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ABSTRACT

This report on the Management of Instructional Information Systems Project describes its activities in developing and disseminating research on educational information systems to school personnel. Section 1 presents the methodology of an ongoing review of the management information systems literature for information relevant to educational settings. It contains an annotated bibliography, glossary, and bibliography. Section 2 reports on the development, activities, and accomplishments of the Instructional Information Systems Network, a growing group of educators interested in instructional information systems. Group newsletters and interest surveys are attached. Section 3 is a progress report on a small working conference on educational information systems planned for February 1985. Section 4 analyzes teacher and administrator resistance which can emerge during the implementation of information systems and suggests strategies for facilitating the implementation process. (BS)

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MANAGEMENT OF INSTRUCTIONAL
INFORMATION SYSTEMS PROJECT

Adrienne Bank & Richard C. Williams
Project Directors

U.S. DEPARTMENT OF EDUCATION
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PREFACE

This document includes the deliverables promised to the National Institute of Education by CSE's Management of Instructional Information Systems Project. After an appropriate review of the draft and revision, this version is being submitted on December 1, 1984.

The four sections of this document represent the MIIS project's effort to conduct research of relevance to the emerging field of educational information systems (Section 1), to connect local school personnel with both research-based and field-based knowledge (Section 2), and to disseminate such knowledge via conferences and conference presentations (Sections 3 and 4).

We believe that the work of the MIIS project this year usefully gathers many of the threads running through the previous efforts of our team.

Over the years, we have been interested in the local uses to which test data and evaluation findings have been put. We have regarded the school district - with its central office staff, its lay school board, and often, its research and evaluation staff - as one of the key management and support elements for encouraging principals and teachers to make classroom and school-wide use of collected data. We have assumed that the district office itself could analyze and disseminate such collected data to better track student learning. Such monitoring would then contribute to policy and administrative decisions about matters such as budgets, textbook selection, staffing, staff development.

In earlier project work, we identified three models districts were using to link data with decision making. They included an achievement-oriented criterion-referenced test model, a school improvement norm-referenced test model, and a staff development state assessment test model. Each district had developed idiosyncratically, in response to the unique characteristics of its internal context and its external environment.

We have recognized and continue to regard as very important these interactions among the subsystems internal to school districts, as well as the continuing interaction between the schools and their powerful, often turbulent social environments. We believe that understanding these organizational dynamics is a precondition to understanding how schools can be improved; and, more particularly, to understanding how data derived from testing and evaluation can both describe the present and influence the future.

The increasing availability of school microcomputers has somewhat shifted the focus of our work. It is now possible to develop socio-technical information systems which can take a variety of forms: centralized in the district office, decentralized in school sites, distributed in both places. These information systems can input many types of data files, can provide regular or responsive reports, can serve decision making and operational needs. The push of technology makes it imperative to weave together existing research and practitioner knowledge about testing and evaluation, about schools as complex organizations, and about the installation and maintenance of technical systems. We have confidence that this year's work has responded to that imperative.

SECTION 1

LESSONS FOR EDUCATORS FROM THE
MANAGEMENT INFORMATION SYSTEMS LITERATURE

Overview

Outline

Annotated Bibliography

Glossary

Bibliography

Overview

LESSONS FOR EDUCATORS FROM THE MANAGEMENT INFORMATION SYSTEMS (MIS) LITERATURE

This section contains the supporting documents -- Outline, Annotated Bibliography, Glossary, and Bibliography -- for the final version of our review of the literature, Lessons for Educators From the Management Information Systems Literature.

This review of the literature is addressed to two audiences of educators: administrators who are interested in supporting the development of information systems and evaluators in district offices who may be responsible for that development. It may also interest school board members, principals, and technical assistance providers. The review is targeted for publication in a journal such as Educational Evaluation and Policy Analysis, Administrator's Quarterly, or Educational Leadership. Assembling the documents for the literature review has been more time-consuming and complex than we anticipated. The management information field, as might be expected, is changing rapidly. Earlier research concerns focused on hardware and system design; later concerns expanded to include software, organizational interfaces, and "people problems." New concerns continue to emerge.

Traditional library search methods provided us with a substantial background in the field, but they were only a jumping off point. The literature in the MIS field is found under a variety of headings, many of which are not cross-referenced in library indices; individuals from many specializations are working in common or overlapping areas.

Our traditional research approach, involving computer searches, journal indices, and noted authors' references lists, gave us a basic understanding of concepts and issues related to MIS. We are currently working a network of contacts with researchers and professionals in the MIS field as a way of identifying current "hot topics" and major research concerns. It is through this process, for example, that we have discovered the research focus that looks at MIS interaction with power and politics.

We are still working our expanding network list and have recently discovered six university centers doing research on management information systems.* We are in the process of contacting researchers at these centers as well as other promising contacts referred to us through previous phone and personal interviews.

The materials in this section therefore represent a true progress report. Our work is in transition; the content and form of the final product is not yet clear. As we continue to add to the annotated bibliography, the outline for the paper will undoubtedly change. As we continue our work in school districts and consult with our CSE colleagues also working in districts and classrooms, we will refine our view of the appropriateness of the MIS experience to IIS in education.

*Irvine (Public Policy Research Organization); at MIT (Center for Research on Information Systems); at NYU (Center for Research on Information Systems); at Florida International University, the University of Texas, and at the University of Minnesota.

Outline

LESSONS FOR EDUCATORS FROM THE MANAGEMENT INFORMATION SYSTEMS (MIS) LITERATURE

A. Introduction

1. Review Purpose
 - a. to overview major content areas in MIS literature
 - b. to familiarize educators, particularly administrators, evaluators, school board members, with issues/areas of concern in MIS literature
 - c. to suggest findings which might usefully transfer to educational settings
 - d. to connect the MIS literature with recent developments in educational testing and evaluation
2. Review Methodology
 - a. source identification: types of literature, location, search strategy
 - b. selection criteria: MIS citations; appropriateness to educators; availability; readability
 - c. content organization

B. Review of the Literature

1. Definitions of MIS: range, focus (Mason & Mitroff, 1973; Federico, Brun, & McCalla, 1980; Murdock, 1980; Riley, 1981)
2. History of MIS: research, practice (Markus)
3. Typology of issues and perspectives
 - technical, economic, behavioral considerations
 - context, design, installation, evaluation characteristics
 - personal, interpersonal, intra-organizational problems

(see Boland, 1978; Robey & Markus, 1984; Taggart & Tharp, 1977; Tricker, 1977; Zani, 1970)
4. Understanding the Context
 - a. approaches: Management Information Requirements (MIR); Information Analysis (IA); Situation Analysis (SA)

(See Cooper & Swanson, 1979; Gorry & Scott-Morton, 1970; Lientz & Chen, 1980; Mitroff, Kilmann, & Barabba, 1979; Schewe & Weik, 1977.)

- b. context factors: personal styles, values, roles, resources, motivations/interests, organizational subsystems, organizational environments

(See Ackoff, 1967; Argyris, 1970; Carter & Silberman, 1980; Cerullo, 1980; Dickson & Simmons, 1970; Driver & Mock, 1975; Gingras & McLean, 1981; Kling, 1980; Markus & Robey, 1983; Markus.)

- c. tools for use: data analysis, decision analysis, information deficiency analysis, functional decomposition, environmental scanning, needs assessments, checklists, simulations, negotiations, interviews

(See Cooper & Swanson, 1979; Mendelow, 1978; Srinivasian, 198_;

5. Designing the System

- a. uses: decision-supported vs. operational; tracking/responding/interacting; reports

(See Alter, 1976; Boer, 1972; Caldwell, 1975; Hall, 1979; Neumann & Hadass, 1980.)

- b. users: number, needs, styles, interests, resistances, types of involvement

(See Markus, 1983; McLean, 1979; Munro, 1978; Sterling, 1976; Swanson, 1982.)

- c. roles during design: outside experts, inside experts, users, idea champions

- d. approaches to design: top-down vs. bottom-up, positional vs. personal, user vs. analyst involvement, linear vs. feedback, fixed vs. adaptive, limited vs. extended

- e. sequences for design: linear, loopy linear, plug-in, prototype

(See Bally, Brittan, & Wagner, 1977.)

- f. elements in design: hardware, software, resources, skills, financial, data bases, data inputting, processing, accessing, reporting

- g. costs: financial/psychological/organizational; start-up/maintenance; training/support

- h. tools for design: data analysis, design analysis, system dynamics, syntactical analysis, structural analysis, information flow analysis, process analysis

6. Installing the System

- a. locating operations: centralized, decentralized, distributed, off-site/on-site

(See Danziger, 1979; King, 1982.)

- b. personnel: accountability, training, revised job descriptions and evaluations, supports, resistances

- c. monitoring/debugging/feedback procedures

7. Evaluating the System

- a. criteria: efficiency, effectiveness, user attitudes, satisfaction, values, usage, decision, performance, work environment, organization-environment interaction

- b. tools: MBO; interviews; observations, record keeping, feedback sessions, semantic differential, tracking of relevant indicators, cost-benefits analysis

(See Elam, 1979; Keen, 1975; King, 1982; Knutsen & Nolan, 1974; Kraemer & Danziger, 1982; Land, 1976; Swanson, 1982.)

C. Lessons for Educators

1. What the MIS literature tells us about information systems:
 - a. need to understand complexities of information systems as socio-technical processes
 - b. need to be knowledgeable about alternatives for context analysis, design, installation and evaluation:
 - new approaches, methods, tools; existing educational approaches which can be adapted
 - c. need for front-end time for context analysis and design
 - d. importance of initially and continually specifying users, uses, cycles, formats
 - e. importance of "people issues" such as accountability, conflict, commitment, trust, time, training, security, resistance, responsiveness
 - f. need for continuous back-end evaluation and feedback
2. Relevance to current practice in testing and evaluation
3. Relevance to current understandings of schools as complex organizations

Annotated Bibliography

LESSONS FOR EDUCATORS FROM THE
MANAGEMENT INFORMATION SYSTEMS LITERATURE

This annotated bibliography is designed to accompany our review called Lessons for Educators From the Management Informations Systems Literature. It may, in addition, stand alone as a reference document.*

The audience for the review and for the annotated bibliography is administrators, school board members and educational technical assistance providers. The purpose of the literature review is to overview major content areas in the MIS literature, to familiarize readers in the field of education with issues and concerns in the MIS literature, and to suggest findings which might usefully transfer to educational settings. It will also connect current thinking in educational evaluation and testing with the MIS literature.

The more limited purpose of the annotated bibliography is to supply a ready reference resource for busy educators who want to be able to access key articles without hunting them down in management libraries. This bibliography, then, is intended to be selective rather than comprehensive. It does not deal with technical issues of hardware, software, or systems design and installation. Instead, it focuses on the organizational and people issues which arise when conceptualizing, developing and implementing

*It should be noted that this is a preliminary document because we continue to find relevant literature under many classifications within the general rubric of management information systems - e.g., office automation, socio-technical systems, decision support systems, management information requirements (MIR), information services management, etc.

such systems. It does not illustrate the range of settings - banks, manufacturing companies, aerospace companies, retailers, local governments, etc. - which have had experience with MIS, but rather focuses on the empirical or "wisdom" literature which has developed over the past 15 years by researchers in graduate schools of management and centers devoted to this area of inquiry, and by practitioners working with MIS in the field.

The search for this annotated bibliography and its more extensive non-annotated bibliographic counterpart proceeded with the usual computer searches, supplemented by nominations from experts, course reading lists, pursuit of oft-cited articles, identification of relevant journals, key articles, etc.

The criterion for including articles and books in this annotated bibliography included: importance in the MIS field, likely appropriateness for educational settings, newness of orientation to educators, ease of summarizing major points.

In each annotation we try to indicate the audience to which the article is addressed, the use that educators might make of it, the orientation or point of view of the article, and the main points or arguments made in the article. In a few cases, we indicate that the article should be read in its entirety because of its content density or its importance.

BOOKS

Clowes, K.W. The impact of computers on managers. Ann Arbor, MI: UMI Research Press, 1982.

This book is addressed to managers interested in the research on the impact of computer technology in organizations, particularly in the manager's role. Clowes identifies three major categories of problems encountered in organizations: technical, economic and behavioral. Technical problems relate to integration of hardware and software. Economic problems relate to costs of acquiring and maintaining such systems. Behavioral problems relate to the human relations considerations. The behavioral problems are the hardest to identify and resolve.

Clowes maintains that successful implementation of any MIS requires intensive planning focused on the system's impact on its users. His approach focuses on behavior, not as a separate entity, but as a phenomenon related to characteristics of the organization, situation and information system.

Clowes includes a comprehensive review of management literature related to computers in organizations. The review contains five major areas: Organizational Characteristics, Managers' Situational Roles, Computers and Information Systems, Computer Impact Perceptions, and Work Activity Orientations.

Davis, G.B. Management information systems: Conceptual foundations, structure, and development. New York: McGraw-Hill, 1974.

A basic text with chapters that include summary, exercises and selected references, many charts, tables and diagrams. In three main sections, the book discusses conceptual foundations, structure of an MIS and MIS development and management.

Federico, P.A., Brun, K.E., & McCalla, D.B. Management information systems and organizational behavior. New York: Praeger Publishers, 1980.

The authors review the literature concerning the impact of MIS on managerial and organizational behavior. They focus on 1) the effects of MIS on managerial performance and decision making and 2) the implications of MIS for organizational structure and process.

One of the most comprehensive review of MIS research to date, this book includes an extensive reference list.

Kroeber, D.L. Management information systems: A handbook for modern managers. New York: The Free Press, 1982.

Kroeber has designed this book to be a practical guide to MIS. However, he includes conceptual discussions of systems in general and of MIS in particular so that the manager can not only use MIS but can understand them as well.

His introductory chapters include discussions of computer hardware and software; data processing (which he distinguishes from MIS), and decision making.

He describes in detail basic MIS activities: report generation, inquiry processing and data analysis.

He also describes the phases of the MIS Life Cycle starting with an Information Need and moving on to Planning, Development, Implementation, Operation, and Control

Lucas, H.C., Jr. Why information systems fail. New York:
Columbia University Press, 1975.

In this basic book for non-technical readers, Lucas views an information system within the context of the organization and contends that "the major reason most information systems have failed is that we have ignored organizational behavior problems in the design and operation of computer-based information systems," and concentrated too heavily on the technical aspects of systems. He notes that the early history of MIS reveals that systems were used to support clerical tasks as opposed to management decisionmaking. He reviews a number of studies which "support the observation that computer systems have had a small impact on the decisions made by most members of the organizations, especially management." He attributes this to problems such as: users not understanding the output; duplication overload or inaccuracy of data, unexpected and frequent changes in the functioning of the system.

Murdock, R.G. MIS, concepts and design. Englewood Cliffs, NJ: Prentice Hall, 1980.

A comprehensive textbook. Each chapter includes a summary, questions and problems, and selected references. The book covers a wide range of topics, such as Introduction to MIS, the Manager's view of MIS, Planning, Design, Implementation, Forms and Reports, Problem Solving and Decision Making, Data Base Management.

Synnott, W.R., & Gruber, W.H. Information resource management: Opportunities and strategies for the 1980s. New York: John Wiley & Sons, 1981.

Two chapters in this comprehensive book seem very applicable to district concerns: Chapter 5: Effective User Relations: The Care and Feeding of Users, and Chapter 6: Top Management: Closing the Communications Gap.

Synnott and Gruber maintain that effective user relations are one of the critical keys to success of MIS. They suggest user measurement strategies such as: market research, assessment of user IM penetration, user satisfaction surveys, and a backlog task force. They describe a host of "user involvement strategies" including "Foot in the Door, Joint Systems Development, Perception Management, User Service Contracts, and Customer Service Centers.

Another critical key to success is top management involvement. Synnott and Gruber describe Critical Success Factors, Decision Support Systems, management graphics, and strategies for gaining top management support.

The following are good sources for collected articles/readings on MIS.

Davis, G.B., & Everest, G.C. Readings in management information systems. New York: McGraw-Hill, Inc., 1976.

Dock, V.T., Lucksinger, V.P., & Cornette, W.R. (Eds.). MIS: A managerial perspective. Chicago: Science Research Association, Inc., 1977.

Riley, M.J. Management Information Systems (2nd ed.). San Francisco, CA: Holden-Day, 1981.

ARTICLES

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Ackoff, R. Management misinformation systems. Management Science, 1967, 14(4), B147-156.

This has become a classic article in the MIS literature and is widely quoted and reprinted. The article comes out of the author's background in operations research and management science. The article attacks several of the (in 1967) prevailing assumptions about MIS and then describes a decision and analysis approach to specifying information requirements.

Ackoff's list of erroneous assumptions and his corrections:

Assumption: managers lack relevant information.

Ackoff: managers suffer from "an over-abundance of irrelevant information." A MIS should replace information overload with filtered and condensed information.

Assumption: managers know what information they need.

Ackoff: managers often don't know how they make decisions. They therefore "play it safe" and ask for "everything."

Assumption: more information will lead to improved decision making.

Ackoff: many managerial problems/decisions do not require more information, but instead can benefit from decision rules or performance feedback.

Assumption: better inter-organizational communication leads to better coordination.

Ackoff: if organizational units are in conflict with one another better communication hurts organizational performance.

Assumption: managers need only to use the information system, not understand it.

Ackoff: managers should be trained "to evaluate and hence control it rather than be controlled by it."

Ackoff, 1967 cont.

Ackoff's model for system design flows from his view of the above assumptions. He suggests 1) analysis of the decision system; 2) analysis of the information requirements into a) those for which solution models are available, b) those for which heuristics can be provided, c) those for which models cannot be constructed; 3) reorganize job descriptions so that similar type decisions are aggregated to single decision makers; 4) design procedures for collecting, storing retrieving, and treating information; 5) design system controls.

Alter, L. How effective managers use information systems. Harvard Business Review, (Nov-Dec 1976), 97-104.*

A typology of decision support systems is provided with examples of each type. The categorization consists of systems which:

- 1) Retrieve isolated data items
- 2) Aid ad hoc analysis of data files
- 3) Produce standard reports
- 4) Estimate consequences of proposed decisions (modelling)
- 5) Propose decisions (optimizing)
- 6) Make decisions

Alter's research with 56 systems revealed that successful decision support systems increased the manager's effectiveness in the organization by improving interpersonal communication (e.g., by using the system as a "tool of persuasion"), facilitating problem solving, fostering individual learning, and increasing organizational control. A major finding was the problem with cost-justification of decision support systems.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Argyris, C. Resistance to rational management systems. Innovation, 1970, No. 10, 28-35.

This article is a provocative and fascinating analysis of the concept of resistance to MIS. Argyris says that "with regard to MIS, there does exist some valid basis for resistance, or at least skepticism." Besides the usual reasons that managers give -- their lack of understanding of MIS and their reluctance to change to a new technology -- Argyris says managers "begin to realize that fundamental changes will be required in their personal styles of managerial thought and behavior."

He analyzes the changes that could occur when the MIS expert tries to make explicit covert policies, practices and norms. "As the informal modes become explicit, information becomes increasingly under the control of top management." Middle managers, for example, may feel hemmed in, feel themselves losing their traditional powers, feel that there is less need for organizational politics, more need for intellectual and conceptual competence.

Although the author does not suggest solutions for these problems, their identification is likely to be extremely relevant to some educational settings.

Bally, L., Brittan, J., & Wagner, K.H. A prototype approach to information system design and development. Information Management 1 1977, Nov. 1977, 21-26.*

"An information system, as implemented, represents a synthesis between what the users want, think they want, or state that they want, the designers' appreciation of the users' wants and needs, and the constraints of time, cost, human capability and technical feasibility." With this thought and the many information system failures of the sixties, the authors propose alternative system design and development strategies to the traditional linear strategy. The strategies discussed are:

- 1) Linear - One activity follows logically from its predecessor. Concurrent activities are not allowed and looping back implies deficiencies in earlier work.
- 2) Loopy Linear - Same as linear except that looping back is acceptable.
- 3) Plug-in - Follows linear strategy except allows for the phasing of the design and implementation of different functions.
- 4) Prototype - a highly simplified version of the system is built and brought into operation. Experience gained from this system is used to revise system requirements leading to the implementation of a less simplified version. This cycle is repeated until a satisfactory system is achieved.

The authors feel that the prototype strategy is very strong when dealing with fluid situations and fuzzy requirements.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Boer, G. A decision oriented information system. Journal of Systems Management, Oct. 1972, 36-39.*

Recognizing the difficulty in determining what decisions are made by managers, the author presents a method to facilitate this process. The method involves the directing of attention towards the organization's resources, both tangible (inventory, money, etc.) and intangible (employee skills, customer good will, etc.). Once the resources are identified, their associated decisions can be determined along with the information required to support the decision process.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Boland, R.J., Jr. Control, causality and information requirement. TIMS - ORSA Conference, May 1, 1978.

The author feels that current approaches to the definition of information systems are characterized by "inadequate reflection on ourselves as systems designers, or on the social process within which our information services are put to use." He states that ". . . we have selectively ignored our own biases in observing the decision making process, and underestimated the complexity and dialectical quality of social reality." As such, an attempt is made to provide an alternative basis for defining information needs. This alternative basis includes the following considerations:

- 1) Information requirements should be viewed as temporary.
- 2) Information should support the dialectic process of the confrontation between man and his reality.
- 3) Focus decision analysis upon what currently is/is not and what could be.
- 4) Consider control due to social interaction (without orders) as well as the traditional top down control.
- 5) Consider a mutual causality in which things are both prerequisites and products of each other as well as considering the traditional sequential causality.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Caldwell, J. The effective report crisis. Journal of Systems Management, June 1975, 7-12.*

The author presents guidance for effective management reports focusing on report content design. Guidelines include the attributes of a good report (e.g., inclusion of many varied visual formats, concise, relevant, necessary, exclusion of information not applicable to management action, etc.), attributes specifically related to management control (e.g., inclusion of plan figures; actual figures, variance and trend information as well as responsibility), and attributes of report identification (clear indexing and good titles showing subject, classification, and frequency). Examples of good and bad reports are provided.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Carter, J., & Silberman, F. Establishing a MIS. Journal of Systems Management, January, 1980, 15-21.

The authors list what they see as major reasons for the failure of MIS to live up to expectations: system-user mismatch, bottom-up rather than top-down system design; data which are too general and too late; lack of clarity about reasonable system expectations.

They define information as that data which actively informs us about the status of something of interest to us. "Data becomes information only when viewed as part of a pattern."

They suggest a six step process for establishing information requirements: determining managers' needs, e.g., regular periodic reports or phased reports; monitoring managers' performance against their plans; forecasted demands for products and services, etc.; establishing differences between short and long term planning needs; analysis of standard and routine problems which can be addressed through a computerized decision-making system.

MIS can be classified as low level systems which supply raw data which users must interpret, intermediate level systems which allow for selective retrieval, or high level systems which have computational abilities. The authors say that the greatest potential of a management information system is reached when such a system is integrated with a management science model.

Cerullo, M.J. Information systems success factors. Journal of Systems Management, Dec. 1980, p. 10-19.

This is a should-be-read nuts and bolts article with many good checklists, outlines and lists. Cerullo identified seven critical success factors for computer based information systems and analyzed the reason for their importance. He infers from these working model for a company to use in designing, developing, and installing such a system. Much of the information is based on questionnaire responses by corporations on the Fortune 1000 list.

The seven most critical factors connected with successful use are 1) manager/user attitudes; 2) personnel training; 3) operating and middle management involvement in planning; 4) technical expertise of DP personnel; 5) operating and middle management involvement in analysis, design and implementation; 6) user/manager expertise in making their needs known; 7) the use of data-base management systems. The least critical factors were 1) manager involvement in post-implementation evaluation; 2) use of management science or research-based techniques; 3) MIS steering committee composition or organization location; 4) top management involvement in analysis, design and implementation phase; 5) use of external consultant in any phase.

Cooper, R.B., & Swanson, E.B. Management information requirements assessment: The state of the art. Data Base, (Fall, 1979).

Densely written for those familiar with MIS terminology and literature, this paper provides a useful and comprehensive review of the literature related to the assessment of management information system requirements (MIR). It begins with the idea that MIR is a design process active over the life cycle of a MIS. The review uses Simon's three design phases: the intelligence phase (focusing of the problem area by identifying the dissonance between the way things are and the way they should (could) be; the design phase (development of informal or formal theory about the problem area leading in clarification and prioritization of action alternatives); the choice phase (evaluation of the alternatives resulting in a determination of information system requirements).

After succinctly summarizing the literature in each of the phases, the author suggests areas needing further research.

In the intelligence phase, the literature suggests two types of expert roles: active and passive. Active analyst roles could involve marketing postures, purchase motivation, product adjustment, communications, post-transaction analysis. A passive analyst role suggests that the analyst wait for users to express needs.

Techniques for determining current status include questionnaires and interviews as well as methods derived from transactional analysis, Jungian characterization, intellectual understanding, exchange/bribe/punishment postures.

Discussion of the design phase can be arranged according to six dimensions: top down vs. bottom up, positional vs. personal, user involvement vs. analyst involvement, linear vs. feedback, fixed vs. adapting systems, and limited vs. extended systems.

Seven methods considered in the literature as useful in the design phase include: decision analysis, data analysis, System Dynamics, syntactical analysis, structured analysis, information flow and process analysis.

The literature relating to the choice phase is mostly concentrated on tools: goal criterion analysis, utility assessment, Bayesian estimation, tree structuring, cost benefit analysis.

The paper identifies deficiencies in the methodologies used by the MIR analyst and groups them into three areas: inadequate direction for the foundation and evolution of alternative methodologies; insufficient components from which to formulate alternative methodologies; insufficient components for the implementation of the candidate methodologies.

Daniel, E.H. Information resource management: An overview for educators.
Report to NIE No. IR-58, Contract No. NIE-400-77-0015. (Available
from Information Resources Publications, School of Education, Syracuse
University, Syracuse, NY 13210. Also available as ERIC Document ED
244 500.)

This is one of the few attempts to link an existing literature - in this case, the information services literature - with the needs of educators. The paper defines the problem, presents the background and then provides some "challenges to educators in the future." Although incomplete and not thoroughly conceptualized, it contains good references and bibliography.

Danziger. The "skill-bureaucracy" and intra-organizational control: The case of the data processing unit. Sociology of Work and Occupations, May 1979, 6(2), 204-226. Also available as Reprint No. RP-36 from Los Angeles, CA: Public Policy Research Organization, University of California - Irvine, 1979.*

Does a "skill bureaucracy"--a professionalized service-providing organizational unit with a relative monopoly of expertise--operate with minimal effective control by either top managers or the clients of its services? This issue is examined for local government data processing units.

*Abstract found in Publication List, Public Policy Research Organization, University of California - Irvine.

Dickson, G.W., & Simmons, J.K. The behavioral side of MIS. Business Horizons, 1970, 13(4), 59-71.

This article is based on the authors' interviews with 17 firms which identified "people problems" as of greater concern to them than any topic in the area of operations management. The authors' abstract says:

To enjoy the technical benefits of management information systems, it is often necessary to solve the dysfunctional side effects stemming from behavioral problems - in short, people problems. Reactions to the installation of MIS may range from failure to use the output to outright sabotage. The authors identify three types of dysfunctional behavior - aggression, projection and avoidance - that may appear in four groups - operating personnel, operating management, technical staff, and top management. Only the technical staff - being designers and agents of change - shows no dysfunctional behavior. Operating management, the group that should enjoy most of the system benefits, goes further than any other group in its resistance, and exhibits all three forms. The authors suggests ways of minimizing the behavioral problems that may follow introduction of MIS.

Some of the ways they suggest include establishing proper atmosphere (e.g., top management support, open communication, trust), participation (of non-experts, users), clarity of system purpose and characteristics (e.g., maximizing individual and organizational goals, minimizing initial system errors), attention to the "human" scope of systems, reexamination of manager's tasks, their priorities, and performance evaluation criteria.

Driver, M.J., & Mock, T.J. Human information processing, decision style theory, and accounting information systems. The Accounting Review, July 1975, 490-508.*

The authors propose and test a theory of decision style based upon the degree of solution focus and the amount of information used. Decision makers are divided into four decision styles categories: 1) Decisive - using minimal amount of data to generate one firm opinion; 2) Flexible - using minimal data to derive alternative solutions; 3) Hierarchic - using masses of data, carefully analyzed, to arrive at one best conclusion; 4) Integrative - using masses of data to generate a multitude of possible solutions. Proposed attributes to each category are: 1) Decisive - concerned with speed, efficiency, and consistency; 2) Flexible - associated with speed, adaptability, and intuition; 3) Hierarchic - associated with great thoroughness, precision, and perfection; 4) Integrative - experimental, creative, information loving style. prior research has shown that decision makers may vacillate between decision styles; this may happen, for example, when the environmental load (i.e., its compleity, threatening or positive aspects) changes. One common mixed style (Integrative/hierarchic) is labeled complex. An experiment with 54 MBA stdents in a simulated production and manufacturing environment was performed to see if the proposed theory explained differences in the volume of information used (purchased) and the speed of decisions. It was found that: 1) Complex style used the most information; 2) Hierarchic style used more information than decisive style; 3) Flexible style used more information than decisive style; 4) Decision speed general conformed to the expected; however, the decisive style was found to be slower than all other styles; this was hpothesized due to the effects of overload conditions. An extensive survey of Human information processing theory literature is also provided.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Elam, P.E. User-defined information system quality. Journal of Systems Management, August 1979, p. 30-33.

This easy-to-read but not very comprehensive article takes a strong position that "quality as perceived and defined by the user is (and always should be) the dominant evaluation criterion in the effective design of information systems." Reasons include reduced frustration for user, reduction of later conflicts, user familiarity and understanding of system, minimal transfer of power to the data processing department.

The author says that designers must build descriptive models of user needs and design processes, must pilot test the system before it becomes operational, and must regard design as a step function. He provides seven guidelines which seem to come from his experience within an organization and as a lecturer/author in the field of information resource management.

Gingras, L. & McLean, E.R. Designers and users of information systems: A study in differing profiles. Information Systems Working Paper #7-82, 1981.

Gingras and McLean report results of a very interesting study showing why "user-oriented" systems often do not meet user needs. The study indicates that designers' images of users differ markedly from the users' self images. Even more significant is the indication that designers' concept of the "ideal user" is closely aligned with the designers' own self profile and is not closely related to the actual user profile. The authors conclude that designers who claim to be "user oriented" may be unconsciously seeing themselves as the user of their designs.

Gorry, G.A., & Scott-Morton, M.S. Management decision systems: A framework for management information systems. Working Paper #458-70, Sloan School of Management, Massachusetts Institute of Technology, April 1970.*

In this much-cited article, the authors combine Anthony's taxonomy of management activities (strategic planning, management control, operational control) with Simon's views on the decision process (structured vs. unstructured decisions and the intelligence, design, and choice phases) to derive a framework for information system requirements. They propose a decision analysis approach focusing on and modelling those decisions key to the organization. This modelling reveals phases of the decision process capable of being structured and thus to be included in the information system. Implications of this approach include: 1) strategic planning and management control information systems should not be based upon (aggregated) operational control data; if this data is found necessary, statistical techniques should be employed; 2) the differing requirements of operational control, management control, and strategic planning systems imply different hardware and software; 3) information system support of strategic decision activities should be individualized and need not be efficient; 4) information system support of operational decision activities should be efficient, have ready access to current data, and be easily changed.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Hall, T.P. User need analysis. Journal of Systems Management, January 1979, p. 12-13.

This how-to-do-it two-page article provides a useful checklist of questions relating to current operating systems both manual and computerized, questions relating to constraints in a proposed system, and questions relating to an analysis of the problem being addressed.

Keen, P.G.W. Computer-based decision aids: The evaluation problem. Sloan Management Review, 1975, 16(3).

This article is especially interesting for its emphasis on the evaluation of qualitative benefits derived from MIS since the concept of better information leading to better decisions is hard to assess in a traditional cost/benefit analysis.

Keen stresses linking evaluation to the goal-setting process and dealing head on with questions of qualitative issues. He proposes an approach to evaluation that considers the major problem for evaluation to be defining what a successful system is. He suggests that interested parties -- top management, users, designers -- need to negotiate a consensus on "success." They also need to decide what the trade-offs are and agree on success indicators.

King. Organizational cost considerations in centralized vs. decentralized computing operations. Working Paper version [WP-119] only available, [Los Angeles, CA: Public Policy Research Organization, University of California - Irvine, 1982] (published in: R. Goldbert & H. Lorin (Eds.), The economics of information processing, Vo. 2. New York: John Wiley & Sons, 1982).*

Raises a challenge to the assumption that decentralization will preserve and/or enhance productivity improvements from computing. Examines the impetus behind moves toward decentralization, reviews the research on cost-related arguments on both sides of the cost characteristic of decentralization, and constructs a set of hypotheses regarding problematic "cost dynamics" of decentralization suggested by the research.

*Abstract found in Publication List, Public Policy Research Organization, University of California - Irvine.

King, W.R., & Rodriguez, J.I. Evaluating management information systems. MIS Quarterly, 1978, 2(3), 43-51.

The authors note that most evaluations of MIS are based on efficiency rather than effectiveness considerations, are developed post hoc rather than conceptualized along with system goals, are likely to be based on unreasonable and unfeasible expectations. The evaluation model presented here proposes assessments of attitudes, value perceptions, information usage and decision performance at five points in time: before the needs assessment, before the MIS design phase, before the MIS development phase, before system implementation and after system implementation. An extended example and description of measures is provided for each of the assessments.

Kling. Social analyses of computing: Theoretical perspectives in recent empirical research. In A. Mowshowitz (Ed.), Human choice and computers, 2. Vienna, Austria: IFIP Conference Proceedings. (Also available as Reprint No. RP-102 from Los Angeles, CA: Public Policy Research Organization, University of California - Irvine, 1980.)*

Provides an orienting perspective toward the study of social impacts of computing and discusses the intellectual evolution and social organization of scholarly and professional activity in which these studies are pursued.

*Abstract found in Publication List, Public Policy Research Organization, University of California - Irvine.

Knutsen, K.E., & Nolan, R.L. Assessing computer costs and benefits. Journal of Systems Management, Feb. 1974, 28-34.*

The authors state that computer systems are agents of change enabling firms and people to operate in new, more efficient ways. As such, the traditional capital investment analysis techniques (e.g., return on investment) are not adequate benefit measures for computer systems. Benefit assessment should include equipment displacement, direct cost (e.g., people) displacement, indirect cost (e.g., inventory level) displacement, sales increase (through intelligence, etc.), management planning and control impact, and organizational character changes (e.g., resulting in a "higher order of discipline).

*This abstract can be found in R. Couper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Kraemer & Danziger. Computers and control in the work environment. Working Paper No. WP-172. Los Angeles, CA: Public Policy Research Organization, University of California - Irvine, 1982.*

Empirical data from more than 1,500 local government employees are used to explore the effects of computing on key control issues in the work environment: control over others, control by others, time pressure on the job, and overall mastery of one's work environment. The findings are clear and often surprising, indicating that certain roles have characteristic patterns of benefits and losses of control. Overall, the "information elite" of staff professionals enjoy the greatest increases in control due to computing.

*Abstract found in Publication List, Public Policy Research Organization, University of California - Irvine.

Land, F.F. Evaluation of systems goals in determining a design strategy for a computer based information system. Computer Journal, 1976, 290-294.*

The author describes " . . . a method for identify and evaluating the goals of the organization and of measuring the contribution alternative systems designs may make to the achievement of the goals." The approach says to:

- 1) Identify groups impacted (both negatively and positively) by the system
- 2) Relate organizational goals to the groups
- 3) Decompose goals into "measureable" form (sub goals)
- 4) Assign utilities to each subgoal
- 5) Evaluate systems in light of their impact and the utilities.

An automated tool has been developed to aid in the evaluation.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Lientz, B.P., & Chen, M. Long range planning for information services.
Long Range Planning, Feb. 1980, 13, 55-66.

The authors are addressing managers in an attempt to persuade them that long range information services planning is a good thing. They say that increased diversity in hardware/software, increased costs and increased complexity in the need for coordination and planning of distributed computing systems and the tendency for outmoded systems to maintain their old inefficiencies even with new equipment make it important to engage in three levels of planning: long range, intermediate strategic planning, and immediate action planning. The steps suggested for doing long range information service planning (LRISP) include: Understand the Environment, Define the Objectives, Develop a Strategy, Suggest Project Candidates, Specify Expected Performances.

Markus, M.L. The new office: More than you bargained for.
Computerworld OA, 1984.

Interesting reading; a good news/bad news approach to Office Automation (OA). Recommended reading for managers/administrators: not only do they deal with office staffs who are involved with implementing automated processes, but they could likely draw parallels from the OA experiences to situations in which technology is being introduced in instructional settings.

Markus identifies two conclusions from research on computer-based applications:

"Office systems must be considered on at least two levels: their effect on individuals and their effect on the collections of people as we know as organizations . . . [it cannot] be assumed that a system that benefits individuals will benefit their organization and vice versa."

"Office systems must be considered not just for their impacts on what people do when they work, but also for their impacts on how they work (and how they feel about this) and where and when they work . . . The social aspects of OA are as important as work task impacts."

Markus describes potential benefits of OA systems (such as reduced time to perform tasks) and explains why expected benefits do not always materialize (automated systems seem to create recurring hassles users.)

In assessing impacts of office systems, Markus focuses not on technology nor on characteristics of people and organizations. He approach is to look at "the way particular system features interact with a particular organizational setting."

Markus, M.L. Implementation politics: Top management support and user involvement. Systems, Objectives, Solutions, 1981.

Markus discusses resistance in terms of the organizational power structure. She questions the automatic use of user participation; she maintains that it is not appropriate in all cases.

Her thesis is that ". . . causes of resistance lie in the degree to which a system conflicts with the existing power structure in the organization."

"Resistance can occur independent of user participation and top management support. Users may unwittingly participate in the creation of an organizationally-dissonant system design which they later resist when its implications are felt. Organizationally appropriate designs are frequently adopted willingly regardless of who suggested them or developed the specifications. The presence or absence of implementation tactics like user participation cannot produce accepted or successful systems in and of themselves, but they may be instrumental, in a secondary way, in affecting the degree to which a computer-based system matches or diverges from the organizational power structure."

Markus, M.L. Power, politics and MIS implementation. Communication of the ACM, 1983, 26(6).

A refreshingly different perspective on resistance. Based on "interaction theory," this perspective does not view resistance to MIS as inherently bad, but views it as a phenomenon which may be a signal that "an information system is altering the balance of power in ways that might cause major organizational disfunctions."

Markus describes three theories that can be used to explain why resistance occurs:

1. Internal Factors -- such as people, in general, resist change.
2. External Factors -- involves factors inherent in the application or system being implemented, such as technical quality.
3. Interaction Theory -- interaction of the system and the context of use cause the resistance:

The "Sociotechnical variant" looks at the interaction of the system with the distribution of intra-organizational power.

The "Political variant" looks at the interaction of the system with the distribution of intra-organizational power.

She says, "It should be noted that this explanation identifies neither the system nor the organizational setting as the cause of resistance, but their interaction . . . The interaction theory can explain different outcomes for the same system in different settings."

"The interaction theory has the apparent disadvantage of providing no universal, noncontingent advice to systems analysts and management implementors of systems. But it is more useful than other theories for predicting resistance and for generating varied and creative strategies that will help both to prevent it and to deal with it when it arises."

Markus recommends implementors use self-examination strategies to understand other people's reactions. She also warns that "the analyst should recognize that the goal of the exercise is not to 'overcome' resistance, but to avoid it, if possible, and to confront it constructively, if not . . . Resistance is not a problem to be solved so that a system can be installed as intended; it is a useful clue to what went wrong and how the situation can be righted."

Markus, M.L., & Robey, D. The organizational validity of management information systems. Human Relations, 1983, 36(3), 203-226.

The authors say that accumulating research indicates that while the technical attributes of a system may be necessary for system success, at least in some threshold quantities they are not sufficient for system success.

They provide a conceptual framework for understanding the organizational validity of MIS systems. The prevailing view is that an organizationally valued system is one in which key attributes of the system match users' psychological characteristics. "In our conception, the fit between the system and users' motivations or cognitive styles is only one of four ways in which a system can match its context of use. The others include the structural dimensions of an organization, distribution of power in the organization, and the interface between the organization between the organization and the environment." Then they go on to say "a second key aspect of our conceptualization is that organizational validity is a property neither of the system itself, nor of the organization in which it is used, but rather of the degree of fit or match between them." Finally, they say, "organizational validity is a useful concept" but recommend "caution in applying it normatively." That is, "an organizationally valid information system might be easily installed but fail to produce any significant benefit because it merely automates inefficient organizational rules of thumb."

Mason, R.O., & Mitroff, I.I. A program for research on management information systems. Management Science, 1973, 19(5), 475-487.

This article is addressed to the academic research community interested in a systematic research agenda on MIS. The authors propose a particular definition of MIS and describe the alternatives flowing from it. Their own abstract states that:

An information system consists of, at least, a PERSON of a certain PSYCHOLOGICAL TYPE who faces a PROBLEM within some ORGNIZATIONAL CONTEXT for which he needs EVIDENCE to arrive at a solution, where the evidence is made available through some MODE OF PRESENTATION. This defines the key variables comprising a Management Information System (MIS). It is argues that most research and development to date on MIS has assumed only one underlying psychological type, one class of problem types, one of two methods of generating evidence, and, finally, one mode of presentation. Other states are suggested for all these key variables. The result is the outline of a systematic research program on MIS.

Mason, R.O., & Swanson, E.B. Measurement for management decision: A perspective. California Management Review, 1979, 21(3), 70-81.

This article is intended by the authors to be a contribution to that management literature which is concerned with developing a general theory of measurement in the managerial context.

The thrust of this article is that "measurement is a fundamental process of management." Since the manager is the user of the measures, the system for measurement must take into account the managers' disposition and intentions rather than traditional scientific measurement techniques. Three kinds of managerial dispositions are identified by the authors: "What problem shall I look into?" (attention directing); "What course of action is better?" (problem solving); and "How well am I doing?" (scorecard keeping). This means that the designer of a measurement system must have intentions consistent with the client's values and must design a system that guarantees that their mutual and compatible intentions are realized.

In the authors' terms, "the actual implementation of a measurement system takes the form of a management information system." The primary functions of such a management information system are data gathering, data processing, and managerial inquiry and deciding."

McLean, E.R. End users as application developers. Information Systems Working Paper, Center for Information Studies, Graduate School of Management, UCLA, 1979, 8-79.

This paper emphasizes the ever-changing needs of users and addresses issues of design, prototyping, and maintenance.

McLean proposes having end users function as their own system developers (as opposed to DP personnel) so they can create and modify their own applications as needed. For this purpose, he recommends establishing a use-friendly environment which takes into account user frustrations and terrors and their need to change the system as they use it.

Mendelow, A.L. Environmental scanning - The impact of the stakeholder concept. Proceedings of the International Conference on Information Systems, 1978, pp. 407-417.

The open systems perspective emphasizes the importance of environmental considerations in strategic planning. This article mentions four modes of scanning (undirected, conditioned, informal search, formal search), six foci for the scanner (the image, the customer, the potential customer, the competition, the regulators, and the critical intelligence providers), and three schedules for scanning (crisis-oriented, periodic, continuous).

The author accurately notes that these frameworks do not tell a manager how to do environmental scanning. He proposes a stakeholder framework (referencing Mitroff and Mason, 1980; Ackoff, 1970; Ross & Goodfellow, 1980) that categorizes stakeholders as shareholders, government, customers, suppliers, lenders, employees, society, competitors. He notes that since the purpose of environmental scanning is to reduce uncertainty, stakeholders may be categorized into one of four quadrants using Power (Hi-low) and Dynamism (Hi-low) as axes. Each quadrant has its own scanning schedule and process. Stakeholders are assigned to quadrants.

This is an interesting conceptual article which suggests a start on a practical how-to-do-it technique. However, it does not go far enough to be useful to a manager.

Mitroff, I.I., Kilmann, R.H., & Barabba, V.P. In G. Zaltman (Ed.), Management principles for nonprofit agencies and organizations. New York: American Management Associations, 1979.

This is a key must-read article in the MIS literature. It builds on Ackoff's (1967) classic article identifying an array of erroneous assumptions and adds five other areas.

1. Solving the right problem. This means the design must ask: What are the classes of problems to which the system will restrict itself? Are they well known beforehand or unspecified? Fixed or changing?
2. Involving the right people in the design. "It is vitally important to get as many potential users, clients and stakeholders of the system deeply involved in as many phases of the MIS design as possible."
3. Different kinds of evidence. The issues include evidence for whom? Evidence for what?
4. The System's Boundaries. "Many MIS designers implicitly take the concept of an information system to be synonymous with that of a computerized system . . . Such a limitation need not always be the case . . ."
5. The Decision-Information Structure. Using the Montgomery and Urban (19) model of an MIS as composed of four banks - a statistical model bank, a display system, a model bank, and a data bank - the authors add a problem bank, a strategic assumption bank, and a decision maker bank.

The authors describe eleven principles for avoiding a mis-information system, and outline in great detail a stakeholder-based process for a MIS.

Munro, M.C. Determining the manager's information needs. Journal of Systems Management, June 1978, 34-39.*

The author compares and contrasts the data analysis and decision analysis approaches to identifying management information needs. Data analysis advantages are stated as 1) cost-effective for structured decisions; 2) may provide more flexible information flow. Data analysis disadvantages are: 1) requires managers to articulate information needs; 2) information is not linked to organization's objectives; 3) there are no established procedures or standards. Decision Analysis advantages are stated as: 1) explicit linkage between information and organizational objectives; 2) provides information results independent of the analyst involved; 3) good for unstructured decisions; 4) information is tailored to the personal decision style of manager; 5) improves decisions as well as information. Decision Analysis disadvantages are: 1) information requirements may change when the manager is replaced; 2) decisions are difficult to model.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Neumann, S., & Hadass, M. DSS and strategic decisions. California Management Review, 1980, 22(2), 77-84.

An easy to read discussion of the interaction between computerized information systems and strategic decision making. The authors, based on their literature review, assert that the major reasons for the lack of sufficient impact of information systems on such top level decision making is due to 1) press to get such systems operating quickly. This is easier to do at the operational control level which is easier to do than at the strategic planning and management control level; 2) MIS contribution to top level decision making is regarded as a by-product of the routinely generated operational information rather than as an independent activity; 3) the undefined nature of both the decision-making structure and the products (i.e., reports) it needs from a MIS.

The article classifies decisions into structured, unstructured and partially structured. "The process of making a completely structured decision is algorithmic (logical, quantitative, unequivocal, entirely defined). All of the alternatives and the consequences of their implementation are known and quantitatively defined . . . The process of making an unstructured decision is heuristic . . . We must resort to hypotheses, intuition, evaluations, educational processes, experience and such. It is a decision mode under uncertainty that the alternative selected is optimal, so there is no predefined or best approach to making such a decision" (p. 78-79).

The authors then argue that a MIS can have two logically distinct components, one to support structured decision making, the other to support unstructured and semi-structured decision making. They suggest independent information systems which are separate from one another in terms of aims, structure, location, staffing, status, methods and resources but which are "confederated" to take advantage of one another's existence.

Robey, D., & Markus, M.C. Rituals in information system design.
MIS Quarterly, 1984.

The authors point out that political factors have been largely ignored in IS research with the exception of Argyris (1971) and Mason and Mitroff (1973) who "mentioned the relationships between information and power in their seminal article on IS research."

The system development life cycle goes from project inception to a feasibility study, systems analysis, systems design, specification perspective, programming, testing, training, installing, and operating.

The authors see that political perspectives underlying the seemingly rational motivations for systems design. They note that a political perspective would not imply that user involvement techniques such as steering committees, informational analysis requirements, prototyping, or behavioral approaches, are inappropriate. Rather, that there may be underlying differences in the motivations of various actors and the opportunities which system development offers them may be either to their advantage or disadvantage.

Schewe, C.D., & Weik, J.L. Guide to MIS user satisfaction. Journal of Systems Management, June 1977, 6-10.*

The authors propose a marketing approach to the design and implementation of management information systems. This approach includes: 1) Market delineation - determine potential users and their characteristics; 2) Purchase motivation - assessment of factors influencing purchasing behavior; 3) Product adjustment - matching product to market; 4) Physical distribution - movement of information products; 5) Communications - creation of favorable selling climate through communication with potential/current users; 6) Transaction - the encouraging of system usage after purchase; 7) Post-transaction - feedback for effective marketing.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Srinivasan, A., & Kaiser, K.M. Information deficiency: Implication for information systems design. Proceedings of the International Conference on Information Systems, 198, 77-88.

This article is not of much direct use to educators. However, it introduces an interesting notion - that of Information Deficiency - as a way of focusing on users' information needs. The gap between the need strength and the user-perceived degree of availability of a particular information category is termed Information Deficiency (ID). The authors say:

The factor determines how critical a particular information category is therefore not only dependent upon how much it is perceived as being needed by the decision maker, but also on the factor of how difficult the user perceives it is to obtain information of that particular category. The implication here is that, a particular information category may not even be a part of the elicited needs, simply because the prevailing perception of the user may be that the chances of obtaining it are very low . . ."

Sterling, T.D. Humanizing computerized information systems. The Journal of the Association for Educational Data Systems, Fall 1976, 10.*

The author points out that " . . . design strategies that account in large part for the presence of dehumanizing features in a management system . . . [include treating] . . . the recipients of the service and participants in the systems as unpaid components whose time, effort and intelligence do not appear in the cost accounting." He thus presents twenty-five guidelines for humanizing information systems. The areas dealt with by the guidelines are: 1) procedures for dealing with users; 2) procedures for dealing with expectations; 3) system action with respect to information; 4) the problem of privacy; 5) the ethics of systems design.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Swanson, E. B. Measuring user attitudes in MIS research: A review. Omega. The Institute Journal of Management Science, 1982, 10(2), 157-165.

This article attempts to define user attitudes toward MIS and seems to indicate that we don't know all the components of user attitudes toward MIS but that they are probably influenced by cognitive set, attitude toward people running the MIS; disposition to MIS kinds of information; experience with previous reports generated by MIS and previous experience with the process of using MIS.

The purpose of the paper is to review user attitude measurement in MIS research. The motivation for doing user attitude research in MIS is two-fold. First, user attitudes are assessed for the purpose of contributing to a theory of MIS development and explaining their success and failures. This is called the implementation perspective. A second purpose is to understand how users are informed by an information system. User attitudes are seen from this perspective as a dependent variable in studying the value of information systems. Attitudes, for the purpose of the paper, are defined as "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object."

The author suggests that a concept of channel disposition might be useful for further research. Channel disposition is conceived as evaluations about both the quality of the information and the quality of access. Quality of information refers to the value placed on the outputs of the information system; quality of access refers to the value placed on the process of obtaining the outputs. Thus, channel disposition is an indicator of the net utility of the information system to the user. However, it does not intended to represent the whole of an individual's attitude toward MIS.

Taggart, W.M., Jr., & Tharp, M.O. A survey of information requirements analysis techniques. Computing Surveys, 1977, 9(4), 273-290.

This article reviews a variety of approaches to the determination of information needs which has been identified as "a most critical factor" in successful MIS implementation. The review organizes the management information requirements analysis process into aspects relating to 1) development, 2) reformation (characteristics, scope, degree of sophistication), 3) decision-making (process, hierarchy, decision-maker), 4) organization (environment, subsystems, management function and level).

For each of these aspects an annotated bibliography is provided as an appendix. Although the references are by now somewhat dated, they provide an interesting range of experience in libraries, agricultural settings, energy agencies, and businesses.

Tricker, R.I. The impact of information systems on organizational thinking. IFIP '77, 213-221.*

The author explores the "interrelatedness" of information systems and the organization. He finds that organizational structure and management style affect the type of information system necessary and that, conversely, the information system available affects the organizational structure and management style. Information is defined as the process of deriving "surprise" value from data. This process is the result of the data, the use, and the organizational/environmental context. It is suggested that high value information (i.e., that derived from the creative process) is the result of the interaction between habitually incompatible frames of reference; this process can be aided by semi-confusing, incomplete, and conflicting data. Also included in his discussion are a list of important strategic issues facing management, the attributes of decisions, and a framework for analyzing information systems.

*This abstract can be found in R. Cooper and E.B. Swanson, Management information requirements assessment: An annotated bibliography. Los Angeles, CA: Center for Information Studies, University of California - Los Angeles, 1979.

Zani, W.M. Blueprint for MIS. Harvard Business Review, 1970, 48(6).

Zani was one of the first to identify the disappointing results from MIS and to trace this disappointment to the early bottom-up data-driven approach to MIS development. He argues for a top-down approach to MIS design that focuses on decisions to be made within the organization and on providing managers with the information needed to make those decisions.

Zani offers his approach as "an ideal, not a recipe." It is an orientation to planning MIS rather than a procedure. He suggests that different organizations will follow different procedures to accomplish the top-down approach.

He does offer a series of questions that can be asked to help isolate specific information requirements to support decisions.

JOURNALS

MIS Quarterly

A quarterly journal. Published jointly by The Society for Management Information Systems and The Management Information Systems Research Center, Graduate School of Business Administration, University of Minnesota.

This is one journal targeted toward both the researcher and practitioner. Most issues of the journal include articles related to "application"; another group is related to "theory and research."

Harvard Business Review

Published bimonthly by the Graduate School of Business Administration, Harvard University.

It is targeted toward professional managers with articles from academics and professionals. It covers a wide range of timely management topics, including MIS, by well-known authors. At the beginning of each issue is a section with summaries of articles.

Management Science

Published monthly by the Institute of Management Sciences.

Issues of this journal tend to alternate focus: one month on theory, the next month on application. The articles are primarily research-oriented and have abstracts and extensive reference lists.

Sloan Management Review

Published three times each academic year by the Alfred P. Sloan School of Management, Massachusetts Institute of Technology.

This journal is oriented to top-level practitioners. It covers a broad range of management topics and frequently features articles by well-known authors in the MIS field. Articles are prefaced by an introduction from the editor.

Communications of the ACM

Published monthly by the Association for Computing Machinery.

Articles tend to be oriented toward technical questions rather than management. The journal appears to be very highly regarded by researchers and includes abstracts and reference lists accompanying articles.

Glossary[†]LESSONS FOR EDUCATORS FROM THE
MANAGEMENT INFORMATION LITERATURE

- Analog model** A physical model that acts but does not necessarily look like the real-world object it represents.
- ASCII** American Standard Code for Information Interchange.
- Bottom-up** An approach to IS design that starts with data that is already in the IS or is readily available for storage in the IS. This is contrasted with a top-down or decision-driven approach.
- Central processing unit (CPU)** The hardware component of a computer, consisting of the controller, the arithmetic and logic unit, and internal storage, that executes programs and manipulates data.
- *Choice** In the decision-making process: the selection of the best alternative solution to a problem.
- *Certainty** A decision-making environment in which the outcomes of future events are known.
- Code** The programming language into which information is transformed in order to be processed by the computer.
- CPU** Central Processing Unit
- Critical path** The sequence of activities, as shown on a PERT or Critical Path Method (CPM) network, along which any delay will cause a delay in the completion of the project.
- CRT** Cathode ray tube. An electronic tube (just like a television picture tube) used to display computer output. Also called "monitor."
- Critical Success Factors (CSF)** "the few key areas where 'things must go right' for the business to flourish" Rockert, 19).

[†]Most of the terms in this glossary are in common parlance and are composites or are paraphrased from text. Where there is wide variation among definitions in the field, we have usually included a citation.

*These entries were excerpted from the "Glossary of Terms" in Kroeber, Management Information Systems: A Handbook for Modern Managers, 1982.

- Data** In an MIS or data processing context: unprocessed information; the input to an information-processing system.
- Data analysis** The use of a terminal or other on-line input/output device to perform mathematical or statistical analyses of data stored in a data base or master file.
- Data Analysis Approach** A way of determining information requirements by focusing on the flow of information in the organization.
- Data base** Collection of computer-based and non-computer-based files and records supporting the information system.
- Data base management system (DBMS)** A software or software/hardware combination that maintains data in direct access storage devices and makes them available to application programs or management queries. Data Base Management Systems enable managers and other non-programming users to work directly with the data base system. DBMS software packages allow non-programming users selective access to files and aid in the presentation of reports and in the gathering of statistics. No knowledge of computer programming is necessary to use a DBMS.
- Data element** The smallest unit of data that can stand alone and convey information.
- Data file** A collection of related data records.
- Data gathering** A function which "converts primary sensations of the real world into data" (Mason & Swanson, 1979). Includes processes such as sensing, observing, rendering.
- Data processing (DP)** The manipulation of data by a computer to support the recordkeeping and report generation activities in an organization.
- *Data record** A collection of related data elements.
- Debugging** Finding and correcting errors in computer programs. During the implementation phase, getting rid of technical errors and problems.
- Decision Support Systems (DSS)** Refers to information systems designed to give support to unstructured and semi-structured decisions made by top management in connection with their need to do strategic planning or management control.
- *Decision tree** A branching diagram of the payoffs and probabilities in a decision situation. Decision trees are particularly useful to analyze multistage decisions.

- *Detail reports** Reports that include information on all transactions within the subject matter covered by the report.
- *Distributed system** A system of electronically linked computers. A star system uses a large, central computer while a ring system consists only of distributed computers.
- *DOS** Disk Operating System. Made up of programs that keep track of files, save and retrieve them, and do other organizing tasks.
- *DP** Data Processing
- End User** Person who uses the computer program to perform job functions, as opposed to the designer, programmer.
- Interim reports** Reports that give only information that falls within certain management-defined parameters.
- Exception Reports** Reports that list only information that falls outside of certain management-defined parameters.
- Feasibility study** A study to determine if a major endeavor, such as developing a new MIS, is economically, technically, and behaviorally feasible.
- Feedback** Output of a system that is used to keep the system under control.
- Hardware** The physical components of a computer, such as input devices, the central processing unit (CPU), and output devices.
- Heuristic programming** The simulation of human judgment within a computer program.
- *Immediate conversion** A technique in which the new system replaces the old system in one sweeping change without phasing or parallel operations.
- Information analyst** A systems analyst who helps functional users identify information needs and use the MIS to satisfy those needs.
- Information Services Planning** A name sometimes given to the process of understanding the environment and developing an action plan to get the system designed.
- Information Overload** Often used to refer to situations in which MIS is used to provide managers with more information than they can make sense of.
- Interactive Systems** User can program the system as well as use existing programs.

- Interface** The contact point between the information system and the user; if the interface is two-way, the user both receives output and furnishes input.
- *Inquiry processing** The use of a terminal or other on-line input/output device to obtain limited information from a data base or master file.
- I/O** Input/output.
- IS** Information System
- Life Cycle** (Also MIS Life Cycle) stages in the development of a MIS. Stages can vary but often include: information need; planning; development; implementation; operation; control.
- Mainframe** A large computer capable of handling many peripherals and/or satellite computers.
- Management audit** A postinstallation check to determine whether or not an MIS is satisfying the information needs of management.
- Management Information System (MIS)** Definitions vary within the field. Refers to an organized set of processes that provides information to managers at all levels to support the operations and decision making within an organization ().
- Microcomputer** A very small (hand-held or desk-top) computer. Sometimes called a "personal computer."
- Minicomputer** A small-to-intermediate sized computer, often with capabilities that exceed those of all but the largest computers of ten years ago.
- Model** An abstraction of reality used when the real-world situation represented is too complex, too costly, or too time-consuming for experimentation.
- Modem** An acronym for modulator-demodulator, a data communications device that converts digital data into an analog, such as a modulated sound signal, and back again. Commonly used for computers to "talk" to one another over telephone lines.
- Multi-processing** A timesharing technique in which two or more programs are executed simultaneously. Multiprocessing is a hardware feature.

***Multiprogramming** A timesharing technique in which programs are executed while the CPU is idle with respect to other programs. Multiprogramming is achieved through systems software.

OA Office Automation

Paperless Office where records and information are kept and transmitted electronically

***Parallel conversion** A technique in which the old or manual system continues to operate for a few cycles as a check on the accuracy of the new system.

Performance evaluation and review technique (PERT) A network analysis technique used in project management. PERT is particularly helpful in complex, long-range projects such as MIS development.

***Performance monitor** A means, either using software or hardware, of measuring the efficiency of a computer in processing the application programs of an MIS.

***Phase-in conversion** A technique in which one program or application at a time is introduced until the old or manual system is eventually replaced with the new system.

***Pilot conversion** A technique in which the new system is implemented in a limited fashion - in one plant or in one product line - until it can be determined that the system works and can be implemented organization-wide.

***Programmable decision** A decision that can be reached by following certain rules that lead to unambiguous results; routine decisions involving quantitative inputs and computational processes. Also called a Structured Decision.

***Query language (QL)** The data base management system language employed by users at terminals to make inquiries or perform data analyses on data in the data base.

***RAM** Random Access Memory Stores programs, data, etc., while computer is being used. When you turn off the computer, you lose what is in RAM unless it has been saved.

Real-time processing The updating of a master file or data base with transaction data in time for feedback to influence the outcome of the transaction; extremely rapid transactional processing.

Reports One kind of system output which can be performance, progress, future-oriented, requested, routine; exception; detailed; interim.

- Requirements Analysis** this can be viewed either as a decision process active over the entire life cycle of a management information system (Cooper & Swann, 1949), or as a set of techniques which gather information prior to one MIS design phase
- Resistance** Reluctance of users to use the information system
- *Risk** A decision-making environment in which the outcomes of future events are not known, but probabilities can be assigned to those outcomes.
- ROM** Read Only Memory Built into the computer. It contains all the information the CPU needs to get started. Often computers come with BASIC stored in ROM. ROM stays in the computer even when it is turned off.
- *Scheduled reports** Reports that are produced at regular intervals - daily, weekly, etc.
- *Sequential file** A file in which records are stored in alphabetical or numerical sequence.
- *Serial file** A file in which records, usually transactions, are stored in the order in which they occurred or were recorded.
- Software** The symbolic component of a computer system, to include the operating system, the data base management system, compilers and application programs.
- *Special reports** Reports for which application software does not exist when the report is requested and must be specially prepared before the report can be produced.
- Success Indicators** Need to specify these prior to evaluation of an IS
- *Summary reports** Reports that use summary measures, such as the mean, the range, or the standard deviation, to describe data in less volume than detail reports.
- Syntax error** A programming error that violates one or more rule of the programming language and may prevent the program from being executed.
- System** A set of interrelated parts that work together to accomplish some goal or objective.
- Systems analysis** The analytical process of determining information needs in an organization and describing an information system to satisfy those needs.
- Systems designer** A systems analyst who describes, with flowcharts and other techniques, the programs that will produce information needed by managers.

- Systems programmer** One who prepares, frequently in machine language, operating systems, compilers, data base management systems, and other systems software.
- Terminal** An on-line input/output device, usually with keyboard entry and cathode ray tube (CRT) or typewriter output; a flow-charting symbol for the beginning or end of a program sequence.
- Timesharing** The use of a computer system by several users simultaneously.
- Transactional processing** The preparation, editing, sorting, classifying, sorting, retrieving, and limited calculating of data for recordkeeping, report generation, and input to managerial activities.
- Trend analysis** A statistical prediction technique based on past performance of the predicted variable.
- Top-down** An approach to IS design that starts with the objectives and/or information needs of either managers or of the organization. The focus is on the decisions to be made or purposes to be served. It is usually contrasted with a "Bottom-up" approach which implies that the system starts with existing data or builds upon systems currently in use.
- *Uncertainty** A decision-making environment in which the outcomes of future events are not known nor can probabilities be assigned to outcomes.
- *Unscheduled reports** Reports that can be produced with existing application programs but are not unless specifically requested. Also called demand or on-call reports.
- User-friendly** Can refer to either hardware or software designed so a person with non-technical background can operate the computer system with relative ease.
- User-oriented** Systems which are designed to be responsive to the needs of those who use the system.
- Verification** The process by which data are checked for accuracy; in card input, the keying of data into a verifier for comparison to data already punched into the card.

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SECTION 2

THE INSTRUCTIONAL INFORMATION SYSTEMS NETWORK

Progress Report

Attachments

- A. Steering Committee Materials
- B. Initial Mailing to Prospective Members
- C. Newsletters, Vol.1, Nos. 1 and 2, and
Directory of IIS Members

Progress Report

November 1984

The Instructional Information Systems (IIS) Network is a growing group of over 100 educators interested in a variety of topics related to instructional information systems. The Network includes those involved with testing, evaluation, curriculum, administration, computers, and data processing. The group has a steering committee, has had a mini-conference, has put out two newsletters, and plans exchange site visits.

Development

A chronological history of the Network would reveal its antecedents in CSE's 1975 nation-wide survey of the work of district research and evaluation offices. This survey revealed a high level of activity in test administration and scoring, and a high level of reporting out to funding and regulatory agencies. Concomitantly, there appeared to be low levels of 1) existing R&D office activity on test sub-score analysis, or combining of such data sets with other existing data sets (such as evaluation or attendance), 2) an explosion of interest in technology for classroom instruction, for administrative services (e.g., payroll, accounting) and 3) a growing awareness of the need for data for instructional decision making.

Following the survey, we completed case studies in districts which were, in some way, using test or survey data for internal decision making (Bank & Williams, 1980). Further intensive examination of the impact of linkage systems in districts (Williams & Bank, [1984a]) led to the formulation of several models of such district systems using management information system terminology (Williams & Bank, [1984b]).

As we worked in our "heroic" case study districts, we had become aware that district administrators did not conceptualize what they were creating as coordinated subsystems. However, when we viewed what they were doing from an open-systems perspective, they were indeed creating an information subsystem which had identifiable characteristics.

We organized a UCLA Dean's Forum in the Fall of 1983, to express this view, and scheduled two districts' representatives to speak with approximately 80 superintendents about their testing-evaluation-instructional linkages. At this event, the desire was expressed to create a network of people interested in initiating, developing and maintaining instructional information systems.

Activities

Our next step, then, was to create a low profile, non-time-intensive format by which people could access one another when and for as long as they wished.

In this particular area of educational change - that is, the creation of instructional information systems - practice seems to be leading research. Change is partly a result of technology push with the increasing availability of computer hardware and software. Research is needed to document the push, and, perhaps, to guide it. However, what practitioners, each of whom sees only a piece of the situation, seem to want at the present time is "low energy access to trusted information" (Miles & Lake, 1975). That is, they want a network which, without taking too much time, permits them to use peers as well as academics to answer immediate problems of pressing concern and to lay out more long range issues.

A six-person steering committee met in February 1984 to explore the feasibility of forming such a network and to plan an initial set of

activities (See Attachment A). They were asked to express their preferences for a possible set of Network activities that included: Brokerage/referral; technical assistance/training; information exchange; research-development; evaluation and replanning. They were also asked to describe what their districts/agencies did.

From the discussion emerged the idea of a mailing to identify network members. This mailing included a Status Survey, an Interest Survey, and a note about CSE work (see Attachment B). Fifty-seven percent of the 61 districts responded and indicated high levels of interest in a newsletter, collections of exemplary materials, tips/techniques/tools, working conferences, exchange visits. Substantively, our respondents were interested in matching tests/texts and objectives; with information about hardware/software; with a taxonomy of policy, administrative, and instructional questions to ask of the data.

In June 1984, a mini-conference was held where six presentations were made by participants on various topics of interest to other participants. Task groups were formed to address questions such as "What do you do now with your existing data base?" "What would you like to know from your data base?" "What are some typical questions you are now asked that you cannot answer?"

Two Newsletters have been distributed along with a Directory of IIS Networkers on which are more than 100 names (see Attachment C).

As can be seen from the second Newsletter, site visits are being planned for those interested in particular aspects of information systems.

Accomplishments

Accomplishments clearly depend on the view as seen from where one sits. From the perspective of Network members, we have anecdotal evidence that the Network has:

1. introduced to them the idea of information systems. Information systems as a concept is new to most district and school personnel. While schools and district offices collect data, analyze data, produce reports, and make decisions, these activities are not conceptualized as if they were part of a system. While individuals performing these various tasks may relate to and communicate with one another during the course of their work, they have not, up to now in most districts, thought of themselves as parts of an interlocking, coordinated system.
2. introduced them to one another. Individuals within the Network have been in phone contact with one another. In addition, a group of district administrators has met to discuss an issue of common concern - how to educate the media to a proper and balanced interpretation of test scores.
3. introduced them to CSE's work and the work of other labs and centers. Although some knew of the existence of UCLA's Graduate School of Education, and some may even had had contact with the Center, most were not aware of the array of research conducted at CSE. Nor did they know of the variety of skills and talents, and the technical reports and publications available from CSE. The Network, both through the mini-conference and through the

Newsletters, is publicizing the work of colleagues at other labs and centers which relates to this area of interest.

From our own perspective within the Management of Instructional Information Systems Project, we have experiential evidence that the Network has:

1. sensitized us to the nature of the work currently being done in districts, helped us to convert our ideas into language familiar to those working in the area of testing/evaluation/instruction/data processing, and given us criteria by which we might prioritize our work in accordance with the needs of the field.
2. provided us with a valued set of colleagues to whom we can go with questions/issues/problems/etc.
3. provided a forum in which colleagues in other CSE projects can present their work for discussion and comment.

Action/Research Issues

The following is a list of issues and related concerns which have surfaced in the mini-conference and have been contributed to by our own and other projects' previous and current work in districts. (They are neither exhaustive nor yet stated in a form ideal for creating a research agenda.

The nature of the "information" to be inputted into an IIS.)

Comment: The real issue for us is that we have too much information. How can we digest it to get a better idea of where a child is at?

Comment: We've got a lot of stuff in boxes and file cabinets. What, of all of it, is important to computerize?

- Comment: Could we find out about kids': academic self-concept, amount of time they work after school; what extra-curricular activities they engage in; their self-report on time spent on coursework; who is at home to help with homework; personal problems?
- Comment: We'd like to know how many of our kids go to college; how many have decided on vocational choices; what they're like several years from now.
- Comment: "Who's going to do the work to get what's in our files into the computer? We don't have enough clerical time as it is."

The uses of the "information" from an IIS.

- Comment: Politics is the main factor entering into school board decisions. How would an information system help us on, for example, school closings?
- Comment: We've been trying to develop a system by which the district can supervise principals so they, in turn, can supervise teachers, so that kids' scores go up. How could an information system be useful here?
- Comment: An IIS could print out reports that could show the press, realtors, new parents, what the school was like and what the kids were achieving.
- Comment: Maybe you could use such a system to identify kids in a secondary school who were weak in certain subjects and have the objectives of classes be turned into this. Or kids who were high achievers.
- Comment: What's happened to privacy?
- Comment: Data can be an embarrassment, maybe even a source for law suits.
- Comment: Is more data an improvement over informal judgments of teachers? Do we know enough, for example, to match teacher style to student learning style? To understand the effect of home environment?
- Comment: Can we learn what the causal factors are that account for a kid's growth or behavior?

Attachment A. Steering Committee Materials

NETWORKING

Carol Thomas

Center for the Study of Evaluation

When people try to solve problems in education, they naturally search for other people who are devoted to the same purpose. Networking is a term that has been applied to the search to create new channels which link people who can share information in support of school improvement. This paper poses a number of questions about networks and provides brief answers to them.

1. What is a Network?

There are various kinds of networks, but a key notion is the inter-relatedness of parts. Miles (1978) defined network in the most abstract as simply a set of nodes or points (in social networks, the nodes are persons, groups or organizations) connected by lines or links. Combining key ingredients of networks he examined, Parker (1979) defined networking as a strategy that facilitates the sharing of information and psychological support among independent innovators and problem solvers who link together voluntarily as equals seeking assistance not provided by established systems. Taking networks for educational improvement as a whole, their function is to foster the sharing of information and inspiration among independent educators in their local problem-solving efforts and to assist in the development, adaptation or adoption of new programs, products and practices. A key factor in networking is that its purpose elicits commitment and a sense of community. Miles and Lake (1975) see the prime strength of informal social networks in their capacity to provide members "low energy access to trusted information." House (1974) asserts that the flow of personal communication is the key to innovation. Deliberately stimulated interactions among innovators and problem solvers in some networks remain informal and minimally organized, while in some networks the participants develop names for the networks and some formal operating procedures.

2. What Are the Essential Components of a Network?

Parker (1971, 1979) suggested that to be successful, interactive networks must include at least these five components: 1) a problem-oriented goal with facilitating objectives; 2) voluntary participants concerned with the goal; 3) an information exchange or clearinghouse; 4) a facilitating staff; 5) temporary cooperative projects. In addition, Parker and other researchers have found the following traits common to networks:

- ° a situation of limited resources
- ° a sense of being an alternative to established systems
- ° a feeling of shared purpose
- ° a mixture of information sharing and psychological support
- ° a person functioning as an effective facilitator
- ° an emphasis on voluntary participation and equal treatment
- ° a sense of community
- ° a beginning with individual's self-interest

Potential participants will likely be interested not in the process of networking, but primarily in the network, as an instrument for achieving their own objectives. This implies that the goal of the network must be oriented to the felt problems of participants. The goal must be an umbrella under which people with overlapping, complementary, and sometimes conflicting objectives can gather.

3. What is the Role of the Network Facilitator?

All successful networks have one or more participants who consciously facilitate the sharing of information. In many networks, these coordinators were also the founders of the network. A major operational challenge facing network facilitators is the arrangement of opportunities for face-to-face interactions. Since participants in a network have similar goals, the open sharing of information is likely to lead to an awareness of situations in which teaming could result in benefits for everyone involved. The facilitator is responsible for monitoring and attempting to maintain the balance between give and take among participants, therefore a facilitator's sensitivity to other people is an important characteristic. Network facilitators are likely to have disproportionate influence due to their knowledge of the network as a whole and to the special facilitating skills they develop. If network coordinators begin to use their position in a manner which threatens the equal treatment of network participants, however, the future of the network is endangered. In summary, an effective network coordinator has

- commitment to the network's purpose
- ability to get along well with diverse people
- a good sense of whom to link with whom
- a tendency to downplay his/her own expertise
- ability to persuade participants to interact
- a sense of when to be directive and when to be non-directive

4. What are Typical Activities of Networks?

- Brokerage or referral
Examples: newsletters, handbooks, directories or catalogues, materials collections
- Technical assistance/training
Examples: process consultation, workshops, seminars
- Facilitation of information/insight exchange
Examples: journals containing articles by members, conferences, joint problem-solving sessions, personal/visit exchanges among members
- Research and development
Examples: policy analysis, case studies of members' work, studies on special problems/issues, systematic development of innovations

- Political action
Examples: lobbying, building constituencies
- Evaluation and re-planning
Examples: surveys for needs/resources identification, meetings, self-study

5. What are the Factors That May Limit a Network's Effectiveness?

The following factors have been cited in the literature as barriers to effective networking:

- failure of the network to meet members' self-interest
- serious ambiguity or differences of opinion regarding definitions, intents, division of labor, nature of needs, etc.
- lack of follow-through and demonstrated commitment by members
- problems of turfdom, agency imperialism and competitiveness
- tendency to be overly ambitious or underestimate the time and careful planning required
- inability or unwillingness of members to participate in decision making that affects the network
- over-emphasis on money, formality, and visibility

Name: _____
 Agency: _____
 Position: _____

NETWORK ISSUES

1. Listed below are some typical network activities. For each activity, rate the degree of importance for including the activity in this network. Then indicate the top priority activities for your organization.

Typical Network Activities	Very Important	Somewhat Important	Not at all Important	Top Priority
<u>Brokerage/Referral</u>				
toll free phone line	[]	[]	[]	[]
newsletters	[]	[]	[]	[]
directories	[]	[]	[]	[]
catalogues	[]	[]	[]	[]
referral by mail	[]	[]	[]	[]
materials collections	[]	[]	[]	[]
<u>Technical/Assistance Training</u>				
long-term consultation	[]	[]	[]	[]
workshops	[]	[]	[]	[]
seminars/study groups	[]	[]	[]	[]
<u>Information Exchange</u>				
co-author journal articles	[]	[]	[]	[]
conferences	[]	[]	[]	[]
joint problem-solving sessions/task forces	[]	[]	[]	[]
personnel exchange	[]	[]	[]	[]
exchange of visits among members	[]	[]	[]	[]
trouble shooting	[]	[]	[]	[]
<u>Research and Development</u>				
case studies of members' work	[]	[]	[]	[]
studies of special issues, e.g., policy/management/procedures	[]	[]	[]	[]
development of products and practices	[]	[]	[]	[]
<u>Evaluation and Re-planning</u>				
surveys for needs/resources identification	[]	[]	[]	[]

(OVER)

2. What would you/your agency like from the network?

3. What could you/your agency contribute to the network?

Name: _____

Agency: _____

Position: _____

INSTRUCTIONAL INFORMATION SYSTEMS ISSUES

Instructional Information System Components	Your Organization's Current Situation	Important Issues for Your Organization
<u>Users</u> (e.g., assessment of user needs; specified decision focus; delivery processes/reporting of data to users)		
<u>Inputs</u> (e.g., What data is in the system; instrumentation; what analysis is done?)		
<u>Outputs</u> (e.g., how, when and by whom is the system accessed?)		
<u>Supports</u> (e.g., supports for information-based decisions; coordination; role of evaluation office; role of staff development)		
<u>Facilities</u> (e.g., hardware; software)		

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Attachment B. Initial Mailing to Prospective Members

INSTRUCTIONAL INFORMATION SYSTEM NETWORK
INTEREST SURVEY

Are you interested in being involved in an Instructional Information System Network?

YES

MAYBE, depending on _____

What would you like to see an Instructional Information System Network do? (Please check all items that interest you; double-check the three most important. Add others.)

Information Exchange

- toll-free phone line
- newsletter
- special interest telephone directories
- resource catalogues
- collections of exemplary materials
- tips/techniques/tools
- seminars
- working conferences

Technical Assistance/Training

- workshops
- personnel exchange
- hot-line trouble shooting
- long-term consultation
- exchange of visits among members

Research and Development

- case studies of members' work
- issues papers
- development of guides or manuals
- co-authored journal articles
- co-authored professional association articles

Other (list)

Name

School/District/Agency

Your Position

Address

Phone

INSTRUCTIONAL INFORMATION SYSTEM NETWORK
STATUS SURVEY

From this brief survey, we anticipate developing a listing of what interested individuals and their organizations (that is, schools, districts, intermediate agencies, etc.) do in the area of instructional information systems.

Would you be willing to have your name included on such a list along with a brief description of your organization's activities? YES NO

Would you like to receive from us a directory of people interested in a network with a brief description of their activities? YES NO

In our organization, we now . . .
(check all that apply)

We'd like to get more information about
how to . . . (check all that apply;
double-check the three most important)

- 1. administer norm-referenced tests
- 2. administer criterion-referenced tests
- 3. collect non-achievement data (surveys of attitudes,
school climate, etc.)
- 4. have a data base that includes student ID, test information,
and non-achievement data
- 5. know how our tests match our curriculum and our text books . . .
- 6. have a planning cycle that feeds data into instructional
decision making
- 7. have a way to use data for policy purposes
- 8. have a taxonomy of questions to ask of the data
- 9. provide different information to different users
(teachers, principals, parents, board)
- 10. have a delivery system for reporting data to different
groups of users
- 11. provide staff and board orientation to data interpretation . . .
- 12. coordinate the management of evaluation, staff development,
and instruction
- 13. computer analyze our data
- 14. use customized software for data analysis
- 15. use commercial software for data analysis
- 16. have administrator-used hardware/software at school sites . . .
- 17. have district computer facilities with terminals at local sites
- 18. have district-school computer facility
- 19. provide training in administrative computer use for
teachers and administrators
- 20. have policies regarding access and confidentiality of data . .

Name _____ School/District/Agency _____ Your Position _____

Address _____ Phone _____



Attachment C. Newsletters, Vol. 1, Nos. 1 and 2, and
Directory of 115 Members

A NEWSLETTER ABOUT INSTRUCTIONAL INFORMATION SYSTEMS*

NETWORK NEWS

- ° Welcome to the new IIS Network. Many of you from districts and other education agencies responded positively to our CSE survey and indicated that you were interested in being involved in an instructional information system (IIS) network. A listing of those individuals and agencies is enclosed with a brief overview of the survey results.

* * * *

- ° Network Newsletter - Most respondents were interested in having a newsletter to share information about their activities. With your help, CSE staff will take the responsibility to produce and mail a quarterly newsletter (nothing fancy!) during 1984-85. In order for the newsletter to reflect networkers' interests and activities, we need you to submit items in categories such as **NEWS**, **GOOD IDEAS** (programs or projects that your agency is proud of), **HELP WANTED** (issues or questions you would like to discuss with others), **RESOURCES** (items about papers, materials, guides), and **NOTEWORTHIES** (personnel news, conferences scheduled, expertise to share). So when you have information, materials, ideas, projects, etc., to publicize, please call Adrienne Bank, CSE, (213) 206-1526.

* * * *

June Mini-Conference - To kick off the network, CSE is planning a one-day conference for June 20, 1984, at UCLA from 9:00 a.m. - 3:00 p.m. At this conference there will be:

- Raggedy Beginnings - opportunities for networkers to network about interests/activities
- An Hour of Overload - six 10-minute high-interest presentations packed into an hour (time afterwards for discussion)
- Trivial and Not-So-Trivial Pursuits - small group sessions: raising questions for and about question-driven instructional information systems
- Arrangements and Next Steps - expectations/joint projects and papers/newsletter, etc.

Either bring your lunch or you can order from the sandwich bar. We'll provide drinks and nibbles. Free parking will be arranged.

For further details and directions read last page. Please call in or mail back the RSVP form by June 17th if you are coming.

GOOD IDEAS

- Academic Achievement Awards - The OXNARD Elementary School District has developed an effective academic awards program to provide recognition to achieving students. For information about this program, please contact Dr. Fernando Elizondo, Oxnard Elementary School District, 831 South B Street, Oxnard, CA 93030, (805) 487-3918.
- High School Entrance Exam - NEWPORT-MESA has identified several proficiencies that all eighth grade students must master before entering high school. Those who have not passed an "entrance examination" on these proficiencies can attend a special summer school program. This plan has received wide-spread interest and support throughout Orange County. For more information contact Dr. Dale Wooley, Director of Research and Student Services, Newport-Mesa USD (714) 760-3295.
- Social Studies CRT's - NEWPORT-MESA has for many years been a leader in developing a system-wide competency-based testing program. They recently completed a competency test for social studies which is being used for high school entrance and graduation purposes. For more information contact Dr. Dale Wooley, Director of Research and Student Services, Newport-Mesa USD (714) 760-3295.
- Curriculum Cluster Analysis - SAN DIEGO USD has developed a system for clustering NRT results around curricular problems. For example, language arts items having to do specifically with capitalization or punctuation are clustered for each school site. This allows each school to target instructional activities towards improving specific, identified problem areas. The principals and teachers have responded very favorably toward this practice. For more information contact Dr. Grant Behnke, Associate Director, Evaluation Dept., San Diego USD (619) 293-8509.
- School-Site Data Histories - SAN DIEGO USD's Evaluation Department has developed a comprehensive test reporting system that displays test data and other data for each school using histograms and other visual techniques. These data are indexed and cross-referenced in notebooks that are prepared for each school site. Data can be accumulated from year to year. These notebooks then contain a "data history" for each school site. For more information contact Dr. Grant Behnke, Associate Director, Evaluation Dept., San Diego USD (619) 293-8509.

- Test/Teaching Alignment - NORWALK-LAMIRADA USD has a matrix showing the relationships among the CAP, CAT, district proficiency tests and district skills continua. Teachers use this to identify those skills which are tested but not taught. For more information, contact Dr. Betty Coogan, Assistant Superintendent, Norwalk-LaMirada USD (213) 868-0431.
- Improving SAT Scores - ANAHEIM UNION High School District is developing teacher-designed SAT test-taking materials for both students and teachers to be used in high school English classes. SAT scores have improved dramatically. For more information, contact Dr. James Cox, Director, Research & Evaluation, Anaheim Union HSD (714) 999-3558.

* * * *

HELP WANTED

- Anyone have good data display techniques?
 - POMONA Unified School District is interested in how other districts are providing/displaying data (particularly longitudinal data) to various groups. They would like to see examples of charts, graphs, or just effective, clear writing, and talk to others interested in this problem. Please contact Mike Hartman, Director of Program Assessment, Pomona Unified School District, 800 South Garey Avenue, Pomona, CA 91766, (714) 623-5251, ext. 404.
- What are you doing about effective schools?
 - OXNARD Elementary School District is focusing on variables that the literature says increase school effectiveness, particularly school climate, high expectations, and frequent monitoring of student achievement. They are developing training for administrators. They are interested in identifying ways to measure the effectiveness of frequent monitoring of student achievement, and in how one can translate "high expectations" into an inservice program, e.g., what are the skills and competencies one needs in order to bring about high expectations. Please contact John Marshall, Assistant Superintendent, Educational Services, Oxnard Elementary School District, 831 South B Street, Oxnard, CA 93030, (805) 487-3918.
- Software for teachers and principals?
 - NEWPORT-MESA USD has received a grant to develop software for training teachers to use microprocessors. They are interested in current practices regarding how principals use microprocessors for school-based instructional management. Anyone with information about this should contact Dile Wooley, Director of Research and Student Services, Newport-Mesa USD (714) 760-3295.

* * * *

RESOURCES

- District Policy on Microcomputers - Schools are acquiring microcomputers at a phenomenal rate. There is great variation, however, in the ways these computers are used and the district office's role in introducing computers into the schooling system. Adrienne Bank, Richard C. Williams and Carol Thomas of CSE have written a paper that highlights some topics with which all districts must eventually cope: hardware and software acquisition, management systems, curricular and staff development programs and instructional methods. The authors propose a contingency approach that suggests that districts' planning be ongoing, incremental, adaptive, and self-correcting. Four components of a contingency approach are discussed: 1) conducting a situation audit of external and internal environments; 2) generating support; 3) formulating district-wide policy; and 4) developing an ongoing operational plan. Anyone interested in a copy of this paper, please contact Katharine Fry - CSE, 145 Moore Hall, UCLA, Los Angeles, 90024, (213) 206-1536.

- Various Perspectives on Information Systems - A number of CSE papers were presented at the 1984 meeting of AERA which approached the topic of information systems from various perspectives. Among them:

Bank, A.	What's In A Name? Defining District Information Systems
Burstein, L.	Information Use in Local School Improvement: A Multi-level Perspective
Sirotnik, K.	Using Versus Being Used by School Information Systems
Williams, R.	Relating Instructional Information Systems to School District Decision-Making Structures

Anyone interested in obtaining copies should contact Katharine Fry, CSE, 145 Moore Hall, UCLA, Los Angeles, 90024, (213) 206-1536.

* * * *

NOTEWORTHIES

- IDEA Fellow Program - John Marshall, OXNARD School District, has been selected to attend the IDEA Fellow Program, sponsored by the Kettering Foundation, to be held in Denver, July 7-13, 1984. This program bring selected administrators together to share common projects and problems. John is interested in bringing instructional information systems issues to the meeting. If anyone has specific concerns they want to discuss with John prior to the meeting, call him at (805) 487-3916.

- ° Ripple effects - As a result of CSE's October 1983 Dean's Forum on Linking Testing, Evaluation and Instruction, Jim Cox (ANAHEIM UNION High School District), Lois Blackmore (GARDEN GROVE), Bob Ryan (SANTA ANA), Joellen Crawford (PLACENTIA), Don Hays (FULLERTON) and Tom Martin (ABC) have been having agenda-less meetings every six weeks or so. Last time they met with education writers of local papers to discuss reporting of CAP scores. "We didn't try to resolve anything - just make contact." Jim said it paid off later when a reporter called to ask for his opinion.

- ° Management of Instructional Information Systems project at CSE, in addition to facilitating this IIS Network will be developing a paper on lessons for educators from the Management Information Systems field, will be developing a taxonomy of questions which policy-making administrators and teachers can use to address data in IISs, and will be making presentations around the state. CSE also has a number of other projects touching on information systems, particularly the Systemic Evaluation project directed by Leigh Burstein and Ken Sirotnik. For further information about all this, call Adrienne Bank (213) 206-1526 or Dick Williams (213) 206-6639.

* * * *

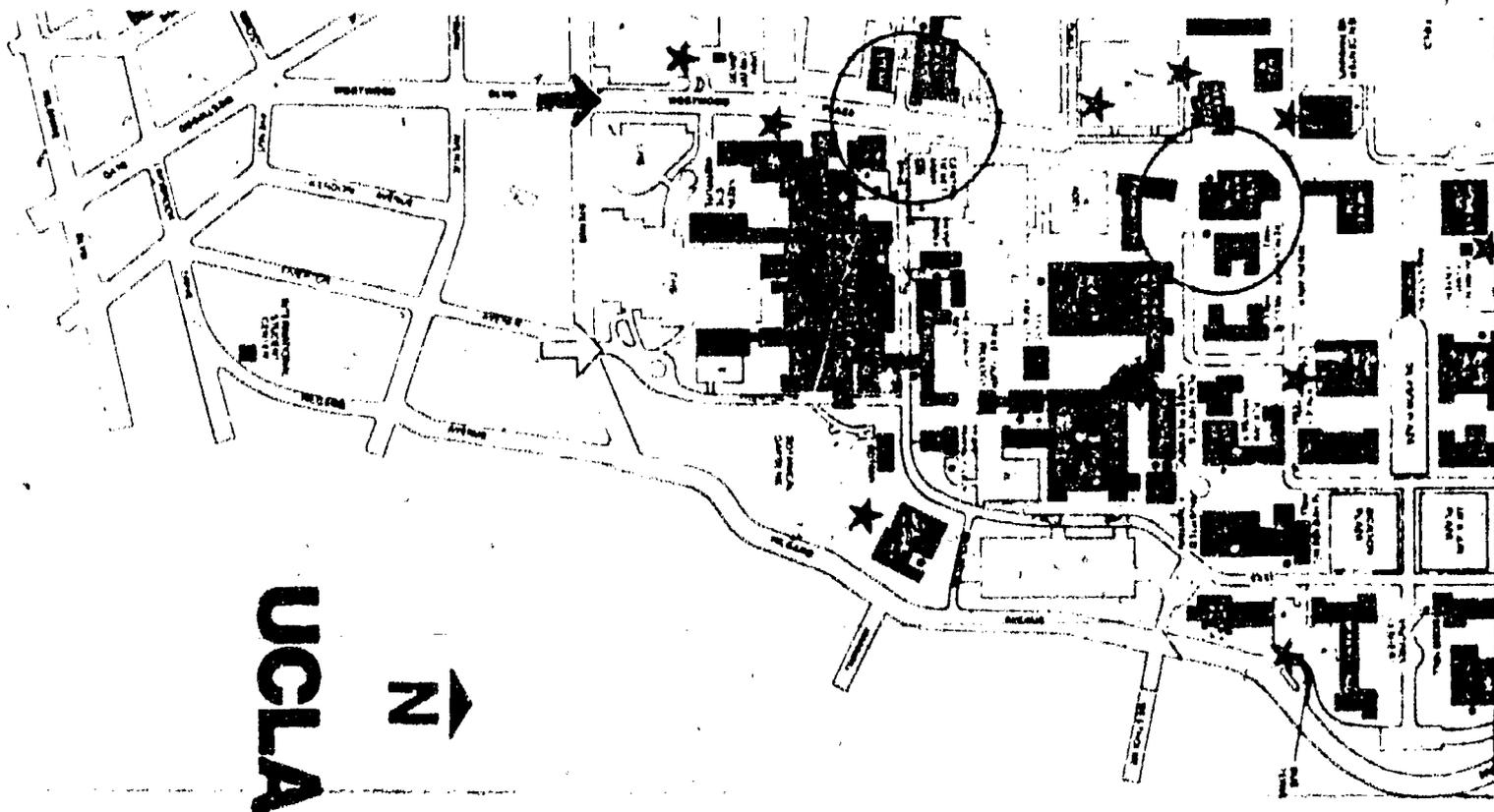
Please -- mail back your comments and suggestions, even if you can't come to the conference (see other side for address).

RSVP Form
June Mini-Conference

Please call us (213) 206-1536 or return this form by June 12 to Katharine Fry, Center for the Study of Evaluation, Room 145 Moore Hall, UCLA, 405 Hilgard Avenue, Los Angeles, CA 90024.

For parking, enter campus on Westwood Boulevard. Stop at the Kiosk and ask for directions to Lot 6.

For the meeting, go to Ackerman Hall (the building where the book store is), take the elevator to the 2nd floor, go to Room 2408.



=====
(tear off, mail back)

The following person(s) from our agency will attend the mini-conference:

Name

Title

Name

Title

Name

Title

Agency District

We will require _____ parking spaces.

116 BEST COPY AVAILABLE

OVERVIEW OF NETWORK SURVEY RESULTS

We received a total of 37 individual responses to the survey (a 57% response rate) from 33 different agencies.

Preferences for Network Activities

Network activities that most respondents expressed interest in included: a newsletter, collections of exemplary materials, tips/techniques/tools, seminars, working conferences, workshops, exchange of visits among members, and the development of guides or manuals. Most respondents were not interested in a toll-free phone line, personnel exchange, or long-term consultation.

Seventy-five percent (N = 27) of respondents indicated that they would like to have their name and a brief description of their agency activities included in an IIS directory. A total of 86% of the respondents (N = 31) indicated that they would like to receive such a directory.

Current District IIS Activities

- Over 70% of institutions responding administer norm-referenced tests, computer analyze data, and provide staff and board orientation to data interpretation. - Over 60% collect some type of non-achievement data, know how their tests match their curriculum and textbooks, provide different information to different users, and have established a delivery system for reporting data to different groups of users. - Fewer than 42% have a way to use data for policy purposes, use commercial software for data analysis, or have district computer facilities with terminals at local sites. - Fewer than 20% of respondents have a taxonomy of questions to ask of the data.

Agency IIS Interests

Our sample of school districts and other education agencies indicated that they would like to get more information about:

- ° how our tests match our curriculum and our textbooks;
- ° a way to use data for policy purposes;
- ° a taxonomy of questions to ask of the data;
- ° delivery systems for reporting data to different groups of users;
- ° coordinating the management of evaluation, staff development, and instruction.

The following Table summarizes the information we received from agencies about their current activities and interests.

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Results of Preliminary Network Survey of Current IIS Activities & Interests By Agency*

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	Orange County	San Diego USD	Azusa USD	Hollywood Bch. Sch.	Anaheim Union HSD	Norwalk-La Mirada USD	Fullerton USD	Simi Valley USD	Glendora USD	Garvey USD	Pomona USD	Hemet USD	Inglewood USD	San Bernardino City USD	Rialto USD	East Whittier City USD	Vallejo City USD	San Diego County	Hueneme S.C. USD	San Gabriel USD	Oxnard USD	Charter Oak USD	Lawmoale USD	El Rancho USD	Culver City USD	Fontana USD	Santa Ana USD	Lennox USD	Fullmore USD	Morenc Valley USD	Newport-Mesa USD	Delano Union USD	Irvine USD	Total X	Total O
1. administer norm-referenced tests		x	x	(x)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	21	2
2. administer criterion-referenced tests		x	x	(x)		x	x	x	x	(x)	x	(x)	x	x		(x)	x	x	x	x	x	x	x	x	x	x				x	(x)	x	16	6	
3. collect non-achievement data (surveys of attitudes, school climate, etc.)	(x)	x	x	(x)	x	(x)	x	(x)	x	x		x	(x)	(x)	(x)	x	(x)	x	x		(x)	(x)	x	x	x	(x)		x	x	(x)	(x)	x	25	14	
4. have a data base that includes student ID, test information, and non-achievement data		(x)	x	x	x	x	x			(x)		x	x	x	x	x	x	(x)			(x)	(x)	x	x	(x)	x		(x)		(x)	(x)	x	21	4	
5. know how our tests match our curriculum and our text books		x	x	x		x	(x)	x	(x)	x	(x)	(x)	(x)	(x)	(x)	x	(x)	(x)	(x)		(x)	x	x	(x)	x	(x)	(x)	x	x	x	(x)	(x)	24	16	
6. have a planning cycle that feeds data into instructional decision making		x	x	x		x	x	(x)		x	x	x	(x)	(x)	(x)	(x)	(x)	(x)	x	(x)	(x)	(x)		(x)	x	x	(x)	(x)	x	x	(x)	(x)	18	15	
7. have a way to use data for policy purposes	(x)	x	x	x		(x)	(x)	x		x	(x)		(x)	(x)	(x)	(x)	(x)	(x)	x	(x)	(x)			(x)	(x)	(x)		x	(x)	(x)	(x)	(x)	13	19	
8. have taxonomy of questions to ask of data	(x)	(x)	(x)			(x)	(x)	(x)	(x)		(x)		(x)	(x)	(x)	(x)	(x)	(x)	(x)		(x)	(x)		(x)	(x)	(x)		(x)		(x)	(x)	(x)	11	26	
9. provide different information to different users (teachers, principals, parents, board)	x	(x)	(x)		x	x	x			x	(x)	x	x	x	x	x	(x)	(x)	x	(x)	x		(x)	x	x	(x)		x	(x)	(x)	(x)	x	23	11	
10. have a delivery system for reporting data to different groups of users	x	x	(x)	x	x	(x)	x			x	x	x	x	(x)	x	x	(x)	(x)	(x)	(x)	x		(x)	x	(x)	x	(x)	(x)	(x)	(x)	(x)	(x)	22	14	
11. provide staff and board orientation to data interpretation	x	x	(x)	x	x	x	(x)	x		x	x	x	x	x	x	x	(x)	(x)	(x)	(x)	x		x	x	x	(x)	x	(x)	(x)	(x)	(x)	(x)	27	10	
12. coordinate the management of evaluation, staff development, and instruction	(x)	x	(x)		x	x	x	(x)				(x)	(x)	(x)	(x)	x	(x)	(x)	x	(x)	x		(x)	(x)	x	(x)				(x)	(x)	(x)	18	17	
13. computer analyze our data	(x)	x	(x)		x	x	x	x		x	x	x	(x)	x	x	x	(x)	x	x	(x)	x	x	x	(x)	(x)	(x)	x	x	x	(x)	(x)	(x)	27	10	
14. use customized software for data analysis		(x)	(x)		x	(x)	x			x	x		x	(x)	(x)	(x)	(x)	x	(x)	(x)	(x)		x	x		x	(x)	x	(x)	(x)	(x)	(x)	17	12	
15. use commercial software for data analysis	x	(x)	(x)		x	x	x	(x)				x	x	(x)	x	(x)	(x)	(x)	(x)	(x)	x		x				(x)		(x)	(x)	(x)	(x)	14	11	
16. have administrator used hardware/software at school sites		x	x	x		(x)	x	x		x			x	(x)			(x)	x	(x)	(x)	(x)	(x)	(x)	x	x	(x)	x	(x)		(x)	(x)	(x)	16	9	
17. have district computer facilities with terminals at local sites			(x)		x	x	x							x	x	x	x	(x)	(x)	(x)	(x)		x		x					(x)	(x)	(x)	12	5	
18. have district-school computer facility					x	x	x	x		x			(x)	x	(x)	x	x	x	x	(x)	(x)		(x)	x		x	x					14	6		
19. provide training in administrative computer use for teachers and administrators	x	x	(x)	x		x	x	x	(x)				(x)	(x)	(x)	x	(x)	x	(x)	(x)	(x)	x	(x)	x	x	(x)	x	(x)		(x)	(x)	(x)	20	12	
20. have policies regarding access and confidentiality of data	x	(x)	x		x	(x)	(x)					x		x	x		(x)	(x)	(x)	(x)	(x)	x	x	x	x	x	x	(x)		(x)	(x)	(x)	19	11	

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Legend:

In our organization, we now . . . X

We'd like to get more information about how to . . . ()

*Entries in this table indicate, in general, district activities and needs for information. Definitions of activities, of course, vary by district and individual interpretation. These entries should not be regarded as research data or cited in any way.

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IIS NETWORK NEWS

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A NEWSLETTER ABOUT INSTRUCTIONAL INFORMATION SYSTEMS*

Vol. 1, No. 2

October, 1984

FIRST IIS NETWORK CONFERENCE LEADS TO PLANS FOR FUTURE

Mini-Conference at UCLA

The first ever Mini-Conference on Instructional Information Systems was held at UCLA on June 20 with 30 district and university people interested in policy, administrative and classroom uses for IIS:

The morning sessions featured "An Hour of Overload" -- six 10-minute presentations on current developments related to districts' use of information systems. The presentations included a description of software for administrators, explanations of processes of developing computer based information systems, a procedure for matching tests to curricula, a way of training raters to grade essays, and the development of a student information survey. [See pages 4-6 for brief summaries of these presentations.]

Give Us A Call

Is your district doing something to link information (test scores, attendance patterns, social data) to instruction? Please let us hear from you so we can help other interested districts connect with you. Call Katharine Fry at CSE (713-206-1536).

Future Activities

Participants at the June IIS Network Mini-Conference said they wanted to:

- Continue to meet;
- Visit a district where "something good" is going on;
- Have CSE play a brokering role in bringing people together;
- Distribute a directory of districts and district personnel involved with IIS.
- See demonstrations of software actually in use for IIS;
- Learn how to select and interpret demographic trend indicators for strategic planning;
- See displays of simulated data;
- Describe evaluation-driven school improvement systems for principals;
- Demonstrate practical uses for data;
- Discuss how to develop and use data bases;
- Define problems districts had in implementing data bases with the solution strategies they used.

Directory Enclosed

As a step toward connecting IIS people with one another, we have sent along with this issue our Newsletter mailing list. Please tell us who else should be on it.

*Produced by Adrienne Bank and Richard G. Williams, directors, Management of Instructional Information Systems Project, IIE, UCLA. High level assistance by Elaine Craig.

DOES THIS "SPECIAL INTEREST GROUP" INTEREST YOU?

Have you heard about Microcomputers Applications in Education, the Special Interest Group (SIG) of the American Educational Research Association (AERA)?

Their informative newsletter says that the purpose of this SIG is to promote and facilitate the sharing of information among people interested in microcomputer use and research. Major areas of interest are (1) teaching about microcomputers and their applications; (2) teaching with microcomputers; and (3) conducting research, evaluation, assessment, and management/administration tasks with microcomputers.

The group's members include college and university faculty, local and state level professionals, and researchers. Membership in the SIG gets you a newsletter that features news of the group's activities, reprints of articles and a "bulletin board" for exchanging information about Events, Products, Software, Research, Positions and Personals.

Yearly membership fees are \$5 for AERA regular members and \$8 for non-members. For a membership application call Dennis Deck, NWREL, 300 S.W. Sixth Avenue, Portland, OR 97204 (503-248-6800).

DO THESE SITE VISITS INTEREST YOU?

VOICE YOUR CHOICE

CSE will serve as "broker" in setting up site visits so Network members can see first-hand what other districts are doing. If any of these site visits interests you, call Katharine Fry at CSE (213-206-1536).

Norwalk-LaMirada USD will demonstrate how they use an evaluation matrix showing the relationships among the CAP, CAT district proficiency tests and the district skills continua. The experiences that teachers, principals and central office staff have had with the system will be presented.

Newport-Mesa USD has an enrollment prediction system on a main frame computer. The district has 10 years experience with this system which is especially useful in predicting declining enrollment. The system can also be used to simulate the closing of school sites and the impact of such closings. The Director of Research and Student Services will explain the system and its applications.

Santa Monica School District is trying out a school-based instructional information system with Apple IIE. Data about student achievement, attendance, language skills and home background will be available in the principals' office on computer. Principals are working with CSE's MIIS project to develop a list of high interest questions about the school, class functioning, or individual students to ensure that the system will be useful. Three schools have terminals. Come visit with program developers, principals, data processing staff, clerks.

ABC III will demonstrate a computer system used to retrieve proficiency test data. The system is

HOPES AND PROBLEMS FOR IIS

At a CSE sponsored symposium held at the Evaluation Research Society/Evaluation Network (ERS/ENet) meeting in San Francisco, Walt Hathaway (Research, Planning & Evaluation, Portland, Oregon Public Schools) and Pete Idstein (Supervisor of Instruction, Christina School District, Newark, Delaware) both made impressive presentations. Hathaway described the hopes school system administrators have had for comprehensive information systems, the obstacles to achieving these hopes, and new conceptualizations and technologies to overcome them.

As Hathaway sees it, the hope is that "by collecting, analyzing, reporting and using accurate and appropriate information about students, and about classroom, school and district support systems, we could help create self-renewing and ever better learning communities."

The obstacles in the way of achieving this hope include:

- The dominance by the 'business' functions of the district over the resources committed to data-based instructional decision making.
- The shortcomings of extant hardware and software systems.
- The lack of theoretical and causal models of learning.
- And, perhaps most important of all, the difficulty of enlisting the sustained commitment of over-worked school teaching and administrative staff to the difficult task of gathering, maintaining and reporting "upward" sufficiently accurate data to support decision-making needs at levels further up the educational hierarchy.

Hathaway's optimism about comprehensive information systems stems from the new concept of distributive processing and the new technology for school and classroom-based networks of micro and miniprocessors linked to the district's central processor. This decentralized system allows "the data upon which higher level decisions are based . . . [to] be created by the school user primarily to meet his or her own decision-making needs . . ."

Hathaway suggests several uses for such comprehensive information systems:

- Targeting instruction on the needs, abilities, readiness and characteristics -- including learning style -- of individual learners.

- Grouping and placing students so that their learning needs may be met most effectively and efficiently.
- Better and easier classroom, building and district management resulting in better decisions at lower cost and more time and other resources spent on instruction and direct learning support and leadership.
- Prompt, accurate and thorough evaluations of program cost effectiveness.
- Timely and thorough data to support policy formulation and monitoring.

For a copy of the paper presented at the meeting contact Walter Hathaway, Portland Public Schools, 501 No. Dixon Street, Portland, OR 97227 (503-249-2000).

Pete's presentation focussed on the pitfalls and errors that occurred when a school district with 15,000 students and 25 school buildings implemented an electronic information management system. He discussed nine areas where problems can (and did) occur. They were:

equipment (e.g., operating systems, boards, terminals, printers and card readers), applications software, data base management, protocol conversion, communications, handshaking, handholding, redundant bureaucracies, and the binary perception of the world by end users.

By the way, Pete has formed a subgroup of the Microcomputers in Education Special Interest Group (see article, p. 2) designed for school people. He hopes that members will share interests and needs and "get together in our subgroup first to talk with other people who work for a living." Send your cards and letters to Peter Idstein, Supervisor of Instruction, Christina School District, Newark, DE 19711 or call 302-434-2457.

MINI-CONFERENCE HIGHLIGHTS

Leigh Burstein reported on a survey instrument designed to provide information on students' attitudes, opinions, and interests to aid in educational decision making developed through a collaborative effort between Royal High School in the Simi Valley ESC and the CSE project which he and Ken Sirotnik direct.

As part of their on-going work on Comprehensive Information Systems for Local School Improvement, a Ability Test in Secondary Schools, this CSE project collaborated with staff from Royal High School in the development of a student survey intended to augment the student information system previously developed by school and district staff.

Royal already had developed an extensive on-line information system under Title IV-C and SIP support that included student background and referral information, grade records, cumulative test score, attendance data, course schedules, four-year course plans, and career-to-skills and skills-to-courses maps intended for use as part of the school's Career Magnet School Program. The student survey information is intended for use at the individual, class, and school levels.

The survey was first given to all students present at a given class period on a day in late May 1984. Approximately 75% of the students enrolled in Royal completed the

survey with less than 2% flawed data for most questions. A shorter and slightly modified version was administered to incoming 10th grade students during a pre-school orientation meeting with counselors. A revised survey is planned for Spring 1985 to monitor trends in student attitudes.

The Survey results have already been used by school staff in their request for SB813 funding and in documenting a recommendation for specific staffing decisions. The survey data are also a central part of the development of student-level, class-level, and school-level reports intended to routinely inform decision-making by teachers and administrators in their school improvement efforts.

Persons wishing to receive copies of CSE reports on the Royal-CSE collaboration or copies of the survey instruments and reporting formats developed as part of the project should contact Leigh Burstein (213-825-1889) or Ken Sirotnik (213-206-1134).

ABC ESC Implements Data Retrieval System

Tom Martin, supervisor of Research, Planning and Evaluation for ABC Unified School District, described the process his district used to solve a data retrieval problem. The district had implemented a lengthy proficiency test and needed a system to retrieve information about test scores to teachers, counselors, administrators and parents. Eventually, the district main frame would be available, but everyone wanted a data retrieval system as soon as possible. Their short-term solution was to use a microcomputer based system, the TRS-80 model II with 3 disc drives.

The decision to go with a microcomputer was reached after a series of committee meetings. Martin stressed that an important aspect of the selection process was that users had to be involved in the beginning.

established prior to software development and recommended using the "Five Steps of the Software Design Cycle," written by Dr. Bill Miller of Golden West College. Copies can be obtained from Tom Martin (213) 825-1889.

MINI-CONFERENCE HIGHLIGHTS cont.

SWRL Software For District Execs

Carol Thomas of SWRL described the District Executive Browsing System (DEBS), a software package designed to give an education executive ready access to school information comparable to the business information systems available to private sector executives.

DEBS is designed to provide information to answer district schooling questions in three areas:

- The Instructional Accomplishments Information File permits the user to look at the instructional accomplishments of students by subject, grade, skill area, and/or school.
- The Demographic Information File contains information relevant to

the characteristics of a particular school (for example, ethnicity, language, fluency, and gender).

- The Instructional Practices Information File contains information relevant to an individual district's program, such as textbook series, amount of off-grade-level instruction, proportion of textbook completed, absentee rates.

IIS Operating Problems Identified

Millie Murray, CSE Visiting Scholar, described a district which improved its information quantity and flow but unwittingly created major data entry and retrieval problems. Murray speculated that these problems were caused by lack of communication with users and designers, administrative boundaries, and lack of long range planning. She suggested that creation of long-term evaluation of system processes and products along with close monitoring of system utilization would help avoid these problems.

Tests and Curricula: Do They Match?

Joan Herman of CSE described a district who thought their CAP scores were too low. CSE looked at the match between CAP items and district objectives and found that over 50 percent of the CAP items were not being taught.

Some general conclusions from this experience:

1. Tests are accurate and appropriate indicators of student progress and school effectiveness only under a special circumstance: when the test reflects the basic goals and objectives which the school is trying to achieve.

2. Students do not do well on content to which they have not been exposed, and districts likewise do not look good on tests covering content which is not part of their curriculum.

Herman suggested that once district goals and objectives are defined, there are two basic strategies to finding an appropriate test with the desirability and resources required for each strategy inversely related:

- a. Develop tests to match your district curriculum; or,
- b. Analyze available tests and determine, by item content analysis, which represents the best match.

A GOOD ARTICLE

Analytic Assessment of Students' Expository and Narrative Writing

James Burry, CSE, described the development of analytic rating scales. Burry explained that the CSE project developed analytic scales to assess students' writing because they have greater instructional payoff than holistic judgments. There are separate expository and narrative scales because each mode requires its own writing skills.

The scales can provide teachers with a profile of students' specific skills in: paragraph organization, support, essay coherence, grammar and mechanics. They also consider general impression which considers originality and tone in addition to the other writing elements.

Each element described above receives a score indicating mastery (4-6) or non-mastery (1-3). Each essay also gets a total/averaged score.

Analytic rating takes two to four minutes per essay depending on sample length, compared to a minute or so for holistic judging. The additional analytic time gives

teachers' useful information with which to plan instruction around diagnosed strengths and weaknesses.

Training of teacher raters takes several days depending on: number of trainees; how quickly they accept and consistently apply scale criteria; whether training includes ratings of actual student work.

CSE Resource Paper No. 5 describes the scales (which are CAP's 8th grade writing assessment measure), the underlying research, and the training (Quellmalz, E., & Burry, J., Analytic Scales for Assessing Students' Expository and Narrative Writing Skills, 1983).

WE'VE HEARD ABOUT . . .

A New Package for Apple IIE

We've heard good things about Appleworks - a \$250 software package that includes wordprocessing, spreadsheet, and data base functions. It is easy to use and has an advantage over separately purchased programs because it uses the same commands for each of the three functions. Appleworks runs on an extended Apple IIE (128K) and needs two disk drives.

Computer Student Profiles

Northwest Regional Educational Laboratory (NWREL) is developing a student performance profile that includes academic performance, attitude, and social behaviors. Each of these three categories has a different data base culled from existing school records. For more information contact: Robert E. Blum, Northwest Regional Educational Laboratory, 300 S.W. Sixth Avenue, Portland, Oregon 97204 (503-248-6800).

A Good Article

Keen, P.G.W. (1975) "Computer-Based Decision Aids: The Evaluation Problem." Sloan Management Review, 16(3).

The author points out that a major benefit of information systems -- providing better information which in turn should lead to better decisions -- is hard to assess with a traditional cost/benefit analysis. He proposes an approach to evaluation which stresses linking the evaluation process with the goal-setting process and dealing head-on and up front with qualitative issues. Keen considers a major problem to be defining what a successful system is. He suggests that interested parties -- top management, users, designers -- need to spend time in negotiating a consensus on "success." They also need to decide what the trade-offs are and agree on success indicators.

IIS NETWORK NEWS

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October 1984

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Please write or call with
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SECTION 3

CONFERENCE ON INFORMATION SYSTEMS
FOR SCHOOL IMPROVEMENT
February 5-6, 1975

Progress Report

CONFERENCE ON INFORMATION SYSTEMS
FOR SCHOOL IMPROVEMENT

Progress Report

A small interdisciplinary working conference is being planned for February 6th and 7th, 1985, on the subject of educational information systems.

Because of limited funds, the conference will be restricted to approximately 30 interested participants who will spend two days focusing on this topic in a variety of presentation and discussion formats.*

It is anticipated that conference topics will be assembled into three clusters.

In the first cluster will be presentations dealing with the State of the Technology. Among the topics that may be included here are: the various hardware systems and their costs and benefits for schools; the likely state of the industry five years down the road as the shakedown takes place; software currently available for

*Individuals who have already agreed to participate: Bill Cooley (LRDC), Bob Blum (NWRL), Pat Millazo, Ed Brown, and Carol Thomas (SMRL), Leigh Burstein and Ken Sirotnik (CSE), Jean King (Tulane University), Mike Patton (University of Minnesota), Terry Cannigs (Pepperdine University). Others who will be contacted: Lynn Markus (UCLA/GSM), Rob Kling (UC Irvine/CPP), Ian Mitroff (USC/GSM), Bill Ridley (NIE), Pete Idstein (Christina School District, Newark, DE), Walter Hathaway (Portland (OR) Public Schools), Nick Dessault (Sheboygan (WI) School District), Steve Araubel (Montgomery Co. School District), as well as selected superintendents, principals, school board members, and representatives from industry, the State Department of Education, technical assistance centers, and schools of educational

administrators and how it can be used for instructional support systems; factors to consider in buying or developing software.

In the second cluster will be presentations dealing with the State of Research and Development. Among the topics to be included are: lessons to be learned from management information systems literature; the social and organizational impacts of computers; the changing roles of administrators; teacher reactions to information systems; the development of a student performance profile; the development of a school survey.

In the third cluster will be presentations dealing with the State of the Practice. Among the topics to be included here are: what high schools are doing to computerize instructional management; case studies of districts who are installing and using information systems focusing on problems and solutions.

Immediately after each of the cluster presentations, participants will discuss what they have heard in relation to its implications for policy, for research and for practice. By the end of the conference, participants will have produced a written list of suggestions/issues/concerns for each area. Throughout the presentations and discussions, participants will be pressed to address the issue underlying the conference: How will information systems improve schools and student learning?

We expect that the conference proceedings - papers, discussion comments, and suggestions for policy, research and practice - will be quickly assembled and published. The audience for such a book will

be administrators interested in developing and installing information systems, along with the technical assistance providers and lay persons who will be asked to establish, maintain, and use the process.

SECTION 4

PAPER PRESENTED AT ERS/ENet CONFERENCE*

"Concerns About Moving Ahead on Instructional Information Systems
in School Districts"

Richard C. Williams and Adrienne Bank

*Presented as part of a CSE-organized symposium, The Role of Information Systems in Educational Excellence: Central? Useful? Irrelevant? Dangerous?, ERS/ENet, San Francisco, October 1984.

CONCERNS ABOUT MOVING AHEAD ON INSTRUCTIONAL INFORMATION SYSTEMS
IN SCHOOL DISTRICTS*

Richard C. Williams and Adrienne Bank

A School District Meeting

Recently we attended a meeting in a local school district. We were there to make arrangements whereby we could work with the district in helping them implement an instructional information system that would be placed in local school sites. The system was based on an innovative software package that had been developed by two district teachers. Essentially, the software allowed each participating elementary school, using an Apple IIC computer, to record electronically individual student data such as: attendance, NRT scores and growth over specified periods of time, English language proficiency, basic skills proficiency test results, schools and classrooms in which the student had been enrolled.

With these data available on a micro-computer in the principal's office, it would be possible to quickly and easily manipulate instructionally relevant data in order to gain insights into pupil characteristics whether individually, as parts of a selected cohort, or of the entire school population. Armed with that information the school principal or staff could begin to raise interesting questions about the effectiveness of the school's instructional program.

In attendance at the meeting was the assistant superintendent for instruction, the developers of the software package, the district's central

*Presented at the symposium, The Role of Information Systems in Educational Excellence: Central? Useful? Irrelevant? Dangerous?, ERS/ENet, San Francisco, October 1984.

computer supervisor and the three principals who were going to participate in this program. We had talked to the principals prior to the meeting and they were interested in the proposed program but were unclear about how exactly it was going to operate and the role that they and we would have in it.

Soon after the meeting started, an intense and heated discussion emerged between the local software developers and the central mainframe computer supervisor. The gist of the discussion was whether it was better to keep these data in a micro-computer at the local school site or to input the data once on the district's mainframe computer and then transfer it to the local site. The discussion moved to the relative merits and possibilities of single inputting. Uploading and downloading, and soft-discs and hard-discs began to dominate the conversation between the computer experts. The discussion eventually turned briefly to what was possible to do with computers and what was important to do with computer-based information systems.

We watched the principals' body language during the discussion's shifting directions. When the discussion began, they were sitting forward, talking and exhibiting other indicators of interest. However, as the level of technicality rose and the complexity of the proposed system became apparent, we could see their shoulders slump and their interest in and understanding of the project wane. When the discussion finally returned to their original area of interest - what could the system do for them - their energy level was very low.

We share this vignette because we feel it typifies what is happening in meetings at many school districts around the country. As district

administrators acquire more and more computer soft- and hardware and computer knowledge, they are realizing that much instructionally relevant information which had previously been stored in non-electronic and non-integrated files could be integrated into a central or decentralized computer-based information system. They realize that data presently found in the principal's office and the teachers' and counselors' files could be brought together in one data file and, once that is accomplished, information could be "skimmed off" by decision-makers at the classroom, school site, district administration and school board level.

But starting with this good idea, there are a myriad of problems and considerations that seem tangled together. An understanding of the availability, capacity and costs of hardware and software are needed before one can begin to guess at how the system can improve on current operations. What can be done, what can't be done, what can be done only with great difficulty, how much all this costs, who wants or doesn't want the system, who can design and maintain the system, must all be considered at the same time. When the subject gets opened up, what once seemed like a wonderful dream often gets transformed into a continuing nightmare in which people see themselves being hopelessly trapped.

Many districts are moving, some tentatively and cautiously, some with a good deal of excitement, into the information age. They are beginning to see that there are opportunities to use outside experts and their own internal "idea champions" build a socio-technical system that might improve what we know about teaching and learning. We refer to such a system as an instructional information system to distinguish it from other computerized

school management systems which support administrative functions such as payroll, inventory and attendance.

Expressed Concerns

Based on our experience in this and other districts we would like to list some of the frustrations and fears we've watched emerge during early discussions of instructional information systems. We'd then like to summarize a very enlightening article by our colleague, M. Lynn Markus (now at UCLA's Graduate School of Management), called "Power, Politics and MIS Implementation"* which provides a framework within which to view these frustrations and fears.

Concern #1. Who is going to do all the work involved? The conversation at the district meeting was, early on, dominated by the person responsible for data processing who was knowledgeable about what was currently in the files of the central office, and by the programmers who envisaged a flexible school board system that could be easily accessed by teachers and principals. The principals, although interested in having easy access to a newly created system, worried about the burden of data input on clerks who, they felt, already had too much to do. Only when the programmers described how the system would relieve the clerks of most of their attendance recording responsibilities, leaving them free to do other data inputting, did the principals want to move on to other aspects of the system.

Concern #2. How will this system change what we do now? Teachers and administrators are busy people with the immediate press of students in a classroom and school building. This reality weighs heavily upon teachers

*Communications of the ACM, June 1983, No. 6, 430-444.

and administrators and causes them to value practical and immediate solutions to their problems. They are understandably impatient with theoretical solutions that have not been practically demonstrated. Additionally, they are accustomed to dealing with individuals and problems as unique instances. They find it difficult, irrelevant, or misleading to try to apply aggregated data to individual cases.

One result of this preoccupation with the "here and now" and with the individual is that teachers and administrators rely on solutions that are known because they have been derived from their own or others' experience, and are therefore familiar, comfortable and trustworthy - which are the most appealing attributes of working knowledge (Kennedy, 1982). When computer consultants or advocates begin talking about "hard and soft discs, interfaces, uploading," etc., teachers and administrators begin to move into the "unknown, uncomfortable and suspect." It is understandable that the principals in our meeting evidenced "shoulder slump." What was more or less working for them now seemed to be on the way to being replaced by something which might not work as well for them.

Concern #3. What if we start something we don't know how to finish? Information systems are usually designed with a particular goal in mind, namely, to provide appropriate and accurate information to decision makers in a timely fashion. While this goal is laudable, and can be often attained, principals and teachers can imagine unanticipated consequences that occur on the way to and during the implementation and operation of information systems. For example, what happens if unauthorized people use the system and enter inaccurate data? What if they change records and no one knows about it? Or, what about existing data being used by authorized

persons but in unauthorized or unexpected ways. For example, data on pupil achievement in each teacher's classroom might be collected in the spirit of helping the teacher identify students with learning difficulties, but there is no reason to assume that the same data cannot also be used to compare the rate of pupil progress in different teacher classrooms at the same grade level. What advance assurances can be given that this would never happen? Once we start collecting information that everyone can know, things might begin to change. As Argyris (1979) says: information systems can substantially alter the power structures in an organization. Knowledge is, after all, power. If access to limited information gives some people in some units power over others, then the more widely the information is shared, the more organizational power is redistributed. As people's informal modes of making decisions become more explicit, they may feel themselves hemmed in or scrutinized. Or, they may realize that they might have to make changes in their own styles of thought and behavior.

Concern #4. How are all the reports we get going to help us do our jobs better? If data from an instructional information system are going to be used then they must be presented to individuals in a format that he or she easily understands. If reports do not come on time, are complex, cumbersome, irrelevant, impractical, then it is unlikely that the information will be used. The classic example of such unused reports is when a classroom teacher is given a many-page computer print-out of the standardized test scores of children in last year's class. Busy teachers do not have the time to sift the data for relevance to this year's class to derive implications for tomorrow's classroom activities. However, although many may not use these reports, a residue from their non-use remains; teachers

may fear being seen as not smart enough to understand high-status data, or they may worry that the reports contain something they should know about but do not.

It has become self-evident that people in different roles - in this case, classroom teachers, principals, board members - have different information needs in terms of the types of content they need, the format and the frequency with which they get reports. The same data might have to be arrayed and analyzed in quite different ways for people in each of these different roles.

As individuals, adults differ from one another in terms of their cognitive styles. It appears that some people relate more readily to graphic presentations of data while others pay more attention to written text. Some individuals want to be presented with patterns over time. Others prefer to see exceptions flagged. Some people want to see "everything;" others want "only what I need . . ."

Analysis of Concerns

The foregoing concerns were expressed in one form or another at the meeting we attended. The concerns, we believe, are not unique to the particular district we were in; nor are these concerns unique to educators. The management information system (MIS) literature sometimes discusses such concerns under the term "resistance." Resistance is provisionally defined by Markus as "behavior intended to prevent the implementation or use of a system or to prevent system designers from achieving their objectives" (p. 433).

Markus analyzes three theories of resistance and her analysis is addressed to the system designer or to the system manager who may take

different courses of action in dealing with concerns such as those already listed depending on which theory they subscribe to.

The three theories are described as "people determined," "system determined," and "interaction determined."

In the "people determined" theories, the causes of resistance are perceived to lie within individuals' cognitive styles, or personality traits. The assumption is that resistance is an attribute of the user and is undesirable because the purpose of the system being introduced is consistent with rational management theories and because the organizational goals which the system is serving should be shared by all participants.

In the "system determined" theories, the courses of resistance are perceived to lie within the proposed system itself, e.g., lack of user-friendliness, inadequate technical design or implementation. The assumption here is that resistance is a realistic assessment of system inadequacies.

In the "interaction" theories the causes of resistance are perceived to lie within the interaction of the system and the context of use. Resistance is a product of the setting, the users, and the designers. It is neither desirable nor undesirable. "Resistance is not a problem to be solved so that a system can be installed as intended; it is a useful clue to what went wrong and how the situation can be righted" (p. 441).

System designers or system managers subscribing to the people-determined theory of resistance will try to overcome user resistance by education and training of users; or by coercion, sanctions, or persuasion. They will develop strategies to obtain user involvement so as to obtain their commitment.

System designers or system managers subscribing to the system-determined theory of resistance will try to educate designers so that they develop better technology or modify their procedures and packages to conform to organizational procedures. They will develop strategies to get user involvement so as to get better system design.

System designers and system managers who subscribe to the interaction theory will try to: fix organizational problems before introducing systems, restructure incentives for users, restructure relationships between users and designers. According to this theory, user participation is not always necessary or appropriate.

Dealing with Concerns

Although we were observers at the district's meeting described at the beginning of this paper, we anticipated that we would be able to provide some assistance in easing the introduction of an information system into the schools. We were familiar with the "rules of thumb" suggested by the MIS literature and by our own previous case studies of school districts to overcome initial resistance: get top management support, get user involvement, make the system user-friendly; design a system that has immediately perceived benefits; start small.

These prescriptions are derived from either the "people" or the "system" theories of resistance. While we believe that these are still valuable tips to keep in mind, we will use additional insights suggested by the "interaction" theory in an attempt to facilitate the design and implementation of an instructional information system that will work. These might include 1) power: discovering who wins and who loses by the introduction of an information system into the schools; 2) culture: exploring

how information systems may change the division of labor and organizational relationships and norms; 3) image: investigating how the proposed information system may affect and be affected by the image that people have of themselves, their school, their district, the community.

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