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THE METAPHORICAL USE OF THEORIES AND MODELS IN SUPERVISION: BUILDING A SCIENCE

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Can supervision and teaching evolve into disciplined fields of inquiry and professional practice?[1] The answer, I think, is yes, but this evolution will not result from accumulating more of the same kinds of theory and research, building the same kinds of practice models, and using these models in the same way. Knowledge generation and use need to be viewed in a different light—a light better linked to the nature of the sciences on the one hand and the realities of practice on the other.

My argument can be summarized as follows. The current state of knowledge generation and model building in supervision and teaching is patterned after the physical sciences, but in fact these fields fall within the domain of the cultural sciences. Further, our mimicking of the physical sciences is too simplistic to be considered scientific by the standards of that guild. This simplistic mimicking results in the development of rationalistic rather than rational theories and practices. "The rationalistic tradition is distinguished by its narrow focus on certain aspects of rationality which ... often leads to attitudes and activities that are not rational in a broader perspective."[2] Further, rationalistic theories and models are typically implausible given the realities of practice. These theories and models tend to lead to bad science because they are either wordy elaborations of the obvious or because they deal with trivial questions.[3]

A proposed cultural science view is better able to accommodate and to serve the limits and strengths of the human characteristics of supervision and teaching. Within this view, using theory and research metaphorically is a first step to building a more relevant basis for inquiry and practice. Since the intent

[1]This article is based on the paper, "Theories and Models as Metaphors. Building a Science of Supervision," presented at the Annual Meeting of the American Educational Research Association, San Francisco, April 1986

[2]Terry Winograd and Fernando Flores, *Understanding Computers and Cognition* (Norwood, N.J.: Ablex Publishing, 1986), p. 8.

[3]Charles Taylor, *Philosophy and the Human Sciences Philosophical Papers, Volume 2* (New York: Cambridge University Press, 1985).

is not to abandon scientific thinking and disciplined rigor but to redirect it, this article concludes with an attempt to establish criteria for judging the relative worth of theories and models for use in practice. Given the present state of our art and science, I promise more than I can deliver. Many questions that are raised remain unresolved.

Within the more established disciplines, advances have been made in understanding the nature of knowledge generation. These advances are not sufficiently reflected in mainstream supervisory thought. For example, scientists and philosophers both agree that human thinking influences scientific reality. The social scientists McGrath, Martin, and Kulka, for example, point out that "we can never know anything independently of the ways we found it out; empirical knowledge is always contingent on the methods, populations, situations and underlying assumptions involved in the process by which knowledge was acquired."[4] "Finding out" decisions are human choices. Much of what is found out in research and counts as scientific evidence is an artifact of these human choices.

Human choice is a factor in determining scientific reality in the physical as well as the social sciences. Heisenberg's uncertainty principle and Bohr's principle of complementarity are examples from physics. Together, these principles establish that the characteristics and properties of quantum reality cannot be defined separately from their environment and the decisions that researchers make in studying them. As these conditions change, so do the characteristics and properties of quantum reality. Electrons, for example, exist in the form of particles or waves, depending on how they are measured. Measurement decisions are human decisions, and thus scientific reality (particle form) becomes an artifact of such decisions.[5]

Not only do human decisions regarding method affect scientific reality, but the mind-set of the researcher contributes to this reality as well. For example, in discussing a science of history, Dilthey points out, "The first condition for the possibility of a science of history consists in the fact that I myself am an historical being, that he who researches into history is the same as he who makes it."[6] Gadamer states, "It is not so much our judgments as it is our prejudices that constitute our being."[7] Scientists, according to the argument, are linked to specific contexts and transitions that provide them with a pre-understanding of the subject matter they study, and thus they are not able to inquire into reality with a neutral mind.

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[4]Joseph E. McGrath, Joanne Martin, and Richard Kulka, *Judgment Calls in Research* (Beverly Hills, Calif.: Sage Publications, 1982), p. 105.

[5]See, for example, Thomas J Sergiovanni, "Expanding Conceptions of Inquiry and Practice in Supervision and Evaluation," *Educational Evaluation and Policy Analysis* 6 (Winter 1984): 355–365, for an elaboration of this theme.

[6]Wilhelm Dilthey, quoted in Joseph Bleicher, *Contemporary Hermeneutics, Hermeneutics as Method, Philosophy, and Critique* (Boston: Routledge and Kegan Paul, 1980), p 23

[7]Hans Georg Gadamer, *Philosophical Hermeneutics*, translated and edited by David E. Linge (Berkeley: University of California Press, 1976), p. 9.

As human thinking and acting influence scientific reality, so does scientific reality influence human thinking and acting, and the resulting evidence is an artifact of this interaction. But sciences differ, and depending on which species we have in mind, this balance of influence changes. In the physical sciences, for example, scientific reality emerges as the more dominant of the two. In the cultural sciences, human thinking and acting are the more dominant.

How are the cultural sciences different from the physical sciences? Weber[8] suggests that the goal of the cultural sciences is the study of social behavior through understanding the motives and intentions of others and by interpreting the subjective meanings of their actions. Basic concepts for the cultural sciences are the interpretation of our own and others' experience, the establishment of meaning, and the interpretation of meaning.[9] The cultural sciences acknowledge the omnipresence of subjectivity and accept the influence of subjectivity in determining what counts as meaning and reality. Outside facts, within the cultural sciences, change through interpretation as they become inside reality. The cultural sciences recognize that humans both behave and act but give prime attention to the human as actor. Thus, most of what people do and say is considered embedded in intention and motive and is not construed as mere behavioral reactions to physical and psychological stimuli. To understand human action, therefore, we must move beyond recording and averaging behavior to understanding the causes of our actions.

In sum, the cultural sciences in contrast to the physical sciences are largely mind dependent. The physical sciences, by contrast, are largely mind independent. The subject matter of the two are construed differently. The physical sciences emphasize a world composed of inanimate objects that exist independently of human awareness and insight, that can be objectively described, and that can thus become universally verifiable truth. The cultural sciences, by contrast, emphasize a constructed reality born of human intention, modified by social interaction, and verified by the meanings and sense this reality provides to people.

I have argued elsewhere that the nature of teaching and learning and of supervision and evaluation requires that professional practice be based on the realities of the cultural sciences.[10] The crux of this argument is that

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[8]Max Weber, *The Theory of Social and Economic Organization*, 2nd ed., translated by A. M Henderson and Talcott Parsons, edited by and with an introduction by Talcott Parsons (Glencoe, Ill.: The Free Press, 1957)

[9]Alfred Schutz, *The Phenomenology of the Social World*, translated by George Walsh and Frederick Lehnert (Evanston, Ill.: Northwestern University Press, 1967).

[10]See, for example, Thomas J. Sergiovanni, "Supervision and Evaluation: Interpretive and Critical Perspectives" (paper presented at the meeting of the Council of Professors of Instructional Supervision, Knoxville, Tenn., November 1982); Thomas J. Sergiovanni, "Expanding Conceptions of Inquiry and Practice in Supervision and Evaluation," *Educational Evaluation and Policy Analysis* 6 (Winter 1984): 355–365; Thomas J. Sergiovanni, "Landscapes, Mindscapes, and Reflective Practice in Supervision and Evaluation," *Journal of Curriculum and Supervision* 1 (Fall 1985): 5–17.

supervision and teaching differ markedly from the theoretical view of the physical sciences. More pointedly, scientific knowledge so construed and literally applied is mismatched to the realities of supervisory and teaching practice.

The following are examples of this mismatch. Dominant models of supervision and teaching emphasize uniform answers to problems, value-free strategies, separation of process from context, objectivity, and a uniform-technical language system. Patterns of supervision and teaching practice, however, are characterized by much uncertainty, instability, complexity, and variety Further, value conflicts and uniqueness are accepted aspects of educational settings. Since situations of practice are characterized by unique events, uniform answers to problems are not likely to be helpful. Since teachers, supervisors, and students bring to the classroom beliefs, assumptions, values, opinions, and preferences, objective and value-free supervisory strategies are not likely to address issues of importance. Since reality in practice does not exist separate from those involved in the processes of teaching and supervision, knowing cannot be separated from what is known. Since evaluation reality is linked to the observer and to decisions she made about methods of evaluation, it is construed as an artifact of this situation. Since supervisory reality is context bound and situationally determined, the practical language of actual classroom life and actual teaching events will be found more meaningful than the theoretical language or the language that may be inherent in rating scales and other measurement devices associated with the traditional scientific view Where objective or discovered reality exists in teaching and supervision, it becomes transferred into constructed reality as people process and interpret in search of meaning. This world of supervision is at odds with the more predictable and stable world within which the physical sciences flourish

Supervision unfolds to inform the decision-making process. Thus, evaluation data cannot stand apart from human judgments. The basic building block of supervisory knowledge is, therefore, sense datum, not brute [11] Examples of brute data are displays depicting patterns of teacher questioning and student responses, frequency counts of student "on task" behaviors, evaluation instrument checks recording the presence or absence of certain teaching behaviors, as well as verbatim transcripts of classroom verbal interactions analyzed according to fixed rules and protocols. Sense data, by contrast, are accounts of what this information means given supervisor and teaching perceptions, motives, and intentions and the unique events that define and account for the classroom situation under study.

The more cultural or mind dependent the science, the greater is the disparity in meaning between the external configuration of events (brute) and internal meanings (sense). The meaning of brute data is fixed, free from mind

[11]Charles Taylor, "Interpretation and the Sciences of Man," *The Review of Metaphysics* 25 (Winter 1971): 3–51.

and context conditions As brute data are interpreted into sense data, meaning typically changes Different mind-sets and contexts, for example, make different sense of the same brute data. Thus, sensible judgments about the adequacy of teaching cannot be made by merely collecting and analyzing brute data. Instead, worth should be determined by examining such data in the light of its context.

To complicate matters, the context for teaching that counts is largely socially constructed reality Supervision is not concerned with teaching defined as social *behavior* but as social *action*. In describing Weber's thoughts on this distinction Walsh notes that within the social sciences the concept *social* is defined in terms of a relationship between the behavior of two or more people, and the concept *action* is defined as behavior to which a subjective meaning is attached [12] If indeed teaching is construed as more social action than social behavior, then the evaluation of teaching must always be subjective. To assess teaching construed as social action, supervisors must become participants in, and not merely observers of, its unfolding. This reality leads to the following dilemma: "If we remain mere observers, do we not lose the very object of our science, namely the subjective meaning of the action?"[13]

The characteristics of cultural science are omnipresent in supervisory science and practice What implications do these characteristics hold for how supervisory knowledge is developed and used? They make acceptance of any theoretical model (whether based on empirical research or other modes of inquiry) and the resulting models of practice suspect for direct application to practice For this reason, professional practice in teaching and supervision cannot be conceived as applied sciences allied with a science embedded in one or several disciplines. Supervision and teaching are not sciences in a literal sense Further, professional practice does not need to be embedded in a literal science to emerge and flourish. What is needed, however, are multiple modes of analyzing teaching and supervision in a scientific spirit and in a disciplined manner [14] If this inquiry is to be anchored in the concept of cultural rather than physical science, with constructed social reality interpreted in context and recognized as an omnipresent necessity, then the question remains as to how best inform such a construction. What is the role of theory and research and models of practice, whatever their origin, in informing the work of supervision?

Not only are models of research and practice mind dependent, they are mind dominant as well That is, once established and articulated, they frame the way we think about analysis and practice. They structure our thinking,

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[12]Alfred Schutz, *The Phenomenology of the Social World*, translated by George Walsh and Frederick Lehnert (Evanston, Ill.: Northwestern University Press, 1967), p. xxiii.

[13]Ibid.

[14]Israel Scheffler, *Reason and Teaching* (New York: Bobbs-Merrill, 1973), p. 83.

provide us with a logic, and create a mindscape[15] that determines what we see and do, what we do and do not value. As Greenfield reminds us:

> Language is power. It literally makes reality appear and disappear. Those who control language control thought—and thereby themselves and others. We build categories to dominate the world and its organizations.[16]

For example, when caught up in the language of the teaching-effectiveness research, we view teaching and supervision in a certain way. An evaluation system based on such research is a subjective artifact of this thinking. By the same token, when caught up in the language of "informal teaching," we view teaching and supervision differently. An evaluation system based on the informal tradition would value certain characteristics of teaching that would be different from those found in the teaching-effectiveness research Good teaching, then, becomes an artifact of the system used. The system is a subjective expression of a mindscape. A teacher who follows the teaching-effectiveness research in his practice would be declared a winner under one system and a loser under the other. Winning and losing becomes an artifact of the evaluation system. The evaluation system used is mind dependent in conception and mind dominant in implementation—subjective on two counts Teaching effectiveness, therefore, cannot be determined objectively.

The intent of this discussion is not to choose from among several models of teaching and supervision (i.e., teaching effectiveness, informal, direct, artistic, clinical) in search of one best way or for that matter to value one model more than another in an absolute sense. All have worth, but none are true. Within the mind-dependent cultural sciences, absolute truth is difficult to establish and is an impractical yardstick for judging goodness. The standard of relative worth, on the other hand, is both accessible and practical A model is considered worthwhile if it helps us better understand the teaching events and the situations under study and helps us to make more informed decisions about this reality.

However refined a model becomes or however precisely it is translated into practice, the model cannot enlarge its basic premise. This *law of conservation of information* is well understood in the more established sciences but often forgotten by those of us who toil in such fledgling fields as teaching and supervision. In discussing this law, the Nobel Laureate Medawar states, "No process of logical reasoning—no mere act of mind . . . can enlarge the information content of the axioms and premises or observation statements from which it proceeds."[17] The teaching-effectiveness model, for example, is based on a specific set of assumptions about teaching and learning requiring

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[15]Thomas J. Sergiovanni, "Landscapes, Mindscapes, and Reflective Practice in Supervision and Evaluation," *Journal of Curriculum and Supervision* 1 (Fall 1985). 5–17.

[16]Thomas B. Greenfield, "Against Group Mind: An Anarchistic Theory of Education," *McGill Journal of Education* 17 (Winter 1982): 8.

[17]Peter Brian Medawar, *The Limits of Science* (New York: Harper & Row, 1984), p. 79

that we have in mind a specific objective for students to learn, get students ready to learn this objective, state the objective to them, teach to the objective, keep students on task with respect to the objective, require students to practice the task, provide reinforcement in the process, and test students to ensure that they have met the objective. Taken literally and applied to all situations, these are small premises on which to base a science of teaching and an allied science and practice of supervision. Clinical supervision and other models also have their assumptions, protocols, steps, and prescriptions, and the law of conservation of information applies to them as well.

Models of teaching and supervision are much like windows and walls. As windows, these models help expand our view of things, resolve issues that we face, provide us with answers, and give us that surer footing we need so we can function as researchers and practicing professionals. In this sense, mindscapes are useful, for they provide us with a coherent, albeit limited, view of teaching and supervisory reality. But because reality is mind dependent, "there are always walls enclosing us."[18] As walls, these same models box us in and blind us to other views of reality, other understandings, and other alternatives.

In discussing the windows and walls metaphor, Eisner states:

> Theory is both an asset and a liability. It is an asset because it provides guidelines for perception: it points us in directions that enable us to see. But it is also a liability because, while it provides windows through which we obtain focus, it creates walls that hamper our perceptions of those qualities and processes that are not addressed by the concepts we have chosen to use. Our theoretical frameworks function as templates for perception. Every template conceals some parts of the landscape just as it brings other parts to our attention.[19]

Thus, whether we are referring to the teaching-effectiveness research, informal teaching, clinical supervision, target setting, or other models, we are provided with a view of reality that both increases and decreases our understanding at the same time.

We can capitalize on increases in vision and understanding and lessen decreases by transcending the law of conservation of information and the limitations of our windows and walls. Doing so requires that we view research and practice models metaphorically rather than literally. That is, the models should not be conceived as truth designed for application but as thought frames that inform teachers' and supervisors' decisions as they practice. Scheffler, for example, states, "The notion that one can confidently proceed by simple deduction from theory to practical recommendations without regard to related theories, auxiliary assumptions, or possible feedback from recalci-

[18]Wilhelm Dilthey, quoted in Ilse Bulhof, *Dilthey: A Hermeneutic Approach to the Study of History and Culture* (Hague: Martins Nijhoff, 1980), p. 91.

[19]Elliot W. Eisner, *The Art of Educational Evaluation. A Personal View* (Philadelphia: The Falmer Press, 1985), p. 261.

trant cases into the theoretical assumptions themselves, is a mistaken notion."[20] On this point, he quotes William James, who stated in 1892:

> You make a great, a very great mistake, if you think that psychology, being the science of the mind's laws, is something from which you can deduce definite programmes and schemes and methods of instruction for immediate schoolroom use. Psychology is a science, and teaching is an art; and sciences never generate arts directly out of themselves. An intermediary inventive mind must make the application, by using its originality.[21]

Informed intuition and reflective practice are key concepts in understanding the link between knowledge and use. Neither are directly dependent on models of teaching and supervision, but neither can evolve separately from such models.

Suggesting that research and practice models be viewed metaphorically rather than literally is itself a metaphor. Metaphors are language expressions that are anchored in familiar meanings and that help us discover new meanings. They provide conceptual leaps from one thought frame to another and help us to view life from a new vantage point. For example, we can view schools metaphorically as factories, gardens, shopping malls, or airport terminals. Each of the metaphors helps us to see the familiar in a new light. While none accurately describes schooling, together they help us to create a richer and more useful understanding—an understanding that can help us to practice schooling more meaningfully and more productively.

Similarly, viewing teaching-effectiveness, clinical, and other supervisory models metaphorically would provide teachers and supervisors with conceptual rather than instrumental knowledge.[22] This conceptual knowledge, considered as part of a broader array of knowledge (i.e., the teacher's motives and intentions, those of the supervisor, idiosyncrasies that define the teaching and learning context under study), becomes professional knowledge when decisions and actions ensue. Professional knowledge, therefore, should not be equated with the knowledge of research and practice models. Professional knowledge is created in use as teachers teach and supervisors supervise. Professional knowledge is an accumulation of the referentially based decisions that professionals make as they practice.

Does taking a metaphorical stance mean that all models are to be considered equally true or equally worthwhile? With respect to truth, for example, is a model of teaching and supervision based on limited premises equal to a more comprehensive view? It is not defensible to accept the position that all models are equally true or worthwhile. How will *relative* truth and worth be determined? The question of relative truthfulness can be resolved by model

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[20]Israel Scheffler, *Reason and Teaching* (New York: Bobbs-Merrill, 1973), p. 185.

[21]Ibid.

[22]Mary M. Kennedy, "How Evidence Alters Understanding and Decisions," *Educational Evaluation and Policy Analysis* 6 (Fall 1984): 207–226.

approximations to traditional scientific criteria (efficacy, validity, reliability, accuracy, precision, robustness, coherence, etc.). After analyzing the models scientifically, we will reject some as untruthful and decide others have varying dimensions of truthfulness.

The teaching-effectiveness model, for example, is true for *precision,* but true only in a limited sense for accuracy. In this example, accuracy refers to the general importance or value of an educational activity or goal. Precision, on the other hand, refers to the specificity and rigor with which the activity or goal can be monitored, programmed, articulated, and measured. Within this model, teaching effectiveness is construed as a narrow strike zone and is defined in the form of predetermined, highly structured, and highly specific outcomes amenable to easy identification and measurement. A teacher is effective if teaching pitches land inside this learning strike zone and ineffective if teaching pitches (regardless of general worth) do not.

A limitation of the teaching-effectiveness model is its tendency to substitute precision for accuracy. Then, we tend to select, fit, or force objectives and activities to be evaluated to the forms and structures that match the technologies required for precise evaluation. The methods and procedures of evaluation determine what will be evaluated. The attractiveness of the teaching-effectiveness model for many seems to be more in the precision of its method than in the accuracy of its outcome. Still, when highly specific learning outcomes make sense, when it is less important that students interact with the learning process to construct their own personal meanings, and when reliability in learning is important, this model of teaching and its accompanying supervisory designs may be hard to beat.

Beyond assessing relative truthfulness, how do we assess the relative worth of available models? At the heart of teaching and supervision, a value judgment must be made on how learning should take place and what ends are of most worth. Answers to questions of how and what cannot be resolved scientifically as if they were factual assertions. These answers are, instead, the products of normative assertions. As Taylor suggests, normative assertions are true only because we decide to accept certain standards, rules, and conditions as being applicable to what we are making the assertions about. He states: "Our adoption of a standard or rule on which the truth or falsity of our assertion depends does not itself depend on the way things are. We must decide what ought to be the case. We cannot *discover* what ought to be the case by investigating what is the case."[23]

Normative assertions can be informed by examining the underlying human conditions that shape and define the situation at hand. In his 1985 address to the American Educational Research Association, Jerome Bruner discussed the connection between several models of learning and underlying human con-

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[23]Paul W. Taylor, *Normative Discourse* (Englewood Cliffs, NJ: Prentice-Hall, 1961), p. 248.

ditions, suggesting that the latter determined the worth of the former. The following three quotations from his address are illustrative:

Any model of learning is right or wrong for a given set of stipulated conditions, including the nature of the tasks one has in mind, the form of the intention one creates in the learner, the generality or specificity of the learning to be accomplished, and the semiotics of the learning situation itself—what it means to the learner.[24]

Yet the model of the learner is not fixed but varies. A choice of one reflects many political, practical, and cultural choices. Perhaps the best choice is not a choice of one, but an appreciation of the variety that is possible. The appreciation of that variety is what makes the practice of education something more than a scripted exercise in cultural rigidity.[25]

In a word, the best approach to models of the learner is a reflective one that permits you to "go meta," to inquire whether the script being imposed on the learner is there for the reason that was intended or for some other reason.[26]

There are as many views of supervision as there are teaching and of teaching as there are learning. A reflective practice of supervision seeks to capitalize on this richness by avoiding a one-best-way mentality. A rich practice turns poor once a decision is made to bring one view to the forefront at the expense of others. Still, not all views are equally appropriate or equally worthwhile in all situations. Occasionally, choosing among them for one to use or, more typically, *creating a new view* from the rich vantage points available (i.e., creating professional knowledge in use as we practice) are signs of professional maturity. This maturity will require that research and practice tend more specifically to particular teaching and learning contexts and to the human motives and intentions that drive the decisions on teaching and learning. Key, in this enterprise, will be the concept of purpose.

Teaching and supervisory practices, whether created in use, adapted from, or expressed as replications of existing models must be both cogent and relevant. Cogency and relevancy are standard criteria, applicable to both physical and cultural sciences, used to judge the adequacy of knowledge claims and the applications of these claims in professional practice.[27] Cogency refers to the rational appeal, compelling reason, and convincing appearance of teaching and supervisory models and the resulting professional decisions and actions. Relevancy refers to the applicability and pertinence of such models, the decisions and actions answering the matters at hand. Both cogency and relevance are established by, and thus dependent on, the purposes we have in mind. Models and practices, therefore, are neither cogent nor relevant in an absolute sense.

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[24]Jerome Bruner, "Models of the Learner," *Educational Researcher* 14 (June/July 1985) 5

[25]Ibid., p. 8.

[26]Ibid.

[27]William N. Dunn, "Reforms as Arguments," *Knowledge: Creation, Utilization, Dissemination* 3 (March 1982): 293–326.

Despite the importance of both cogency and relevancy to inquiry in all science, we find a distinct preference among researchers and practitioners for models and practices characterized by high cogency and low relevance. Cogency can be misplaced or misjudged. An example of misjudged cogency in quantitative research is setting statistical limits either too high or too low—commonly referred to as Types I and II errors. These errors in practical judgment result in either acceptance of suspected reality or rejection of valid reality. Although the forms errors in practical judgment take in the cultural and physical sciences differ, the types of errors apply to both sciences.

Misplaced cogency, on the other hand, refers not to errors of method, precision, measurement, or judgment but to the adequacy of the problems addressed. Addressing the wrong problem in a meticulous and precise way is an example. Medawar is instructive here. "It has been shrewdly observed that an experiment not worth doing is not worth doing well."[28] Using direct instruction techniques in an attempt to attain higher level learning outcomes might well be an example of misplaced cogency. Then, we commit what Mitroff calls the Type III error.[29] It is better to heed Tukey's admonition than to persist in committing the Type III error: "Far better an approximate answer to the right question, which is often vague, than an exact answer to the wrong question, which can always be made precise."[30]

Misplaced relevance refers to the development and application of cogent knowledge that is relevant to one type of problem but not another. A given model of teaching and supervision, for example, might be cogent and relevant for one population of teachers (novices and less able teachers) but not another. When the model is prescribed universally, the danger of misplaced relevance results—a Type IV error.[31]

In summary, the models and theories dominant in supervision do not reflect the realities of teaching and supervisory practice. Teaching and supervision are fields within the domain of the cultural sciences. Models of knowledge generation and use in practice within the cultural sciences are both mind dominant and mind dependent. They emerge from a series of subjective decisions, but once established these models become dominating mindscapes that program our thinking and create our reality. Acknowledgement of this reality requires that we develop a rational rather than rationalistic science. Rationalistic science focuses too narrowly on certain aspects of rationality that are not rational in broader perspective. Rationalistic science, being subject to

[28]Peter Brian Medawar, *The Limits of Science* (New York: Harper & Row, 1984), p. 29

[29]Ian I. Mitroff, *The Subjective Side of Science* (New York: American Elsevier Publishing, 1974).

[30]Richard Rose, "Disciplined Research and Undisciplined Problems," in *Using Social Research in Public Policy Making*, edited by Carol H. Weiss (Lexington, Mass.: Lexington Books, 1977), p. 23.

[31]William N. Dunn, "Reform as Arguments," *Knowledge: Creation, Utilization, Dissemination* 3 (March 1982): 293–326.

the law of conservation of information, increases the likelihood of theorists and professionals making Types III and IV errors.

If models of research and practice are viewed metaphorically rather than literally, they would serve less to impose a reality and more to enhance our understanding of reality. They would help us to reflect on our practice and to make more informed decisions about teaching and supervision. They would help us to create knowledge in use as our professional practice unfolds. Such metaphorical use of theories and models is, I believe, the basis for building a relevant science of supervision.

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Earls, Neal F., with Kathy C. Graham and Judith L. Green. *Naturalistic Inquiry Interactive Research and the Insider-Outsider Perspective* Special Monograph Issue, *Journal of Teaching in Physical Education* 6 (October 1986): 1–108.

This monograph contrasts positivistic and naturalistic research traditions and presents detailed approaches to research design, data collection, analysis, and reporting of naturalistic inquiry. Procedures for mapping a transcript from a multifaceted observation process are illustrated. Reviews of naturalistic inquiries in education, physical education, play, and sport are also included.

Grant, Carl A., and Christine E. Sleeter. *After the School Bell Rings.* Philadelphia: The Falmer Press, 1986, 294 pp., $28.00/$17.00.

This ethnographic case study of Five Bridges Junior High School discusses race, class, gender, and handicap from a conflict-theory perspective. The book contains in-depth data on the school, community, students, administrators, teachers, classroom life, and student beliefs. A critical appraisal points to the perpetuation of inequality and the status quo in this school

Fielding, Glen D., and H. Del Schalock. *Promoting the Professional Development of Teachers and Administrators.* Eugene, Oreg.. College of Education, University of Oregon, Center for Educational Policy and Management and the ERIC Clearinghouse on Educational Management, 1985 77 pp $5 95

The authors summarize the research on promoting professional development that has emerged from studies over five years at the University of Oregon's Center for Educational Policy and Management, and offer guidelines for action based on this research.