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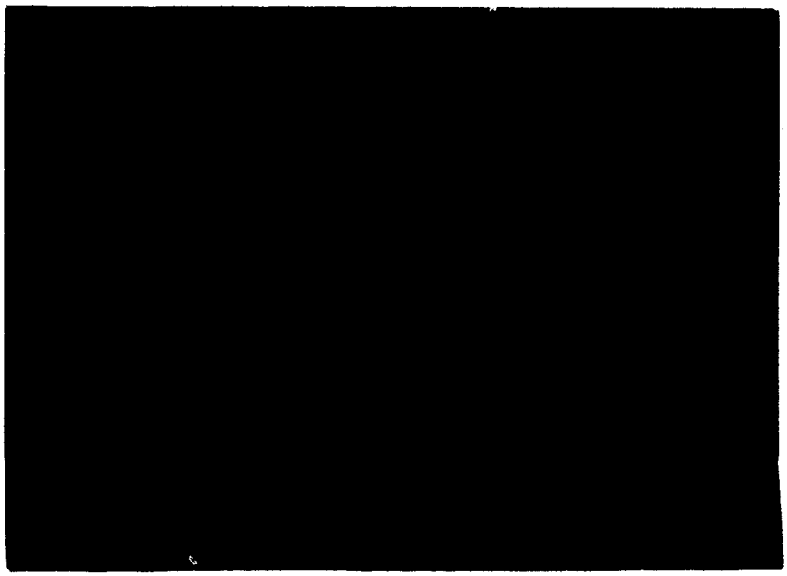
ABSTRACT

This report summarizes major findings and policy implications of a University of Pittsburgh project titled Methodological Research on Knowledge Use and School Improvement. The major emphasis has been methodological rather than substantive. The primary purpose has been to describe, evaluate, and recommend alternative concepts, methods, and techniques that enlarge capacities to understand and shape processes of knowledge use and school improvement. This project focuses on three core methodological problems: the criterion problem in knowledge use, the multiattribute problem of meanings attached to knowledge, and conceptualization and measurement in the knowledge transactional problem. Procedural inventory, typological procedures and analytic procedures are discussed as research objectives. The approach employed to realize these objectives may be described as a form of methodological triangulation: documentary and archival search; pooling, selection, and analysis of procedures; and network consultation, conferences, and workshops. The project results are summarized around five sets of methodological findings: reproducibility, reliability, and validity; knowledge use as a criterion; formal classification schema; generative classification schema; and sociocognitive grid procedures. Appendices contain an annotated bibliography of working and occasional papers, a sample procedure abstract, a sample study profile, and frequency distributions for study profiles. (Author/PN)

PROGRAM FOR THE STUDY OF KNOWLEDGE USE



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METHODOLOGICAL RESEARCH ON KNOWLEDGE USE AND SCHOOL IMPROVEMENT

Volume I: Project Overview and Summary of Findings

August 1982

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CONTENTS

Section 1
INTRODUCTION

This report summarizes major findings and policy implications of a project titled Methodological Research on Knowledge Use and School Improvement. The major emphasis of this twelve-month project, formally initiated in January 1981, has been methodological rather than substantive. Our primary purpose, therefore, has been to describe, evaluate, and recommend alternative concepts, methods, and techniques that enlarge capacities to understand and shape processes of knowledge use and school improvement. We have been concerned only indirectly with the production of new substantive research findings.

Methodological research, in the sense we understand this term, is about some collection or set of methods and techniques; it is not itself one of the set.[1] Methodological research therefore involves the systematic investigation of alternative standards--logical, empirical, practical--for choosing particular research procedures. Many of the most important questions surrounding the study of knowledge use are, in this sense, methodological:

*What do we mean by knowledge when we attempt to measure its uses by parents, teachers, principals, and other stakeholders in school improvement?

*How might we classify and measure the uses of work-related knowledge and how are thses uses related, if at all, to characteristics of knowledge itself?

[1] See Paul Watzlawick, John Weakland, and Richard Fisch, Change: Principles of Problem Formation and Problem Resolution (New York: N.W. Norton, 1974, p.6. Compare Whitehead and Russell: "Whatever involves all of a collection must not be one of the oollection." Principia Mathematica (1910), p. 101.

*What procedures are available to develop more appropriate constructs of knowledge use, given the presence of diverse and frequently conflicting conceptions of knowledge and its uses for school improvement?

*How might we classify and measure criteria employed by educators to assess the adequacy, relevance, and cogency of knowledge introduced into school settings?

*If school improvement is a collective process, involving a system of interdependent relations among principals, parents, teachers, and other educators, how might we investigate the impact of knowledge use on collective as well as individual actions?

Section 2
CORE METHODOLOGICAL PROBLEMS

Questions posed above suggest a range of pressing methodological problems confronting those who study, and thereby seek to improve, processes of knowledge use and school improvement. The present project has focused on three such methodological problems, problems that represent a core of unresolved needs and opportunities facing researchers and practitioners in the field.

2.1 The Criterion Problem

What is knowledge use? Answers to this basic question have assumed a variety of forms, none of which has yielded a satisfactory account of the criteria in terms of which we may recognize the use of knowledge when actually it occurs.[2] Many scientists, policymakers, and practitioners continue to visualize knowledge, information, or research as quasi-physical

[2]Systematic reviews of this question include Judith K. Larsen, "Knowledge Utilization: Current Issues," in The Knowledge Cycle, ed. Robert F. Rich (Beverly Hills, CA: Sage Publications, 1981); Fritz Machlup, Knowledge and Knowledge Production, Vol. 1 (Princeton, NJ: Princeton University Press, 1980); and Carol H. Weiss, "Measuring the Use of Evaluation," in Utilizing Evaluation: Concepts and Measurement Techniques, ed. James A. Ciarlo (Beverly Hills, CA: Sage Publications, 1981). See also Volume 2 of this report, especially papers by Gerald Zaltman, "Construing Knowledge Use;" and William N. Dunn, "Methodological Choices in Studying Knowledge Use." Contents of these and other papers in Volume II are summarized ir Appendix A below.

entities embodied in externally visible objects. Prevalent metaphors are illustrative:[3]

*Knowledge is carried from source to receiver like a bucket carries water

*Knowledge is transported from producer to user like a wheelbarrow carries sand

*Knowledge is delivered from producer to user like a lumberjack fells trees for mills down-river

*Knowledge travels like a bullet shot at a target

*Knowledge is introduced like a hypodermic needle injects vaccine

*Knowledge spreads like an infectious disease

*Knowledge is stored like grain in a silo, books in a library, or bits, bytes, or blocks in a computer

*Knowledge is fabricated like the production of outputs from inputs in a technological or machine process

Physical metaphors such as these justifiably may be regarded as parts of the deep structure[4] of present-day thinking about knowledge use, generally and in settings of educational practice. Although physical metaphors represent one aspect of the domain we seek to understand (it is difficult to imagine knowledge without libraries, research reports, or information systems), they nevertheless constrain or distort our understanding of processes of knowledge use. Physical metaphors, for example, may preempt opportunities to visualize knowledge use as a cognitive process that is at once central

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[3]Compare Everett M. Rogers and D. Lawrence Kincaid, Communication Networks: Toward a New Paradigm for Research (New York: The Free Press, 1981), pp. 38-9; and Ernest R. House, "Three Perspectives on Innovation," in Improving Schools: Using What We Know, ed. Rolf Lehming and Michael Kane (Beverly Hills, CA: Sage Publications, 1981).

[4]See House, "Three Perspectives on Innovation ...;" and Donald Schon, "Generative Metaphor: A Perspective on Problem Setting in Social Policy," in Metaphor in Thought, ed. A. Ortony (Cambridge: Cambridge University Press, 1979).

to school improvement but entirely inaccessible to direct inspection.[5] Thus, to employ a contrasting metaphor, knowledge use is similar to drawing a mental map:

> Everyone employs a "cognitive map," that is, to define it metaphorically, a picture in their mind of the complex phenomena with which they deal. One's map of instruction may be very simple--certain things to be learned, pupils to learn them, and learning activities through which the pupil will learn the desired things. But teachers quickly discover that this map is too simple to help them identify what is wrong when the pupils do not learn even though they go through the activities. They then look for refinements in their maps, additional concepts that help them to understand the phenomena they encounter as teachers, and they will add and modify their maps from time to time as they become aware of new concepts that appear to give greater richness to the representation they have of the situation.[6]

The clash of contemporary metaphors highlights the complexity of knowledge use as a phenomenon-to-be-understood. Knowledge use cannot be satisfactorily defined as a physical or quasi-physical process; nor is the meaning of the term adequately captured by such terms as "social," "political," "cultural," or even "cognitive." Knowledge use is all of these and more, and it is precisely this multidimensionality that creates the problem. At present we lack an adequate understanding of what is meant by the term knowledge use, even though knowledge, information, or research use are frequently taken as criteria of success (and failure) by policy-makers, practitioners, and scientists. Under these circumstances it becomes more than a little doubtful if members of the research and policy-making communities are even equipped to study or shape processes of knowledge use.

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[5]The lack of accessibility to direct inspection does not mean that cognitive processes cannot be classified, measured, or inferred; nor does measurement per se imply the corruption of subjective experiences. See Volume III of this report: Measuring Knowledge Use: A Procedural Inventory.

[6]Ralph W. Tyler, "How Schools Utilize Educational Research and Development," in Research and Development and School Change, ed. Robert Glaser (Hillsdale, N.J.: Lawrence Erlbaum Associates, 1978), p. 96.

2.2 The Multiattribute Problem

Why does knowledge vary in adequacy, relevance, and cogency? This questions calls attention to the fundamentally interpretive character of processes of knowledge use, processes in which different stakeholders attribute multiple and frequently conflicting properties to knowledge and its uses. The meanings attached to knowledge and its uses typically arise from diverse sets of assumptions held by different stakeholders in school improvement. These diverse sets of assumptions are themselves organized in terms of what we and others have called frames of reference, a concept with a long if ambiguous history in the social and natural sciences.[7]

The concept frame of reference performs an essential function in theory and research on knowledge use. In its widest sense the term refers to the orientational framework to which particular physical, social, and cultural objects are related, providing them with contextual as well as referential meanings. Social and cultural objects such as those found in settings of educational practice--for example, technical assistance roles, computer-assisted instruction, standardized achievement tests--derive their meanings from contexts, as well as from external referents for these objects. These contexts are established by frames of reference.

Frames of reference are the equivalent of what others have called construction systems--organized sets of criteria, standards of assessment, or assumptions which facilitate and restrict a person's range of cognitive and social activities.[8] Thus, processes of knowledge use are structured

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[7] See Burkart Holzner and Leslie Salmon-Cox, "Frames of Reference and the Prediction of Knowledge Use," in Volume II of this report.

[8] See George A. Kelly, The Psychology of Personal Constructs, Vols. 1 and 2 (New York: N.W. Norton, 1955).

by the ways that educational stakeholders anticipate or predict events, such anticipation being a function both of individual and collective frames of reference and of the social frameworks in which reference frames are established, maintained, and changed.[9]

Frames of reference, in a more restricted and operational sense, include what we and others have called truth, utility, and cogency tests.[10] Truth tests are decision rules or standards for assessing the adequacy of knowledge claims, while utility or relevance tests delineate appropriate domains of inquiry or action. Cogency tests, by contrast, establish the relative force or confidence required of knowledge in particular circumstances. Tests of truth, relevance, and cogency represent diverse and frequently conflicting standards of assessment brought to bear in appraising and acting on educational innovations.

Until recently it has been unclear whether concepts of truth, relevance, and cogency exhaust the classes of standards employed to assess knowledge claims. Hence, each of these broad classes of tests might be divided into additional categories: pragmatic, ethical, authenticative, causal, and so forth.[11] Needed are procedures for generating a comprehensive classificational schema or typology that not only differentiates broad classes of standards for assessing knowledge but also specifies particular tests employed by different stakeholders in school improvement. Such procedures would facilitate enormously current efforts to map the universe of meaning

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[9]See Holzner and Salmon-Cox, "Frames of Reference and The Prediction of Knowledge Use," Volume II.

[10]See Holzner and John Marx, Knowledge Application: The Knowledge System in Society (Baston: Allyn and Bacon, 1979); Carol H. Weiss and Michael J. Bucuvalas, "Truth Tests and Utility Tests: Decision Makers' Frames of Reference for Social Science," The American Sociological Review, 45, 2(1980): 302-12; and William N. Dunn, "Reforms As Arguments," Volume II and Knowledge, 3, 3(1982): 293-326. See also Donald T. Campbell, "Experiments As Arguments," Knowledge, 3, 3(1982):327-338.

[11]Dunn, "Reforms As Arguments," Volume II.

surrounding knowledge use and school improvement.

2.3 The Transactional Problem

How can we conceptualize and measure knowledge transactions? A comprehensive classification of truth, relevance, and cogency tests, while important for mapping the universe of meaning surrounding school improvement in general, would not deal with the distribution of these tests among individual and collective actors; nor would such a classificatonal schema identify unique or distinctive structural properties of particular frames of reference. Multiple and potentially conflicting truth and relevance tests may be applied by the same person, while the structure of individual as well as collective frames of reference may change over time as a result of the dynamics of social relations among those who affect and, in turn, are affected by school improvement.

What in now unclear about processes of knowledge use, generally and in educational settings, is the extent to which changes in frames of reference affect and, in turn, are affected by patterned social relations.[12] Indeed, it is possible and desirable to visualize this problem as analogous to a single coin with two porous and semi-permeable surfaces, the "social" and the "cognitive". Processes of knowledge use, according to this formulation, may be viewed as sociocognitive relations among actors engaged in

[12]The term patterned social relations is deliberately used to avoid certain well-established but prematurely specified constructs employed to label, categorize, and generalize social processes, including "stages of innovation," "linker", "loosely coupled system," "knowledge transfer," and so forth. The empirical validity of these constructs, and the causal models in which they are often embedded, is at present doubtful if lacking. On these points see Matthew B. Miles, "Mapping the Common Properties of Schools"; and Paul Berman, "Educational Change: Toward An Implementation Paradigm", in Lehming and Kane, op.cit.

generative reciprocal acts, that is, acts involving cognitively structured (filtered, mediated, processed, interpreted, construed) feedback that transforms and is transformed by patterned social relations. The essential property of such sociocognitive relations is that they involve subject-subject and subject-object relations that cannot be decomposed or reduced to erstwhile independent dimensions conveniently labelled as "social" and "cognitive," "instrumental" and "conceptual," or "behavioral" and "attitudinal."[13]

A recognition of the contextual, relational, and generative properties of knowledge use has promoted significant shifts in the language of research. For example, the terms interaction, exchange, and transfer have been replaced with that of transaction,[14] while the term receiver has been discarded in favor of transreceiver.[15] Yet existing methodologies for studying knowledge use do not adequately address generative reciprocal processes involving cognitive as well as social processes.[16] While recent contributions to theory and research on communications networks recognize the importance of distinguishing contextual and referential meanings,[17] there have been

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[13]Compare Buckley: "person-to-person orientations are virtually never made and sustained in an environmental vacuum...person-to-object orientations are seldom, if ever, made in a social vacuum..." Walter Buckley, Sociology and Modern Systems Theory (Englewood Cliffs, NJ: Prentice-Hall, 1967), p. 114.

[14]See, for example, Raymond A. Bauer, "The Obstinate Audience: The Influence Process form the Point of View of Social Communication," American Psychologist, 19(1964):319-28; Gerald Zaltman, "Knowledge Utilization As Planned Social Change," Knowledge, 1, 1(1979):82-105; and Dunn, "Reforms As Arguments," Volume II.

[15]Ithiel de Sola Pool, "Communication Systems," in Handbook of Communication, ed. I. de Sola Pool and W. Schramm (Chicago: Rand McNally, 1973).

[16]William N. Dunn, Ralph Bangs, and Hassan Rahmanian, "Studying Knowledge Networks," Volume 2.

[17]Everett M. Rogers and D. Lawrence Kincaid, Communications Networks: Toward a New Pardigm for Research (New York: The Free Press, 1981), p. 1-78.

few and scattered attempts to develop systematic and reproducible procedures for identifying organized configurations of assumptions, constructs, or criteria applied by members of different sociocognitive networks.[18] While research methods used to study the social and cognitive (intellectual) properties of scientific networks approach what we have in mind by systematic and reproducible procedures, the sociocognitive organization of scientific communities appears to be much less complex than those practice settings with which knowledge use researchers are typically concerned.[19] The problem of knowledge transactions, then, is one of determining how best to conceptualize and measure complex, generative reciprocal processes that are at once cognitive and social.

Section 3
RESEARCH OBJECTIVES

Core methodological problems discussed in the preceding section may be specified in many ways. We chose at the outset of the project to focus on three major objectives:[20]

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[18]See, for example, Diana Crane, Invisible Colleges (Chicago: University of Chicago Press, 1972); Nicholas C. Mullins, Theories and Theory Groups in Contemporary American Sociology (New York: Harper and Row, 1973); and Harriet Zuckerman, Scientific Elite: Nobel Laureates in the United States (New York: The Free Press, 1977).

[19]Compare, for example, the sociocognitive complexity of schools reported by A. Michael Huberman, "Recipes for Busy Kitchens: A Situational Analysis of Routine Knowledge Use in Schools," Knowledge (forthcoming). We join Rogers and Kincaid (op.cit., p. 32) in endorsing a statement attributed to H. Russell Bernard and others: "As far as we are aware, content of communication is a topic universally avoided by researchers in social network theory." We would add that this statement applies with equal force to research on knowledge use in general.

[20]See William N. Dunn and Burkart Holzner "Knowledge Use and School Improvement: Conceptual Framework and Study Design," Volume II.

*Development of user-responsive research instruments

*Construction of a grounded typology of criteria used to appraise knowledge

*Development of decision-focused analytic procedures for investigating complex knowledge appraisals

During the course of the project these objectives were enlarged, elaborated, and redefined as a consequence of our own learning experiences.

3.1 Procedural Inventory

The aim of developing user-responsive research instruments reflected a commitment to research procedures that are likely to elicit the knowledge-in-use of stakeholders in school improvement.[21] Early in the project it became evident that the development, pilot-testing, and provisional validation of such instruments presupposed a systematic review and evaluation of instruments available to knowledge use researchers, generally and in the field of education. Research on knowledge use, it also became clear, has been conducted by many investigators who have not always (or often) labelled their activities in this way.[22] Finally, the original focus on research instruments --that is, more or less carefully calibrated procedures designed to measure properties whose meanings have been defined in advance by researchers--soon gave way to a broader concern with research procedures in general.

Thus, the first of our original project objectives was redefined and

[21]On the concept of knowledge-in-use see Burkart Holzner and Evelyn M. Fisher, "Knowledge-In-Use: Considerations in the Sociology of Knowledge Applications," Knowledge, 1, 2(1979):219-44.

[22]For example, knowledge use has seldom been a common term among investigators in various disciplinary specialties (e.g., cognitive psychology, cognitive sociology, ethnography) and interdisciplinary fields (e.g., planned social change, social marketing, decision theory, communications research).

enlarged to include an inventory of procedures available for the study of knowledge use.[23] The redefinition of this objective was particularly important in certain areas--for example, the broad domain of qualitative methodology--where the term research instrument is often inappropriate.[24] The enlargment of this objective, since it also required an investigation of procedures employed beyond the boundaries of knowledge use research proper, likewise made it unfeasible to develop, pilot-test, and validate more than a few new or promising research procedures.[25] We therefore relied on reliability and validity information supplied by developers of procedures.

3.2 Typological Procedures

The aim of constructing a grounded typology of criteria used to appraise knowledge was based on a recognition that the concept of frame of reference, together with its specification in the form of truth and utility tests, has not been properly validated in settings of practice. In the initial phase of the project investigators reviewed, critiqued, and modified an original typology of tests employed to assess knowledge adequacy, relevancy, and cogency.[26] At the same time it became increasingly clear that a grounded typology--that is, a typology whose categories are coordinated

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[23] See Volume III below.

[24] See Thomas R. McIntyre and Evelyn M. Fisher, "Qualitative Procedures for Research on Knowledge Use and School Improvement." Volume II.

[25] Several doctoral dissertations and one university-funded research project have incorporated procedures identified or developed in this project. These projects, now at various stages of completion, focus on processes of knowledge use in education, mental health, local government, criminal justice, international relations, and state-local program evaluation.

[26] Dunn, "Reforms As Arguments," and Holzner and Salmon-Cox, "Frames of References...," both in Volume II of this report.

with the subjectively meaningful constructs of principals, parents, teachers and other educators--would require substantial field research of a type outlined in a proposal submitted to NIE midterm in the present project.[27] We also concluded that a field study based on available qualitative methods would be unlikely to contribute significantly to the construction of a grounded typology. Although many such studies have been conducted in the past, our assessment of methods used to conduct these studies persuaded us that new procedures were necessary. Existing procedures, while they do elicit subjectively meaningful experiences of educational stakeholders, can seldom be reproduced by other investigators or examined as part of an external audit that attempts to ensure that methodological accountability of research findings.[28]

The second of our original project objectives was therefore redefined to emphasize the identification and development of procedures for generating grounded typologies of knowledge-in-use. While we had followed and appreciated related attempts to conceptualize, measure, and type decision makers' frames of reference,[29] we nevertheless adopted an altogether different methodological

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[27]Transacting Knowledge for Local School Improvement (Pittsburgh, PA: University of Pittsburgh, Program for the Study of Knowledge Use, May 1981).

[28]See William N. Dunn, "Methodological Choices in Studying Knowledge Use," Volume II. Compare A. Michael Huberman and Matthew B. Miles, "Drawing Valid Meaning from Qualitative Data: Some Techniques of Data Reduction and Display," Paper prepared for a Symposium on Advances in the Analysis of Qualitative Data, Annual Meeting, American Educational Research Association, New York, NY, March 1982. The term "external audit" is used by Egon G. Guba in "Criteria for Assessing the Trustworthiness of Naturalistic Inquiries," Educational Communication and Technology Journal (Spring 1981).

[29]Especially Carol H. Weiss with Michael J. Bucuvalas, Social Science Research and Decision Making (New York: Columbia University Press, 1981).

course. Accordingly, we avoided procedures designed to measure assumedly universal (nomothetic) constructs, traits, or factors, attempting instead to identify and develop procedures for generating contextually specific (idiographic) constructs that are subjectively meaningful to stakeholders in school improvement. We also insisted that any such generative procedure satisfy the requirement of reproducibility, since it is the failure to meet this standard that has fatally flawed so many otherwise useful qualitative investigations.[30]

3.3 Analytic Procedures

The aim of developing decision-focused analytic procedures was motivated by the awareness that processes of knowledge appraisal are complex. This complexity is partly a consequence of diverse social relations among stakeholders who shape collective decisions;[31] it is also a function of diverse cognitive relations within and among stakeholders with distinctive frames of reference.[32] Thus, we did not limit decisions

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[30]By reproducibility we mean that a procedure must be sufficiently orderly, regular, and specific to permit repeated applications by successive investigators. Replication, by contrast, refers to the quality by virtue of which studies and/or research findings may be repeated. Replicable studies (e.g., laboratory experiments) require reproducible procedures, but the use of strategies of qualitative research (e.g., multiple triangulation). The issue of reproducibility (not replication) is central to recent critiques of qualitative methods, for example, Matthew B. Miles, "Qualitative Data as an Attractive Nuisance: The Problem of Analysis," Administrative Science Quarterly, 24(1979):590-601; and Huberman and Miles, op. cit.

[31]See Evelyn M. Fisher, "Contexts for Conducting Field Research on Knowledge Use and School Improvement," Volume II.

[32]See Holzner and Salmon-Cox, "Frames of Reference and The Prediction of Knowledge Use;" and Dunn, "Usable Knowledge: A Metatheory of Policy Research in the Social Sciences," Volume II.

to those involving action, but included as well various forms of subjective judgment and appraisal.

The early emphasis on decision-focused analytic procedures was prompted by an awareness of opportunities to explore the applicability of various forms of multiattribute decision theory.[33] These procedures not only permit the modeling of judgment processes, but provide various heuristics designed to improve individual and collective decisions. The limitation of these procedures, however, is that none is based on systematically acquired information about frames of reference. For this reason it is not possible to make inferences about the effects of differences in frames of references (e.g., the dominance of a particular kind of truth test) on individual and collective judgments.

Thus, the third of our original objectives was enlarged to include the identification and development of procedures that would permit:

*The analysis and measurement of structural properties of frames of reference, including differentiation, integration, complexity, permeability, and substantive organization;

*The analysis and measurement of relations among these structural properties in contexts of social decision making and collective action; and

*The joint analysis and measurement of social and cognitive relations as these change over time.

The enlargment, elaboration, and redefinition of this and other original project objectives contributed to a more ambitious but focused research effort.

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[33]These include multiattribute utility analysis, analytic hierarchy analysis, social judgment analysis, strategic assumption surfacing and testing, conjoint analysis, and functional measurement. See William N. Dunn and Mary Jo Dukes, "Multiattribute Procedures for Adoption Decision Making," Volume II.

Section 4
APPROACH

The approach employed to realize these objectives may be described as a form of methodological triangulation.[34] Thus, we attempted throughout the project to explore, anticipate, or document the consequences--theoretical, conceptual, technical, empirical, practical--of employing alternative methods to investigate processes of knowledge use and school improvement.

4.1 Documentary and Archival Search

An important project activity was to conduct a search of relevant books, articles, reports, and papers on knowledge use and school improvement. A select annotated bibliography[35] was compiled on the basis of five criteria: insight into processes of knowledge use; factors impeding knowledge use; strategies for improving knowledge use; elaboration of theories of knowledge use; and most importantly, attempts to define knowledge use as a criterion dimension (or "dependent variable"). Annotated items that satisfied one or several of these criteria were identified through a six-stage process that ranged from consultation with content experts in fields of education and knowledge use to the use of indexes (Social Science

[34]The focus on methodological as distinguished from substantive issues meant that it was rarely possible to employ observer and data triangulation. For this reason the approach may be viewed as a truncated version of multiple triangulation as described, for example, by Norman K. Denzin, The Research Act (Chicago: Aldine, 1970).

[35]Mary Jo Dukes, "Knowledge Use and School Improvement: A Select Annotated Bibiligraphy," Volume II.

Citation Index, Social Science Periodical Index, Current Index to Journals in Education), specialized bibliographies, handbooks, and an archive of measures of creativity and innovation at Northwestern University.

One of the major aims of the documentary and archival search was to identify new or promising procedures for conceptualizing and measuring knowledge use. Archival materials often included detailed descriptions of procedures while, in some cases, available handbooks[36] contained summaries of procedures that were judged to be relevant to the definition and measurement of knowledge use. Characteristically, most books and nearly all articles and reports failed to provide an adequate description of procedures employed to conduct research. For this reason it was necessarily to contact investigators directly.

The documentary and archival search yielded a list of investigators who had reported results obtained form different research procedures: questionnaires, interview schedules, content analysis, case analysis, and so forth.[37] This list was enlarged by adding members of our national advisory network and other networks of researchers and practitioners associated with the National Institute of Mental Health, the National Science Foundation, and National Institute of Education. Also included in this list were persons who had attended a 1981 Conference on Knowledge Use organized by our program. Over one-hundred investigators were contacted by letter and/or phone and asked to provide a description of the procedures they had employed to conduct their research project(s), including copies

[36]For example, Dale G. Lake, Matthew B. Miles, Robert B. Earle (eds.) Measuring Human Behavior (New York: Columbia University Press, 1973)

[37]See Dunn et al., "Measuring Knowledge Use: A Procedural Inventory", loc. cit.

of interview protocols, self-administered questionnaires, tests, or coding schema.

4.3 Pooling, Selection, and Analysis of Procedures

The documentary and archival search, together with inquiries to investigators, yielded a pool of some two-hundred candidate procedures. Our next task was to select from this pool procedures with maximum relevance to methodological research problems addressed in the project.[38] The original set of candidate procedures was eventually narrowed to some sixty-five procedures that were compared, contrasted, and evaluated in accordance with a standardized abstracting procedure. Each abstract provides a general information profile[39] including author, availability, purpose, variables, description, development, reliability/validity and administration. In addition, we wished to investigate the study designs in terms of which procedures were employed. For this purpose we constructed, where possible, a study profile[40] describing the unit of analysis, sampling procedure, type of design, research methods, practice area or population, definition of knowledge use, and other key methodological characteristics of studies.

Study profiles were limited to major studies of knowledge use identified in the course of the project, since it would be unmanageable to examine characteristics of study designs which yielded new or promising procedures (e.g., cognitive mapping techniques) but which were not expressly directed at the conceptualization and measurement of knowledge use. General information profiles were limited to procedures that satisfied two criteria:

[38] Namely, the criterion problem, the multiattribute problem, and the transactional problem (see Section 2 above).

[39] See Appendix B of this report.

[40] See Appendix C of this report.

reproducibility and face relevance to knowledge use. The criterion of reproducibility required that a given procedure be sufficiently specific, regular, and orderly that its steps may be repeated by some other investigator. By applying this criterion of inclusion we were forced to abandon a large number of candidate procedures; many procedures employed by investigators in the field do not meet this standard. In some instances--especially those involving qualitative methods--researchers have explicitly challenged or disavowed the appropriateness of reproducibility as a criterion.

The second criterion--face relevance to the study of knowledge use--required judgments about the conceptualization of knowledge and its uses. Here we were guided by general considerations that procedures should permit the acquisition of information about multiple dimensions of knowledge use; that procedures should be appropriate for investigating alternative theories; and that procedures should somehow elicit information about cognitive properties, since it is this feature that provides the field with a unique purpose and rationale. The criterion of face relevance, when applied to research on knowledge use proper, resulted in the inclusion of some forty-two procedures. An additional 22 procedures were included as relevant, even though they had not been developed or used by researchers who view their work as falling within the domain of knowledge use per se.

4.4 Network Consultation, Conferences and Workshops

Throughout the project investigators were in frequent contact with various members of a national advisory network of scholars and practitioners in the field of knowledge Use. Portions of working papers and occasional[41] papers were reviewed by members of this network or presented

[41] See Appendix A.

at a variety of conferences and workshops:

* National Conference on Knowledge Use, University of Pittsburgh, Program for the Study of Knowledge Use, March 1981

* Annual Meeting, American Educational Research Association, Dissemination and Utilization Researchers Group, Los Angeles, March 1981

* Conference on the Utilization of Knowledge Acquired Abroad, University of Pittsburgh, Center for International Studies, October 1981

* Workshop on the Utilization of Educational Technologies, Pittsburgh, Metropolitan Pittsburgh Broadcasting Company, September 1981

* Workshop on Long-Range Planning for Improvement, Pennsylvania Department of Education and University of Pittsburgh School of Education, June 1981

* Luncheon Workshops on Knowledge Use, University of Pittsburgh, Program for the Study of Knowledge Use, January 1981-June 1982

* Network of Consultants on Knowledge Transfer, the RAND Corporation and the National Institute of Mental Health, May 1981

* Annual Meeting, American Educational Research Association, Dissemination and Utilization Researchers Group, New York, March 1982

* Conference on Knowledge Use: Theory and Methodology, Communications Institute, East-West Center, University of Hawaii, April 1982

These activities permitted continuous interaction and the sharing of ideas and materials with numerous scholars and practitioners in the field, thus enlarging our capacity to achieve project objectives.

Section 5
SUMMARY OF METHODOLOGICAL FINDINGS

A documentary record of research carried out under this project is contained in the working and occasional papers annotated in Appendix A and organized as Volume II (Conceptualizing Knowledge-In-Use) and Volume III (Measuring Knowledge-In-Use) of this report. Although each of these papers presents conclusions drawn from the analysis of distinct problems, the results of the project as a whole may be summarized around five major sets of methodological findings.

5.1 Reproducibility, Reliability, and Validity

A striking feature of published and unpublished literature on processes of knowledge use, generally and in the domain of education, is the relative paucity of reproducible research procedures. Out of the many hundreds of studies surveyed in this project, few are based on procedures that are sufficiently orderly, regular, and specific that they may be repeated by others.[42] Even where procedures are reproducible there are relatively few instances where the same procedure has been applied by two or more investigators.[43] Thus, knowledge use research appears to have the same segmented and non-cumulative character as research carried

[42]These procedures have been abstracted in Dunn, Dukes, and Cahill, Volume III: Measuring Knowledge-in-Use: A Procedural Inventory.

[43]Exceptional instances involving multiple applications of the same procedure are documented in Volume III. Gene Hall, for example, at the Research and Development Center for Teacher Education at the University of Texas at Austin, has developed multiple procedures for assessing various aspects of the innovation process which have been used repeatedly by members of that research team.

out in established disciplines.[44] While research on knowledge use is a much less mature enterprise that spans many distinct but complementary research traditions, it is ironic that investigators in a field committed to knowledge-based innovations are themselves not obviously innovative.

Many individual researchers who have developed reproducible procedures report reliability data. More than forty percent of procedures for which reliability data are appropriate are accompanied by such information. While considerably less than half of testing and content-analytic procedures are accompanied by test-retest or internal consistency reliability coefficients, approximately fifty percent of questionnaires and interview schedules make such reliability data available.[45] Overall, only eighteen of fifty-eight studies attempted to establish the validity of constructs offered to represent processes of knowledge use, even though construct validation procedures are specifically designed to examine the status of mental constructs of all kinds. This methodological gap is particularly significant, given that cognitive constructs are central to the study of knowledge use.[46]

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[44]Compare, for example, Bonjean, Hill, and McLemore's finding that little more than two percent of some 2,000 scales and indices were used more than five times by sociologists. See Charles M. Bonjean, Richard J. Hill, and S. Dale McLemore, Sociological Measurement: An Inventory of Scales and Indices (San Francisco, CA: Chandler, 1967), p. 9.

[45]See Volume III, Appendix C. In almost all instances it was impossible to determine conclusively whether reliability data were neglected by investigators, or simply not reported.

[46]Construct validation procedures may assume nomothetic as well as idiographic forms, the latter of which preserves intact meaning systems while ensuring the methodological accountability of claims about mental states. See, for example, Fay Fransella and Don Bannister, A Manual for Repertory Grid Technique (London: Academic Press, 1977), 92-104.

5.2 Knowledge Use as Criterion

Issues of reproducibility, reliability, and validity are intimately linked to the definition of knowledge use. What we have called the criterion problem[47] pervades nearly all published and unpublished literature on knowledge use of which we are aware. Formal definitions of knowledge use are typically absent; even when such definitions are provided, knowledge is frequently viewed simply as the equivalent of research or information, or as the embodiment of some normative image of scientific knowledge.[48] Knowledge is often represented in terms of quasi-physical objects (e.g., research reports or information sources) or in accordance with definitions favored by scientists and philosophers, rather than in terms that are epistemically meaningful to users themselves.[49]

Methodological limitations are also evident in attempts to define use. A pervasive dualism characterizes much research in the field, a dualism where the uses of knowledge are divided into two classes: conceptual

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[47] Section 2 above.

[48] Such normative images of scientific knowledge, while essential for affirming the comparative superiority of science as a way of knowing, are wholly inappropriate as a basis for defining and specifying constructs that may be investigated through empirical research. Those who confuse descriptive and normative definitions of knowledge have been described as "justified true belief (JTB) fanatics" by Fritz Machlup in Knowledge and Knowledge Production, loc. cit.

[49] A few investigators, while drawing attention to this problem of coordinating meanings of knowledge in science and everyday practice, nevertheless stop short of providing workable definitions or procedures for conducting research on "ordinary" and "scientific" knowledge. See, for example, David K. Cohen and Michael S. Garet, "Reforming Educational Policy With Applied Research," Harvard Educational Review, 45, 1(1975):17-43; and Charles E. Lindblom and David K. Cohen, Usable Knowledge: Social Science and Social Problem Solving (New Haven: Yale University Press, 1979).

and instrumental.[50] Conceptual use is generally understood in terms of mental processes (e.g., problem definition), while instrumental use is equated with individual or collective action (e.g., the adoption of an innovation). Indeed, the vast majority of definitions of knowledge use appear to fit into one of four categories formed by the intersection of two dimensions: conceptual versus instrumental use and imposed versus generated knowledge (see Figure1).[51]

Figure 1
DEFINITIONS OF KNOWLEDGE USE

Knowledge is defined in terms of properties that are:	The use of knowledge is defined in terms of processes that are: Conceptual	Instrumental
Imposed on Users (Imperative)	CONCEPTUAL IMPERATIVISM	BEHAVIORAL IMPERATIVISM
Generated by Users (Constructed)	CONCEPTUAL CONSTRUCTIVISM	BEHAVIORAL CONSTRUCTIVISM

SOURCE: Adapted from Dunn, "Usable Knowledge...," Volume II.

What may be called conceptual imperativism is prevalent among investigators who hold particular normative images of knowledge[52] or of more or

[50]Origins of this distinction are Nathan Caplan et. al., The Use of Social Science Knowledge in Policy Decisions at the National Level: A Report to Respondents (Ann Arbor, MI: University of Michigan, Institute for Social Research, Center for Utilization of Scientific Knowledge, 1975); and Robert F. Rich, "Selective Utilization of Social Science Related Information by Federal Policymakers," Inquiry, 13, 3(1975).

[51]See Dunn, "Usable Knowledge...," Volume II.

[52]Jack Knott and Aaron Wildavsky, for example, reserve the term knowledge for empirical certainty: "When policy makers are certain that manipulating these variables will produce the expected effects--that is, if 'x' is done, 'y' will follow with a known probability--then they have knowledge". See "If Dissemination is The Solution, What Is The Problem?" Knowledge, 1, 4(1980): 515-36.

less fixed psychological structures, styles, or traits.[53] In research on educational innovations the technological perspective of knowledge use described by House comes close to conceptual imperativism, as we use this term, while conceptual constructivism parallels in major respects his own cultural perspective of knowledge use.[54] Conceptual constructivism is also evident among investigators who opt for a broad, flexible, and even diffuse definition of knowledge use, stressing changes in perceptions, orientations, interpretations, and assumptions.[55]

Behavioral imperativism, by contrast, focuses on overt actions that presumably are tied to relatively fixed or at least common structures for producing, disseminating, and using knowledge. A political perspective of knowledge use, which includes generalizations about lawful regularities in bureaucratic behavior that constrain or impede knowledge use, approximates what is meant by behavioral imperativism.[56] By contrast, behavioral con-

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[53]For example, the Myers-Briggs Type Indicator has been used to characterize the cognitive styles or personality types of knowledge users. See Ian I. Mitroff and Donna Mitroff, "Interpersonal Communication for Knowledge Utilization," Knowledge, 1, 2(1980):203-17.

[54]House, "Three Perspectives on Innovation...," loc. cit.

[55]See, for example, Cohen and Garet, loc. cit.; David K. Cohen and Janet A. Weiss, "Social Science and Social Policy: Schools and Race," in Using Social Research in Public Policy Making, ed. Carol H. Weiss (Lexington, MA: D.C. Heath, 1977), pp. 67-83; Marvin C. Alkin et. al., Using Evaluations: Does Evaluation Make a Difference? (Beverly Hills, CA: Sage Publications, 1979); Michael Q. Patton, Utilization-Focused Evaluation (Beverly Hills, CA: Sage Publications, 1978); and Carol H. Weiss, "Measuring the Use of Evaluation," in Utilizing Evaluation: Concepts and Measurement Techniques, ed. James A. Ciarlo (Beverly Hills, CA: Sage Publications, 1981), pp. 17-34.

[56]For example, Rich observes that "the bureaucratization of the knowledge inquiry system... is the critical variable for understanding levels of utilization and nonutilization... Thus, according to this perspective, one would effect change in the knowledge inquiry system by influencing bureaucratic rules and procedures--not knowledge and/or policy/sector specific characteristics." Robert F. Rich, "Editor's Introduction," American Behavioral Scientist, 22, 3(1979) 328-29. See also House, "Three Perspectives...," loc. cit.

structivism defines knowledge use primarily in terms of overt behavior presumably connected to knowledge that has been generated by users.[57]

These four types of definitions draw attention to dualistic tendencies in research on knowledge use. Approximately seventy percent of the forty-two studies reviewed under this project were based primarily on instrumental definitions of use, with the remainder stressing conceptual and symbolic definitions.[58] Instrumentally-focused studies generally neglected properties related to the purposes, expected benefits, or underlying meanings of knowledge and its uses. Yet even that twenty-five percent of studies based on a conceptual definition of use focus primarily on surface properties of knowledge--some eighty percent of such studies take the meaning of knowledge for granted. Indeed, only thirteen of forty-two studies attempt to elicit the subjective meanings attached to knowledge by users. This finding punctuates once more the relative paucity of reproducible qualitative procedures appropriate for studying knowledge use.

5.3 Formal Classificational Schema

A central difficulty with available definitions of knowledge use if their oversimplication of criterion dimensions. The distinction between conceptual and instrumental uses, together with contrasts between imposed and generated properties of knowledge itself, oversimplifies and thereby

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[57] Janet Weiss, for example, urges that we study knowledge use in terms of "The symbiotic relationships among policy actors, knowledge, and the political and institutional context of policy making." See "Access to Influence: Some Effects of Policy Sector on the Use of Social Science," American Behavioral Scientist, 22, 3(1979):456-57.

[58] See Volume III, Appendix C.

conceals numerous additional dimensions according to which knowledge use may be classified:[59]

* Usership. Taking the content of knowledge as given, use may be classified according to the persons or groups who are users of knowledge. Users may be national or local policymakers, members of professional associations, media representatives, client groups, social scientists, and so forth. While it is difficult to imagine users who are not also subscribers, users often subscribe to knowledge for reasons that differ from those of original subscribers. For example, policymakers may use research results to support personal or political goals, thus subscribing to knowledge for reasons that are quite different from those of researchers. Who are the users of knowledge?

* Object. Use may also be classified according to its objects, which may include recommendations, empirical generalizations, hypotheses, theories, models, concepts, assumptions, principles, ideas, and so forth. The object of use and the object of knowledge differ, since use classified by object (e.g., conceptual use) implies nothing about the object of knowledge. Political knowledge may be used to make recommendations, to conceptualize a problem, to explore ideas for their own intrinsic merit, and so forth. What is used? Why?

* Directness. Use may be classified according to its directness to an original knowledge source. Use may be relatively direct, in cases where some user reads an original report or study produced by a

[59] See Dunn, "Methodological Choices in Studying Knowledge Use" and Zaltman, "Construing Knowledge Use" in Volume II of this report. See also Weiss, "Measuring the Use of Evaluation," op. cit., pp. 24-6.

social scientist. Indirect use occurs when research findings are filtered through executive summaries and secondary written descriptions or reviews, or passed on through conversations that involve no face-no-face interaction ("invisible colleges"). Indirect use also takes place when knowledge is imbedded in developmental or technological production decisions. In the latter case, users may be unaware of the underlying evidence and assumptions that accompany the adoption of a technology. A lack of awareness of the knowledge claims themselves makes them inaccessible for assessment and integration into meaning structures or practice. How close is the use of knowledge to its original source?

* Temporal Proximity. Use may be classified according to its proximity in time to an original knowledge source. Apart from its directness, use may be immediate, occurring simultaneously with the creation of knowledge. Use may also be delayed, as when knowledge is transmitted across years, generations, or historical epochs. How immediate is the use of knowledge?

* Magnitude of Expected Effects. Use may also be classified according to its expected effects. Use may refer to "conceptual" and/or "instrumental" effects, categories which appear to be points along a single continuum or dimension, rather than discrete and mutually exclusive classes. In this context, Machlup describes thirteen elements of the state or act of knowing which specify, in part, what is meant by the magnitude of expected effects of use.[60] How much effect is required to count as use?

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[60] Fritz Machlup, "Uses, Values, and Benefits of Knowledge," Knowledge, 1 1(1979):62-81. These elements include acts of knowing that range from being acquainted with or aware of something to being able to explain, demonstrate, talk about, or perform some action. While none of these elements is behavioral, being able to explain or demonstrate something is nevertheless instrumental to being able to perform and actually take actions.

Taking its uses as given, knowledge may be conceptualized according to multiple dimensions that assist in specifying the diverse meanings attached to the term:

* Subscribership. Knowledge may be classified according to the persons or groups who subscribe to it. The dimension of subscribership includes such categories as "personal knowledge," "professional knowledge," "practitioner knowledge," "public knowledge," and so forth. In certain cases the use of knowledge may be virtually indistinguishable from subscribership, for example, when practitioners who subscribe to knowledge about managerial rules-of-thumb also act on that knowledge. Who subscribes to knowledge? Is the act of subscribing to knowledge identical to using it?

* Source. Distinctions may also be based on the source of knowledge. Distinctions by source include "scientific knowledge," "professional knowledge," "craft knowledge," "practice knowledge," "experiential knowledge," "ordinary knowledge." Social scientists may be the source of knowledge while others subscribe to it, long after the same scientists have disavowed their original conclusions. Conversely, social scientists may subscribe to knowledge whose source is practical, experimental, or ordinary. Much "scientific" knowledge is in part "ordinary" knowledge. From what source did knowledge arise? Is the source different from the subscriber?

* Object. Knowledge may also be classified according to its object. Distinctions by object include "educational knowledge," "political knowledge," "environmental knowledge," as well as knowledge whose objects are particular policy issue areas or sectors--for example, criminal justice, housing, welfare, education, and so forth. The object of knowledge is independent of its subscribership and source.

What is the knowledge about? Are different types of objects of knowledge associated with use?

* Benefit. Knowledge may also be classified in terms of the types of benefits expected to occur upon its use. For example, we may distinguish types of knowledge according to expected benefits which are "practical," "intellectual," "pastime," "spiritual," and "unwanted."[61] The expected benefit of knowledge is not the same as its object, since knowledge about a particular object--e.g., the politics of incremental policymaking--may confer benefits that are primarily intellectual and only secondarily, if at all, practical. Moreover, the dimension of benefit is independent of subscribership and source. Professional knowledge (subscribership) based on experience (source) may be primarily intellectual or pastime knowledge (benefit) insofar as there is no expectation that its use will improve practice. What difference will the use of knowledge make?

* Warrant. Knowledge may be classified according to the criteria or standards of assessment that warrant its certification as knowledge. Knowledge-warranting assumptions may be empirical, analytic, teleological, pragmatic, authoritative, ethical, and so forth. Warrants for knowledge ("reality tests") are organized in frames of reference or cognitive maps that govern judgments about the adequacy, relevance, and cogency of knowledge. The type of warrant used to certify knowledge is potentially independent of its subscribership, source, object, benefit, and purpose. "Practitioner knowledge" (subscribership) may be based on the same kinds of warrants employed by social scientists; and there is no necessary relationship between

[61] See Machlup, Ibid.

the source of knowledge (e.g., everyday experience) and its theoretical adequacy or practical relevance. What makes something count as knowledge in the first place?

5.4 Generative Classificational Schema

Formal classificational schema, while helpful in enlarging the range of potentially available definitions, should be recognized as extensions of the frames of reference of researchers. Formal dimensions of knowledge use, together with the constructs of which these dimensions are composed, are likely to be valid representations of knowledge and its uses only if dimensions and constructs have been coordinated with the meanings of users themselves. Simple questions about subscribership, usership, and source, as well as more complex issues surrounding expected effects, benefits, and warrants, are difficult or plainly impossible to address by studying overt behavior alone. For this reason it is essential to ground constructs in the knowledge-in-use of actors whose behavior we seek to understand.

In pursuing this goal it would be highly useful to have generative classificational schema or typologies that capture diverse meanings attached to knowledge and its uses. At present we are aware of no such generative schema, in education or in other practice areas. This methodological gap is not only a consequence of the relative paucity of reproducible qualitative procedures, but also stems from the inappropriateness of reproducible procedures when they are available and used.

Thus, for example, the idea of truth tests and utility tests, while closely linked to the development of generative typologies, is not easily

translated into procedures that elicit constructs which comprise individual and collective frames of reference. While data reduction techniques (e.g., factor analysis, principal components analysis, multidimensional scaling) may be employed to reduce large numbers of item-responses to discrete constructs, the fact that responses have been aggregated or averaged across many individuals diminishes the capacity to identify unique or distinctively organized relations among a given person's constructs. Data reduction procedures also may preclude opportunities to investigate structural properties of frames of reference--differentiation, complexity, integration, permeability, orientation--all of which are central to questions of knowledge synthesis and the dynamics of individual and collective learning.[62]

5.5 Sociocognitive Grid Procedures

One of our major methodological findings, one which emerged gradually over the course of the project, is that new or promising procedures are indeed available to develop generative typologies of knowledge use. These procedures, which build on the simple but powerful idea of a grid with m by n constructs and elements, effectively combine sociometry and social network analysis with various approaches to the measurement of cognitive structures.[63] These procedures, since they permit the simultaneous measurement of social and intrapersonal space, are sociocognitive in the full

[62]See Burkart Holzner, "Social Processes and Knowledge Synthesis," Occasional Paper (Pittsburgh, PA: University of Pittsburgh, Program for the Study of Knowledge Use, 1982).

[63]On social network analysis see, for example, Rogers and Kincaid, loc. cit.; and Dunn, Bangs, and Rahmanian, "Studying Knowledge Networks," Volume II. On the measurement of cognitive structures see, expecially, descriptions of the role repertory grid and referential grid in Volume III of this report.

sense of the term.[64]

A major methodological advantage of sociocognitive grid procedures is that they facilitate the relational study of knowledge use. One of the striking characteristics of research on knowledge use undertaken to date is its predominantly non-relational focus. Individual users are the predominant unit of analysis and collective properties, if they are an object of concern at all, are frequently inferred by aggregating data on individual cognitive and/or social properties that are themselves defined in terms of the frames of reference of researchers and research sponsors. Consequently, the relational and contextual nature of knowledge use is lost in various methodological shredders which tear respondents from their own distinctive contexts of intrapersonal and social space.[65] In this context, Barton's metaphor is appropriate: "It is a little like a biologist putting his or her experimental animals through a hamburger machine and looking at every hundredth cell through a microscope; anatomy and physiology get lost; structure and function disappear and one is left with a cell biology".[66]

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[64]See Patric Slater, Dimensions of Intrapersonal Space (London: Wiley, 1977). As Slater notes (pp. 15-27) grid procedures may be traced to early sociometry (Moreno), Q-methodology (Stephenson), semantic differential (Osgood) and the repertory grid (Kelly).

[65]This point parallels that of Rogers and Kincaid, op. cit., p. 39, although our concern extends to frames of reference as organized intrapersonal spaces. See also Paul F. Lazarsfeld, "Sociology," in Main Trends of Research in the Human Sciences (Paris: UNESCO, 1970).

[66]Allen Barton, "Bringing Society Back In: Survey Research and Macro-Methodology," American Behavioral Scientist, 12(1968):1-9. Quoted in Rogers and Kincaid, p. 39.

5.6 Need for Methodological Innovation

Research on knowledge use is a scientifically demanding, practically important, but relatively new field within the applied social sciences. Accordingly, the summary of methodological findings reported above should be understood in a context that recognizes the magnitude of scientific and practical challenges confronting knowledge use researchers, generally and in the domain of education, as well as the comparative lack of experience of the social and natural sciences in dealing with problems surrounding the creation of usable knowledge.

This report, while it draws attention to methodological limitations and inadequacies of research in the field, also attempts to punctuate opportunities for its improvement. The three volumes of this report, taken as a whole, are therefore devoted primarily to the identification of methodological innovations--concepts, models, approaches, methods, techniques--that promise to improve present capacities to explain, predict, and shape processes of knowledge use.

A striking feature of contemporary research on knowledge use is the uneven quality and limited appropriateness of available research methods. Nevertheless, there are many new and potentially more appropriate concepts, models, and research procedures that have not been properly disseminated or further tested and refined. In this context it is essential that funding agencies continue and even strengthen support for methodological research and development on processes of knowledge use. The benefits of such a research policy include:

* Increased confidence in claims about the positive and negative impact of applied social research, claims whose validity depends on the conceptual adequacy of definitions of knowledge and its uses by educational policymakers and practitioners.

* Enhanced capacity to specify, measure, and monitor processes of knowledge use, processes that involve multiple stakeholders with competing and frequently conflicting perspectives of problems for which educational innovations are advanced as solutions.

* Increased control over the quality of research, including a heightened capacity to promote methodological accountability among investigators and those who base policy decisions on their findings.

Finally, this report highlights the need for new methods that facilitate the development of what might be called a sociocognitive science of knowledge applications, a science that is centrally concerned with the practical consequences of scientific research and development for social change and individual and collective learning. Contributions to Volume II and Volume III of this report mark a step in this direction.

APPENDICES

A ANNOTATED BIBLIOGRAPHY OF WORKING AND OCCASIONAL PAPERS
B SAMPLE PROCEDURE ABSTRACT FORM
C SAMPLE STUDY PROFILE
D FREQUENCY DISTRIBUTIONS FOR STUDY PROFILES

APPENDIX A

ANNOTATED BIBLIOGRAPHY OF WORKING AND OCCASIONAL PAPERS

I William N. Dunn and Burkart Holzner. "Knowledge Use and School Improvement: Conceptual Framework and Study Design"

The University of Pittsburgh Program for the Study of Knowledge Use is now conducting methodological research on knowledge use and school improvement under a grant from the National Institute of Education. The purposes of this working paper are (1) to identify traditions in the study of knowledge use that have shaped the conceptual framework and research platform of the Pittsburgh Program; (2) to outline the three major research problems that the project seeks to alleviate; (3) to specify the research objectives and study design that guide project activities; and (4) to provide a brief overview of research products and their significance.

II Mary Jo Dukes. "Knowledge Use and School Improvement: A Select Annotated Bibliography"

This bibliography is based on a systematic search of the literature and contains 112 annotated citations of recent works in the area of knowledge utilization within the field of education. Each item is annotated according to one of five categories: (1) Provides insight into the KP&U process in education; (2) Identifies factors which impede KU in education; (3) Suggests strategies for improving KU in education; (4) Concern with theories of KU in education; and (5) Attempts to define the dependent variable "use."

III Evelyn M. Fisher. "Contexts for Conducting Field Research on Knowledge Use and School Improvement"

The purpose of this paper is to outline and justify an approach that permits investigators to sample and study key "events", "phases" and "stakeholders" as a means to overcoming the problem of identifying occasions of knowledge use for study or biasing the research by concentrating on a single change attempt.

IV Thomas R. McIntyre and Evelyn M. Fisher. "Qualitative Procedures for Research on Knowledge Use and School Improvement"

The purpose of this paper is to critically review the theoretical perspectives and methodological techniques of qualitative research. The past use and applicability of qualitative procedures to knowledge use and school improvement is explored.

V William N. Dunn, Ralph Bangs, and Hassan Rahmanian. "Studying Knowledge Networks"

The purpose of this paper is to explore potential applications of social network analysis to research on knowledge use and school improvement. The paper (1) outlines conceptual and methodological bases of social network analysis; (2) reviews some relevant past applications of social network analysis of the study of various facets of social structure and behavior; and (3) proposes and justifies the idea of "epistemic network analysis" as an appropriate and useful addition to research on social networks in general and to studies of knowledge use in particular.

VI William N. Dunn and Mary Jo Dukes. "Multiattribute Procedures for Studying Adoption Decision Making"

A major problem in decisions to adopt an educational innovation, whether as an individual or as a committee member acting on behalf of a larger unit, is how to assess the innovations available. This paper suggests that the choice of a subset of usable measures of assessment is a multiattribute problem, that is, a problem where the selection of an appropriate subset depends on the subjective standards of assessment applied by the stakeholders who attribute different properties to the innovation; compares and contrasts multiattribute procedures according to several key dimensions, including the mode, scope, ground, and focus of procedures for selecting assessment measures; and evaluates these procedures in terms both of their general appropriateness to complex problems of choice and their applicability to the specific problem of selecting a subset of maximally usable measures to assess the potential of the innovation.

VII William N. Dunn. "Usable Knowledge: A Metatheory of Policy Research in the Social Sciences"

In an attempt to untangle the field of knowledge use, this paper develops an extended typology designed to capture the most basic properties of present-day theories of knowledge use. Rather than siding with any particular theory, or an ideal-type of which it is an illustration, each theory is taken an a "datum". At a metatheoretical level, proportions and attendant corollaries are generated for making statements about ideal-typical theories as a whole.

VIII Gerald Zaltman. "Construing Knowledge Use"

This paper discusses selected constructs of the term "use" and the complexity that may be concealed by oversimplistic imagery. The way in which knowledge use is construed may influence attempts at measurement. Improvement in measurement techniques may result from increased differentiation in the way we think about use, particularly as distinct from impact, as well as from more imaginative strategies for measurement.

IX William N. Dunn. "Reforms As Arguments"

This paper contends that argument is a more appropriate analogy for reforms than is experiment. In an experimenting society, the outcomes cannot be said to be independent of the preferences of stakeholders in social reforms. The change in analogy directs attention to the knowledge transactions in which knowledge claims are assessed in accordance with frames of reference constituted by different configurations of adequacy, cogency, and relevance tests.

X Burkart Holzner and Leslie Salmon-Cox. "Frames of Reference and Prediction of Knowledge Use"

This paper discusses the concept, frame of reference and the interplay between the individual's frame of reference, his or her location in social structure, and perceived responsibilities. The components of frames of references are examined for knowledge producers and teachers as potential knowledge users. Frames of reference are a critical intermediary between knowledge and its use and therefore our attention to frames of reference is necessary for predicting knowledge use.

XI William N. Dunn. "Methodological Choices in Studying Knowledge Use"

This paper offers a framework of methodological choices for studying knowledge use, choices which go much beyond the selection of particular methods and techniques. As such, it attempts to clarify the complexity in the field of knowledge use which has been conceptually soggy, theoretically fragmented and procedurally poor. Methodological choices require the systematic consideration of alternative ways to conceptualize, define and explain knowledge use, as well as procedures that facilitate the acquisition of information required to address problems and hypotheses posed in accordance with prior conceptual and theoretical decisions.

APPENDIX B

PROCEDURE ABSTRACT FORM

AUTHOR:

AVAILABILITY:

PURPOSE:

VARIABLES:

DESCRIPTION:

DEVELOPMENT:

RELIABILITY/
VALIDITY:

ADMINISTRATION:

SOURCES:

APPENDIX C

STUDY PROFILE

DIMENSION	DESCRIPTION	CODE
Unit of Analysis.....		01 02 03 04 05 06 07 08 09
Sampling.....		01 02 03 04 07 08 09
Design.....		01 02 03 04 05 06 07 08 09
Research Methods.....		01 02 03 04 05 06 07 08 09
Analytic Methods.....		1 2 3 4 5 8 9
Analytic Focus.....		1 2 8 9
Reliability.....		1 2 8
Validity.....		1 2 8
Definition of Use.....		1 2 3 8 9
Object of Use.....		1 2 3 4 5 6 8 9
Practice Area and Population.....		

APPENDIX D

FREQUENCY DISTRIBUTIONS FOR STUDY PROFILES

CROSSTABS FOR NIE HANDBOOK DATA 27-Aug-

File NONAME (Creation date = 27-Aug-82)

UNIT UNIT OF ANALYSIS

Category label	Code	Absolute freq	Relative freq (%)	Adjusted freq (%)	Cum freq (%)
INDIVIDUAL	1.	26	44.8	46.4	46.4
DYAD	2.	2	3.4	3.6	50.0
SMALL GROUP	3.	3	5.2	5.4	55.4
ORGANIZATION	4.	8	13.8	14.3	69.6
OTHER	7.	17	29.3	30.4	100.0
UNCODABLE	9.	2	3.4	Missing	100.0
	Total	58	100.0	100.0	

Mean	3.393	Std err	0.350	Median	2.500
Mode	1.000	Std dev	2.619	Variance	6.861
Kurtosis	-1.560	Skewness	0.459	Range	6.000
Minimum	1.000	Maximum	7.000		
Valid cases	56	Missing cases	2		

CROSSTABS FOR NIE HANDBOOK DATA 27-Aug

File NONAME (Creation date = 27-Aug-82)

SAMPLE SAMPLING DESIGN

Category label	Code	Absolute freq	Relative freq (%)	Adjusted freq (%)	Cum freq (%)
CONVENIENCE	1.	8	13.8	14.3	14.3
EXPOSIVE	2.	39	67.2	69.6	83.9
RANDOM	3.	4	6.9	7.1	91.1
CENSUS	4.	5	8.6	8.9	100.0
NOT AVAILABLE	8.	2	3.4	Missing	100.0
	Total	58	100.0	100.0	

Mean	2.107	Std err	0.101	Median	2.013
Mode	2.000	Std dev	0.755	Variance	0.570
Kurtosis	1.742	Skewness	1.132	Range	3.000
Minimum	1.000	Maximum	4.000		
Valid cases	56	Missing cases	2		

CROSSTABS FOR NIE HANDBOOK DATA 27-Aug

File NONAME (Creation date = 27-Aug-82)

DESIGN

Category label	Code	Absolute freq	Relative freq (%)	Adjusted freq (%)	Cum freq (%)
CASE STUDY-NO THEORY	1.	4	6.9	10.3	10.3
CASE STUDY-THEORY	2.	10	17.2	25.6	35.9
LONG-CROSSECT-NO STA	3.	4	6.9	10.3	46.2
LONG-CROSSECT-STAT 'C	4.	4	6.9	10.3	56.4
QUASI-EXP-NO CONTROL	5.	17	29.3	43.6	100.0
NOT AVAILABLE	8.	2	3.4	Missing	100.0
UNCODABLE	9.	17	29.3	Missing	100.0
	Total	58	100.0	100.0	

Mean	3.513	Std err	0.243	Median	3.875
Mode	5.000	Std dev	1.520	Variance	2.309

Kurtosis	-1.544	Skewness	-0.334	Range	4.000
Minimum	1.000	Maximum	5.000		
Valid cases	39	Missing cases	19		

CROSSTABS FOR NIE HANDBOOK DATA 27-Aug

File NONAME (Creation date = 27-Aug-82)

METHOD RESEARCH METHOD

Category label	Code	Absolute freq	Relative freq (%)	Adjusted freq (%)	Cum freq (%)
STRUCTURED OBS	2.	2	3.4	3.4	3.4
CONTENT ANALYSIS	3.	10	17.2	17.2	20.7
INTERVIEWS	5.	5	8.6	8.6	29.3
QUESTIONNAIRES	6.	28	48.3	48.3	77.6
MULTIPLE METHODS	7.	13	22.4	22.4	100.0
	Total	58	100.0	100.0	

Mean	5.483	Std err	0.194	Median	5.929
Mode	6.000	Std dev	1.478	Variance	2.184
Kurtosis	-0.118	Skewness	-1.063	Range	5.000
Minimum	2.000	Maximum	7.000		
Valid cases	58	Missing cases	0		

CROSSTABS FOR NIE HANDBOOK DATA 27-Aug

File NONAME (Creation date = 27-Aug-82)

METHOD ANALYTIC METHOD

Category label	Code	Absolute freq	Relative freq (%)	Adjusted freq (%)	Cum freq (%)
EMPIRICAL GENERALIZA	1.	7	12.1	13.2	13.2
RATINGS OR CODES	2.	16	27.6	30.2	43.4

[redacted]VARIATE ANALYSIS	3.	15	25.9	28.3	71.7
MULTIVARIATE ANALYSI	4.	14	24.1	26.4	98.1
[redacted]HER	5.	1	1.7	1.9	100.0
[redacted]T AVAILABLE	8.	3	5.2	Missing	100.0
UNCODABLE	9.	2	3.4	Missing	100.0
	Total	58	100.0	100.0	

[redacted]an	2.736	Std err	0.145	Median	2.735
[redacted]ode	2.000	Std dev	1.059	Variance	1.121
Kurtosis	-0.943	Skewness	-0.047	Range	4.000
[redacted]nimum	1.000	Maximum	5.000		
Valid cases	53	Missing cases	5		

[redacted]LSSTABS FOR NIE HANDBOOK DATA 27-Aug

[redacted]le NONAME (Creation date = 27-Aug-82)

[redacted]OCUS ANALYTIC FOCUS

Category label	Code	Absolute freq	Relative freq (%)	Adjusted freq (%)	Cum freq (%)
[redacted]UALITATIVE	1.	13	22.4	22.4	22.4
NON-QUALITATIVE	2.	45	77.6	77.6	100.0
	Total	58	100.0	100.0	

[redacted]an	1.776	Std err	0.055	Median	1.856
[redacted]ode	2.000	Std dev	0.421	Variance	0.177
Kurtosis	-0.161	Skewness	-1.358	Range	1.000
[redacted]nimum	1.000	Maximum	2.000		
Valid cases	58	Missing cases	0		

CROSSTABS FOR NIE HANDBOOK DATA 27-Aug

[redacted]le NONAME (Creation date = 27-Aug-82)

RELIAB RELIABILITY REPORTED

Category label	Code	Absolute freq	Relative freq (%)	Adjusted freq (%)	Cum freq (%)
D REPORT	1.	33	56.9	56.9	56.9
REPORTED	2.	25	43.1	43.1	100.0
	Total	58	100.0	100.0	

Mean	1.431	Std err	0.066	Median	1.379
Mode	1.000	Std dev	0.500	Variance	0.250
Kurtosis	-1.988	Skewness	0.286	Range	1.000
Minimum	1.000	Maximum	2.000		
Valid cases	58	Missing cases	0		

CROSSTABS FOR NIE HANDBOOK DATA 27-Aug

File NONAME (Creation date = 27-Aug-82)

VALID VALIDITY REPORTED

Category label	Code	Absolute freq	Relative freq (%)	Adjusted freq (%)	Cum freq (%)
D REPORT	1.	39	67.2	68.4	68.4
REPORTED	2.	18	31.0	31.6	100.0
OT AVAILABLE	8.	1	1.7	Missing	100.0
	Total	58	100.0	100.0	

Mean	1.316	Std err	0.062	Median	1.231
Mode	1.000	Std dev	0.469	Variance	0.220
Kurtosis	-1.387	Skewness	0.814	Range	1.000
Minimum	1.000	Maximum	2.000		
Valid cases	57	Missing cases	1		

CROSSTABS FOR NIE HANDBOOK DATA 27-Aug

File NONAME (Creation date = 27-Aug-82)

DEFUSE DEFINITION OF USE

Category label	Code	Absolute freq	Relative freq (%)	Adjusted freq (%)	Cum freq (%)
INSTRUMENTAL	1.	40	69.0	71.4	71.4
CONCEPTUAL	2.	14	24.1	25.0	96.4
SYMBOLIC	3.	2	3.4	3.6	100.0
UNCODABLE	9.	2	3.4	Missing	100.0
	Total	58	100.0	100.0	

Mean	1.321	Std err	0.073	Median	1.200
Mode	1.000	Std dev	0.543	Variance	0.295
Kurtosis	1.326	Skewness	1.473	Range	2.000
Minimum	1.000	Maximum	3.000		

Valid cases 56 Missing cases 2

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CROSSTABS FOR NIE HANDBOOK DATA 27-Aug

File NONAME (Creation date = 27-Aug-82)

OBJUSE OBJECT OF USE

Category label	Code	Absolute freq	Relative freq (%)	Adjusted freq (%)	Cum freq (%)
PROJ REPORT-EVALUATI	1.	8	13.8	19.5	19.5
SCI REPORT OR	2.	13	22.4	31.7	51.2
POLICY-MGT INNOVATIO	3.	6	10.3	14.6	65.9
PERS-EMBODIED INNOV	5.	6	10.3	14.6	80.5
OTHER	6.	8	13.8	19.5	100.0
NOT AVAILABLE	8.	2	3.4	Missing	100.0
UNCODABLE	9.	15	25.9	Missing	100.0
	Total	58	100.0	100.0	

Mean	3.171	Std err	0.292	Median	2.462
Mode	2.000	Std dev	1.870	Variance	3.495
Kurtosis	-1.380	Skewness	0.463	Range	5.000
Minimum	1.000	Maximum	6.000		
Valid cases	41	Missing cases	17		