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ABSTRACT

This paper presents a rationale for developing computer-based information systems for use by the special education personnel of a consortium composed of 13 rural school districts, and outlines a three-function database that would meet the operational requirements of administrative and clinical staff and the informational needs of parents and the community. Seven assumptions are presented from the perspective of the needs of an intermediate education agency to demonstrate the need for computer-based information systems; and the concepts of organizing documents, domains of inquiry, and agents of decision and action are identified as the three levels of inquiry of a typical education agency. Finally, the three database functions of "Required Reports," "Reflective Practice," and "Decision Responsiveness" are described, and their relation to the three levels of inquiry is discussed. The relation of the three levels of inquiry to the three database functions is also depicted graphically, and 28 references are provided. (KM)

CONCEPTUALIZING AN INFORMATION SYSTEM FOR SPECIAL EDUCATION PROGRAMMING WITHIN AN INTERMEDIATE EDUCATION DISTRICT: MILESTONE ONE

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Abstract

This paper presents a rationale for developing computer-based information systems responsive to the information requirements of persons interested in special education at the local, community level. Outlined is a three-funtion data base that focuses on "Required Reports," "Reflective Practice," and "Decision Responsiveness," therby meeting the operational requirements of both administrative and clinical staff, and the informational needs of parents and the community. The concepts presented in this paper are congruent with the circumstances and goals of both regular and special education.

CONCEPTUALIZING AN INFORMATION SYSTEM FOR SPECIAL EDUCATION PROGRAMMING WITHIN AN INTERMEDIATE EDUCATION DISTRICT: MILESTONE ONE

There is considerable interest in using technology to support human efforts within regular and special education (Council for Exceptional Children, 1982; Culbertson & Cunningham, 1986; Helge, 1984; Klein, 1986; Lesgold & Reif, 1983.) Implicit to this interest is an assumption that technology can help improve education while at the same time counterbalance a perceived decline of human and material resources. We believe, however, that technology will be able to aid us only to the extent that it supports our efforts to better understand and conceptualize our circumstances and effectively focus resources to advance education's intended purposes. Further, we believe that the establishment of local information systems will be a productive application of technology and a stimulus to the better understanding of education's purposes, circumstances, and course. Because of the potentially positive impact of quality information on educational decision making, it is our intent to establish the development of a special education data system as a priority agenda.

Goodlad has written that "We live in an era of rapidly expanding opportunities to acquire information but of constricting opportunities to reflect, engage in sustained discourse with others, and clarify our beliefs about the times and circumstances in which we live" (Goodlad, 1984, p.15.) The purpose in writing this paper is to provide a basis to reflect, clarify, and discourse about our thinking with respect to the creation of information systems for use by the special education personnel of our intermediate-level education agency, a consortium comprised of 13 rural school districts. Our thinking results from preliminary efforts to understand the information needs of several of our county-wide programs, special programs in speech and language, physical and occupational therapy, visual impairment, audiology, hearing impairment, school psychology and child development; and our initial attempts to design and implement, in collaboration with our colleagues, data bases to support these information needs. We hope our experiences and viewpoint will be of interest and value to others.

The following discussion will be treated in two parts. We will first present our rationale for developing information systems responsive to the information requirements of persons interested in special education at the local, community level. This will be discussed from our perspective of needs within the context of an intermediate education agency. Second, we will broadly outline a three-function data base that would seem to meet the operational requirements of both administrative and clinical staff, and the informational needs of parents and the community. In a subsequent paper, we will extend the present discussion by focusing on a single data base function and its potential application by persons who provide direct and consultative services for children.

AN INTERMEDIATE EDUCATION AGENCY: THE CONTEXT OF NEED

In a discussion of educational data bases, Burstein made the following observation: "School systems around the country are ready to improve their use of information technology" (Burstein, 1984, p. 316.) When we asked why we believed this to be true for our particular circumstance, we uncovered several underlying assumptions which we present for review.

The first assumption is that the increased activity level in the first decade of experience with Public Law 94-142 has suggested to special educators many effective ways of enhancing the services now received by handicapped children. Unfortunately, we lack empirical evidence to fully inform our vision of the future and guide our planning efforts of the moment, even though the multitude of recent commission reports on reform (e.g. National Commision on Excellence in Education,1983; Task Force on Teaching as a Profession,1986; The Holmes Group,1986; National Governors' Association,1986) provide us with both the challenge and the opportunity. We now find ourselves in much the same position as school districts during the "declining test score" debate of the mid-1970's. Although schools had a long history of annual achievement testing, Burstein noted that "Most districts were unable to document whether the national trends evidenced in the various policy reports applied to their local situation" (Burstein, 1984, p. 308.) As a consequence, schools contributed little to the debate because they simply were unable to provide meaningful profiles of their practices and performance. The evidence suggests that an inability to muster relevant information in response to major questions and issues is pervasive and not simply

restricted to concerns about test scores (Goodlad, 1984, p. 31.) Missed opportunities of the past inform the present: information about practices and performance should be made available to guide future direction.

A second assumption is that social changes will require adaptation by educators in a continuing effort to meet new and evolving circumstances. A recent phenomenon, for example, is the "market pressure" or consumer demand for schools to provide a wide variety of learner options including even health-care (Nienhuis, 1986.) Another example concerns the changes occurring within the American workforce as it adjusts to new world-market contingencies. Flux and dislocation characterize the labor force (Dislocated workers, 1986; Fields, 1986, p.38) with one predictable result being certain impact on the lives of school-aged children, including the disabled who are among those most at risk. In responding to these and other trends, educators must be able to characterize the influence of a national phenomenon on local circumstances, summarize the unique strengths and needs of both youngsters and existing special programs, and specify the results of previous and current education on the affected youth. Minimal data such as these will be necessary to plan alternatives and set priorities. Other circumstances will continuously emerge to challenge educators' adaptability.

A third assumption involves the predicted shortage of qualified teachers. Demand for special educators, as for math, science, and bilingual teachers, is expected to continue to exceed supply. With the past as the model, there will be ongoing attempts to open certifications in order to provide a ready source of professionals for schools (Keppel, 1986). At the same time, pressure from the public will continue to build and require inservice staff to insure better outcomes for a mobile and expanding population of at-risk youth (Viadero, 1986.) Our assumption is that technological support will help manage the task of providing both quality and equity in the face of diminished resources.

Our fourth assumption is that innovations available to industry and other productive human endeavors have not yet been put to adequate use in either regular or special education. The potential of computers to tailor educational programs for all children, to help select and guide educational practices in the classroom, and to provide for targeted decision making at the school and district levels

has never been realized (Klein, 1986.) We quote at length from the work of Cunnigham to make the point:

> 'Competitive edge' thinking has not permeated the governance of most local school districts. In fields such as medicine, agriculture, meteorology, even competitive sports, computers are used to refine knowledge successively, achieving small incremental gains in health, agricultural production, predicting weather, or improving athletic performance. Computer companies themselves are searching intensively for scientific or technological developments that will give them the edge in an incredibly competitive information-technology environment. Seldom are data analyzed intensively in the search for gains, even marginal gains in learning or other aspects of district performance for that matter. Computers could be the means to achieve the competitive edge, less to compare one district with another, more to improve upon previous levels of performance within individual school districts. (Cunningham, 1986, pp. 209-210.)

Cunningham's comments, although directed to local school district boards, apply with equal weight to special education within the entire educational enterprise.

Our fifth assumption is that the development and use of data bases should be initiated from within local and intermediate districts and reflect the information requirements of administrators, clinicians, students, parents and the community. This move would insure that persons interested in and responsible for quality special education would participate in the creation of the information system and the specification of its use. The need for inclusive participation in the development of an innovation squares with our experience in trying to respond to the diverse needs of13 individual and unique school districts, and would appear to create many of the interpersonal, organizational, and motivational conditions necessary to establish innovatation and improvement. Our fifth assumption was anticipated some 20 years ago by Moore (1967) for the field of mental health: "If programs are to meet the needs of those they serve, greater emphasis must be placed on the collection and utilization of data for local planning."

Our sixth assumption is that the creation of local information systems will not only be prerequisite to establishing ongoing processes of educational improvement and renewal, but will, in fact, be necessary for sustaining involvement once begun. The process of improvement and the ability to innovate can only exist with

continuous, relevant, and timely feedback. In cybernetic terms, this means constant monitoring of individual and system indicators, interpretation of data, and tailoring of educational procedures much in the manner described by Cooley and Bickel in their work on decision-oriented educational research (Cooley & Bickel, 1986.) It has long been recognized that computer support will be required to manage the amount and kind of information necessary to sustain the adaptive learning environments we are interested in creating (Glaser & Nitko, 1971, p. 650.)

Finally, we assume that there will be both positive and negative aspects to computer applications in special education. Consequently, we acclaim the efforts of those persons trying to clarify the issues and implications of computer assisted information systems (see Bank & Williams, in press; Klein, 1986), and look forward to a time when we can take part in testing the assumptions that are just now being formulated.

LEVELS OF INQUIRY AND A THREE FUNCTION DATA BASE

We would like to be able to pose questions relevant to the educational needs of special education students and, under both stable and changing conditions, seek answers to these questions quickly and efficiently. The design of our information system should, of course, be guided by these concerns and reflect our identified information needs.

Identifying information needs, however, is not the simple task it may first appear to be. Many have stubbed their toe on the challenge. In the context of computer supported decision making by school boards, for instance, Cunningham has noted that, "Becoming competent users of hardware and software is straightforward. Acquiring competence in determing what data and information are relevant to the agenda of the board as a collective is another mattter" (Cunningham,1986, pp. 199, 200.) In an example from the field of social policy analysis, Raymond Bauer, pioneer in the use of social indicators is quoted as follows: "For many of the important topics on which social critics blithely pass judgment, and on which policies are made, there are no yardsticks to know if things are getting better or worse" (quoted in MacRae, 1985, p. 5); the lack of such yardsticks is in part, we believe, a measure of the difficulty involved with their

creation. In the context of mental health, the journal *Computers in Psychiatry/Psychology*, highlighting concerns expressed at a recent conference on computer use sponsored by the National Institutes of Mental Health, reported that the nature of data needed for clinical support "...has been so poorly defined as to make the problem of developing a system to meet the need virtually impossible" (Research directions, 1985, p. 22.) Finally, in the context of public schools, William Cooley has remarked that for many professionals not specifically trained and experienced in decision-oriented research, "Just figuring out what would constitute relevant information in a given situation is no easy matter..." (Duckett, 1986, p. 465.)

Confronted with the challenge just noted, we have relied on four strategies to gain a better sense of information needs and the relationship of these needs to professional role and task demands. First, we began anlayzing the progress of our colleagues in the child development, physical and occupational therapy, and speech and language programs as they used readily available software to build micro computer data bases for tracking student caseloads. This resulted in our clearer understanding of the informational value of specific data elements, and in our confronting the implementation problems within the operating environment of special programs. Second, the authors periodically met as an *ad hoc* committee to raise issues and discuss plans for the implementation of technology within our intermediate district's special education department. Third, clinical and administrative staff were asked to think about what information they relied on in their daily decision making and to outline these needs during weekly team meetings. Currently, we are asking parents to share their perspective about information important to a clearer understanding of their youngster's handicapping condition and educational programming. These four strategies have provided numerous fragmentary and whole ideas about information needs which have been conceptualized as Figure 1.

The facets of the cube in Figure 1 represent three factors we believe important in the generation and usage of information for decision making within a typical education agency. The three factors are labelled Organizing Documents, Domains of Inquiry, and Agents of Decision and Action.

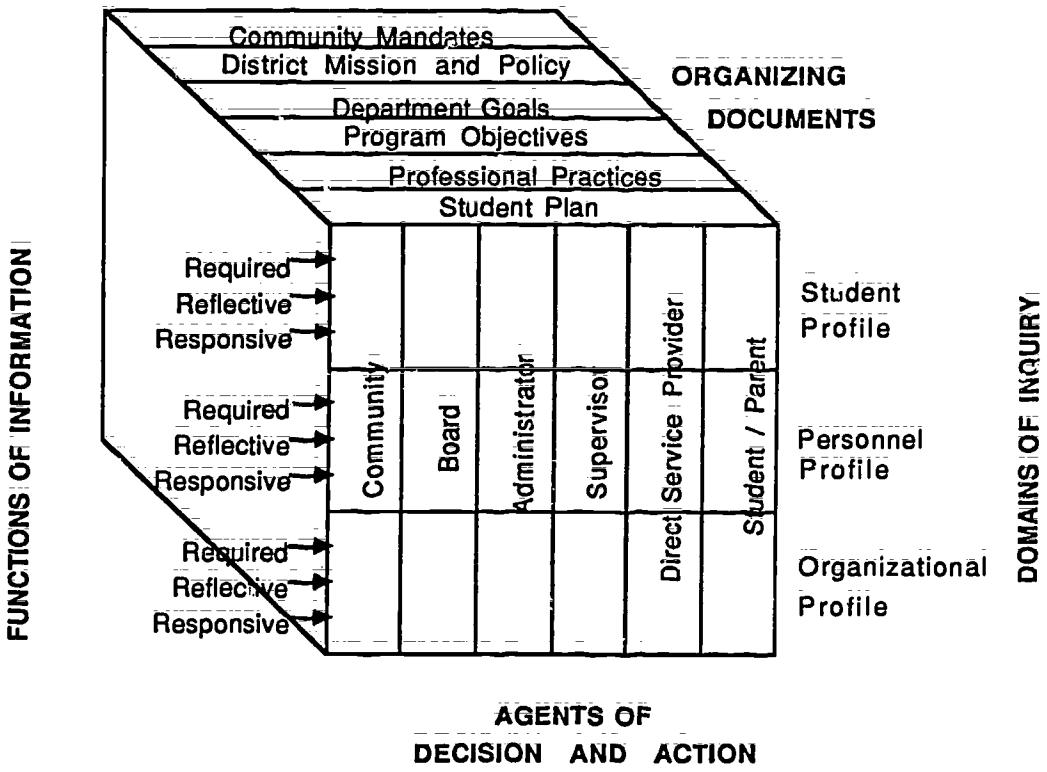

Figure 1: Three functions of information as related to Organizing Documents, Domains of Inquiry, and Agents of Decision and Action.

The "Agents" facet of the cube acknowledges persons involved with the receipt and conduct of special education. Students and parents are, of course, the immediate recipients of and participants in special education provided by direct service personnel, managed by supervisors and administrators, governed by school boards, and financed by the community as a whole. Each of these agents has a stake in the process and outcome of special education. Yet, their information needs vary as a result of their differing roles within the special education environment, and as a result of their differing perspectives of educational efficacy and equity. A comprehensive information system would take into account the diverse information needs of this constituency, and accommodate the diverse array of data that it would also be able to provide.

The "Documents" facet acknowledges the expectation that formal printed documents organize, govern, and motivate human behavior. The "Student Plan" (IEP or individual education plan), for instance, serves as a road map for the instruction and treatment of students with special needs. The IEP identifies a student's current level of functioning, the services deemed necessary for educational growth, and a monitoring system to measure progress and outcome. The IEP document is intended to govern the instructional and therapeutic activities of direct service providers. In addition, service providers may also invoke interpretations of "Professional Practices" (see Figure 1) to help resolve difficult problems-- an example being when disagreements arise within the multidisciplinary team (MDT) responsible for a student's certification or within the IEP team responsible for the course of treatment. Similarly, it is easy to imagine how "Objectives," "Goals," "Policies," and "Mandates" are intended to influence the manner in which individuals carry out their responsibilities. Experience reminds us, however, that formal documents may not necessarily bridge the gap between intention and action. A comprehensive and effective information system would, therefore, yield data to clarify issues not rigorously specified in formal documents, and also provide the authors of such documents with feedback reflecting the realities of special education practice.

The "Domains" facet identifies those aspects of the special education enterprise about which we have frequent and recurring questions. When asked to identify information important to their responsibilities, for instance, special educators with diverse job roles specified data that clustered around student, personnel, or organizational concerns. With this facet, then, we acknowledge the importance to decision making of clear, valid, and reliable profiles of: 1) the educational characteristics of individual students and their learning environments, 2) the professional characteristics of special education personnel, and 3) the organizational characteristics of the agency which governs special education activities and practice.

We contend that the three factors are necessary elements defining the fundamental structure of a data base and identifying, in global terms, data deemed worthy of gathering, storing, manipulating, and retrieving. In addition to structure, however, a data base will also have function. A description of function, which may be defined as the uses to which the data base will be put, adds greater specificity to our notion of the components to be stored within the data base. As illustrated in Figure 1, we have identified

three levels of inquiry which are the three uses or functions of our special education data base. We have determined that it will function to generate required reports, provide a resource for conducting planned inquiries, and support ongoing or mid-course decision making.

The "Required Reports" function deals with routine accountability, compliance, or summary reporting, and is similar to what Burstein has called the "Long-Range Planning" function. Burstein noted that long-range planning draws heavily on demographic, archival, and financial records due to a close linkage with policy and management issues (Burstein, 1984, p. 313.) Data such as enrollments, costs, routine community surveys, ethnic composition, handicapped child census, the number and kinds of referrals, the number of special teachers with particular certifications, and the number of children attending county-wide clinics are but a few examples familiar to both regular and special educators. Understand, however, that our conception of the required reports function extends beyond data which are important only for "organizational profiling." The need for routine information also includes issues important to "personnel profiling" (e.g. professional performance goals and subsequent attainment, job satisfaction indices, professional growth needs as related to "best practices," caseload size, case complexity), and "student profiling" (e.g. handicap severity indices, treatment priority indices, learning rates as related to particular treatments, developmental history and motivational patterns for specific handicapping conditions, IEP dates.) We recognize that our thinking is less well developed with respect to these last two profiles and believe our conception of data base "function" will aid us to more fully develop routine reports based on personnel and student data, both of which are important to local policy issues. The required reports function is related to the discussion of assumption 2, above.

The "Reflective Practice" function of the data base originates from our need to deal with an often confusing and ill-defined set of problems that may resist our best theories, practices, and efforts. At such times, we must plan inquiry to identify salient variables, determine the interaction among variables, or estimate treatment effects. Summative evaluation (Madaus, Scriven, & Stufflebeam, 1983) is characteristic of the type of activity surrounding this use of the data base. As with the required reports function, the reflective practice function may be designed to shed light on organizational

level variables, personnel variables, or student variables. An example of the latter is a two-year follow-up study we have just completed of the school experiences of children screened in our annual, county-wide preschool clinic. Results of the study will impact on our knowledge of student achievement characteristics, will provide new insights for parents, direct service providers, and supervisors, and will inform organizational mission and goal statements. An example of reflective practice within the personnel domain (see Figure 1), might involve a study seeking to understand the special/regular educator relationship and its influence on the decision by special educators to provide either direct or consultative services to regular classrooms. It is easy to imagine planned studies at the organizational level that would rely on the availability of a special education data base. The reflective practice function is related to the discussion of assumptions 1, 2, and 3, above.

The "Decision Responsive" function of the data base results from a need to continuously monitor special education activities during implementation and make corrections to clinical, supervisorial, administrative, and organizational practices. This data base component deals with "formative decision making" (Madaus, Scriven, & Stufflebeam, 1983) and is motivated by a desire to understand when and how to make "mid-course" corrections to ongoing activities. Using a data base for decision responsive purposes means analyzing continuously updated data to determine antecedent, sequential, and consequent conditions surrounding individual and organizational behaviors. This orientation has been labelled "monitoring and tailoring" by Cooley and Bickel (1986,) and was described in a recently published interview as follows: "Through continuous data collection and analysis, we develop and monitor a variety of performance indicators--trends, exceptions, outliers. Then when an indicator moves into the unacceptable range, we attempt to determine just where that condition is most severe. 'Tailoring' refers to whatever corrective action our client then focuses on that problem" (Cooley, quoted by Duckett, 1986, p. 465.) To this we would simply add that steering toward objectives by means of monitoring and tailoring should focus not only on organizational variables, but also on personnel variables and particularly on student variables. The decision responsive function is related to the discussion of assumptions 3, 4, 5, and 6, above.

In a subsequent paper, we will further clarify what we mean by the "decision responsive function" of a data base and its

application by clinical staff who provide direct or consultative service to children. We will be aided in our efforts by the recent and considerable progress being made in the conceptualization of decision-responsive data systems with respect to student programming (see for example Tucker, 1981; *Exceptional Children*, 1985, *School Psychology Review*, 1986.)

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Concepts are like mountains
Initially impossible to scale
Later accessible only to experts
And finally a Sunday morning stroll in the park

Robert W. Earl