbols after each element have been developed electronically using the *Interactive V Diagram* in the Exploring Minds Network, and clicking on this plus (+) symbol enables reviewers to make comments. A research strategy is presented that provides the reader with a framework to guide an analysis of a work as well as planning, carrying out, and finalizing a research investigation. These questions and statements correspond to the components arrayed on the **V** diagram. A stand-alone version of this **V** has been developed that has the capabilities for educators, students, researchers, and administrators to install it on their computers.

This book is divided into four parts. Part One, "Four Commonplaces of Educating Plus One," offers a theory of educating that encompasses teaching, learning, curriculum, and governance plus the societal environment; it describes the role of simplifying complexity without denying it when confronted with new information. Part Two, "The **V** Diagram," explores the relationship between Educating and the **V** diagram by describing the components of the **V**, the elements that are arrayed on the **V**, procedures and examples for making a **V** and for learning and teaching the **V** by teachers and their students in the classroom. Part Three, "Analyzing, Evaluating, and Conducting Research," focuses on the research process by describing the Q-5 technique as a way to transition into the **V** process and as a "code-breaker" when analyzing and evaluating documents, and it shows examples of research **V**s conducted by elementary, secondary, and postsecondary students. Part Four, "Reasoning with Technology," presents alternatives to conventional instruction through electronic educating and describes how the theory of educating and the use of interactive **V** diagrams are being used in the Exploring Minds Network developed at Tennessee State University's Center of Excellence in Information Systems.

Each chapter is written to convey a clear and concise message for using the **V** in ways that hopefully will evoke critical and imaginative thinking. The principles that guide each chapter are:

Principle 1. Educating changes the meaning of experience.
Educating is a process of deliberate intervention in the lives of students in order to *change* the meaning of experience. *Knowledge is a human construction*. Knowledge is not discovered. Coal, for example, is discovered. Knowledge about coal is a human construction. Begin with the practice of making knowledge. Human beings make knowledge out of their experience – they are trying to make sense of their immediate experience and their mediated experience.

Principle 2. Sharing meaning simplifies complexity through educating ourselves and others.

Principle 3. Knowledge has a structure of parts and relations between the parts.

We talk about the structure of knowledge. Structures have parts and relations. A house structure, for example, has a foundation, walls, roof, rooms, etc. – parts and their relations.

*Principle 4. The **V** diagram is a way to show the structure of knowledge.*

A one-page **V** diagram can show the structure of knowledge of an entire scientific research paper.

*Principle 5. A **V** represents knowledge of an educative event formed by human agents interacting in a social setting where the reality of the social constructions vary in complex ways. The **V** simplifies this complexity.*

*Principle 6. The **V** diagram clarifies ambiguities and makes new events happen.*

For the teacher, the **V** makes lesson planning more meaningful to the student. The **V** enables students to pursue their ideas, risking failure in the process to success and achievement.

*Principle 7. The **V** diagram of the structure of knowledge provides a basis for evaluating. The developer of a diagram judges worth by criteria of congruence-correspondence, coherence-conceptual clarity, the question-event connection, and the fit between questions asked and answers given.*

*Principle 8. The **V** diagram mediates conceptual and methodological research design and practice.*

Principle 9. Electronic educating extends learning beyond the walls of the classroom or laboratory and enables meaning to be negotiated electronically in ways that go beyond the conventional paper-and-pencil formats.

The art of educating is a two-fold process. In one we engage ourselves into the thinking–learning process in order to become more knowledgeable in the workings of the world; in the other we inspire individuals through teaching to become self-empowered in the learning process by engaging their minds in meaningful actions. The theory of educating espoused in this book is intended to provide a venue by which these two processes occur. Knowing and applying the four commonplaces – teaching, learning, curriculum, and governance – and taking into consideration the societal environments that impact these commonplaces aid in resolving complexities while simultaneously stirring the imagination. Educating helps us to come into conscious possession of our own powers (and our world), especially the flourishing integration of thinking and feeling and acting. As educative events come more and more under our control, educating becomes self-educating, and that is the goal of education.

To study educating is to become intelligent about becoming intelligent. What intellectual tasks confront us as we seek to achieve this aim? This book moves us in that direction by offering a framework of ideas for conceptualizing phenomena of education. By centering our attention on the four

commonplaces of educating and the influence of the societal curriculum, we will come to understand educating as an eventful process. Educating is reeducating. It is a continual process of working and reworking, structuring and restructuring the qualities of human experience interacting with nature.

INITIAL ASSUMPTIONS

We assume that scientific knowledge is keenly relevant to the art of educating. Science is abstract and theoretic. Educating is about direct human experience and is practical, concerned with human goodness; it is also productive, concerned with beauty. We use **V** diagrams as a proven approach to the many ways of integrating these important human events.

We assume that educated human beings appreciate both the value and the difficulty of governing educative events for themselves and for others who are less well educated.

We assume that the most difficult human learning is learning a language, a learning achieved by most 3-year-olds.

We assume that transactions of human beings and computers are desirable and become educative when they are governed by a proven theory of educating.

We assume that organisms organize. Human organisms organize meaning.

Acknowledgment

The **V** diagram known as Gowin's **V** was invented at Cornell University in 1977, after a decade of research in science, science education, philosophy of science, and philosophy of education. Cornell University Press published *Educating* in 1981, with **V** diagrams. I acknowledge with gratitude and admiration all the faculty members and graduate students who participated in various ways. Cornell graduate students: Peter Cardamone, first test of concept mapping in teaching, college mathematics, 1975; Dr. Marco Moreira, first to publish a book on the use of **V** diagrams in physics laboratories, 1980, in Portugese; Dr. Laine I. Gurley, first yearlong field test, "Use of Gowin's **V** and Concept Mapping in High School Biological Sciences," Ph.D. thesis, 1982. I am grateful to their brilliance and their groundbreaking courage. The **V** is generative and its use has spread worldwide.

Barbara Coulson, former North Atlantic Director for Cambridge University Press, has supported my work for more than 20 years and two books, and I give her my heartfelt appreciation. Philip Laughlin, our editor, has been prompt, and demanding, and delightfully optimistic, and our thanks go to him and his assistants. Kenneth Karpinski, Project Manager, provided the necessary accouterments for the book, for which we are grateful. Patty Schurba gave expert computer advice throughout the difficult and complicated joint manuscript preparation; thank you for your friendly support.

Virginia Pugliese and her many children and grandchildren have given me love and personal support through the half dozen years I have spent writing and working on this book. Thank you so very much.

D.B.G.

A book intended to spur ideas and aid in self-educating and simplifying complexity comes to fruition when we reflect on our parents, teachers, mentors, friends, students, and relatives who provide opportunities for us

to engage in these kinds of stimulating tasks. Both of us have many to thank for helping to better understand the intellectual processes needed to learn new information, but also ways in which to teach others to become self-educating. For me these persons include Professors John Helfeldt, Judith Thelen, Lawrence Erickson, and Thomas Hatcher. Dr. Michael R. Busby, Director of the Center of Excellence in Information Systems, Tennessee State University, has provided us with constant support during this endeavor, for which we are greatly appreciative. We also acknowledge the support provided by NASA through the Tennessee Space Grant Consortium, Network Resources Training Site (NRTS), and NASA Center for Automated Space Science. Greg Henry and Dr. Geoff Burks have served as mentors to many of the students involved in the Exploring Minds project, and Ms. Goli Sotoohi has been an invaluable technician and researcher in the design of the Exploring Minds Network and creating the images appearing in our book. The teachers and their students are important members of our Exploring Minds project. High school teachers who deserve special mention are William Rodriguez, Lee Ann Hennig, Terry King, and Dr. John Lee.

Lastly, I acknowledge my wife, Victoria Risko Alvarez, who has been an inspiration and companion throughout this learning process. I am thankful for our son, Christopher, who provides the incentive and sparks the need for educating to flourish as an enduring process.

M.C.A.