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ABSTRACT

The microcomputer offers social science field researchers a valuable tool for managing qualitative research data. In addition to the flexibility and efficiency of the microcomputer, the logic governing its programming and operation imposes a framework on the research process which necessitates that research decisions and strategies be explicit and logical. This progression enhances methodological rigor and improves the capacity of the research for generating and testing hypothesis. A key to the effective use of the microcomputer is its integration into the overall design of the research. Having such a helpful tool facilitating data storage and analysis provides relief to labor-intensive qualitative research, motivation to continue researching, and helps guide subsequent data collection. The Alternative State Policy Mechanisms (ASPMp) Project is an example of a field study that is ideally suited to the use of microcomputers. By using the working hypothesis as a framework for data collection and capitalizing on the flexibility of the "Quickfile II" program, the project is able to increase the efficiency of data storage and retrieval, which, in turn, enhances the analytical process. On the other hand, the Assistant Principalship study presents some conditions where the disadvantages of using microcomputers outweigh the advantages. This example involves practical as well as research design issues, which may aid researchers as they consider the risks and benefits of computer assistance. A three-page reference list concludes the document.
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Analysis of Qualitative Data with Microcomputers

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INTRODUCTION

Traditionally, the tools of the field researcher have been simple ones: the notebook and pencil. The tape recorder, video tape, and film camera are more recent additions to the researcher's tool kit. Characteristically, qualitative research methods employ these tools to uncover rich data deeply embedded in context. This richness of context allows the researcher to study complex processes. Richness of context also creates problems. The data is often difficult to categorize and manipulate, but the process analysis in field research requires the nimble manipulation of data (Glaser & Strauss, 1978; Huberman and Miles, 1984).

In qualitative research, large amounts of data are gathered which must be analyzed. Before they can be analyzed, the data must be coded and stored in a way which allows them to be retrieved according to the demands of the research. It is crucial to develop a technique for retrieving the huge amounts of data which may be generated in the field (Strauss, 1964; Levine, 1983; Huberman and Miles, 1983, 1984).

With the advent of the microcomputer, researchers have been discovering a useful tool for collecting, storing, and retrieving data in social science research. In 1964, Strauss described the use of computers in qualitative research as "an uncharted possibility" (in McCall and Simmons, 1969, p.75), and researchers are just beginning to understand the potential of this new research tool (Collins, 1982).

This paper will explore microcomputer applications in qualitative social science research. Emphasis will be placed on the application of microcomputer technology by social scientists who are

microcomputer users, rather than programmers or technical experts. After describing some theoretical considerations, the paper will describe models for microcomputer applications in social science research. Finally, the use of microcomputers will be applied to two specific field studies, on state education policy formulation and on the socialization of assistant principals. Sample files for storing data from one research project will be presented and explained.

RESEARCH ISSUES AND MICROCOMPUTER USES

Qualitative research is particularly used for exploration for meaning and for generating grounded theory (Marshall, 1985a; Glaser and Strauss, 1967). Researchers must maintain the openness and ability to alter categories and groupings, in response to new insights from data. Flexibility is necessary in field work which results in the generation of theory. Lutz and Iannaccone (1969) describe the process of data analysis as occurring simultaneously with data collection and the generation of descriptive statements based on the data collected in the field.

The steps in the process of data analysis are not necessarily sequential or discrete, one being completed before the other begins. Rather the field investigator moves between /the steps/, each feeding back to the other until the data no longer modify the statements (p.135).

Glaser and Strauss (1967) guide qualitative researchers in ways to make the most of insights through systematic comparative analysis. A logical, explicit sequence of data collection decisions will facilitate systematic comparative analysis and free qualitative research from its critics. Huberman and Miles (1983) point out that there has existed a somewhat magical belief in the intuitive insights

of the ethnographer as s/he reduces and analyzes data in ways which defy communication. However, processes of analytic induction, intuition, and researcher insight can be strengthened with tools which can display an explicit logic and follow researchers' order⁵ in arranging data. Used in an appropriate model, the microcomputer can assist the researcher in maintaining the balance between logic and intuition. The use of the microcomputer requires that data be arranged in logical units so that they can be stored and retrieved within the framework of a program. Researchers' conceptual categories and analytic questions must guide the data storage and manipulation.

Field research can benefit from such an approach, since it can guide data collection logically, and can enhance methodological rigor. According to Piotrkowski (1978, p.287), qualitative methodology has been criticized for its lack of methodological rigor due to the "mythology" which surrounds the processes of social science research.

LeCompte and Goetz (1982), too, point out that the analytic processes of qualitative researchers are often "vague, intuitive, and personalistic" (p.40). Still, reliability in qualitative research depends upon the extent to which other researchers are able to reconstruct the analytic strategies by which research findings were arrived at.

Validity in qualitative research refers to the extent to which research findings match conditions in real life. According to LeCompte and Goetz, "the ethnographic task is to establish which baseline data remain stable over time, and which data change" (1982, p.45). When data are arranged in logical units, it is easier to determine which data have changed and which have remained the same.

Daniela Weinberg, in 1974, described how the computer can not

only assist in the management of data, but can help structure data collection through the use of "algorithmic thinking." Weinberg defines an algorithm as "... a procedure ... for achieving some desired goal" (p.292) which is stated in logical, sequential steps. As Weinberg describes it in relation to field research, algorithmic thinking involves a series of decisions which shape the direction of data collection based on results achieved from the processing of earlier data. Thus, algorithmic thinking allows the researcher to build a framework for data collection and data analysis which is logical, clear, and replicable.

Algorithmic thinking parallels the process by which computers are programmed, and by which they operate. A series of logical, sequential questions is asked, and a strategic decision is made based on the answer.

Using the microcomputer in an intermediate role, social scientists can begin to alleviate what Sproull and Sproull have called ... a cruel trade-off between the complexity of the information they can extract from social settings and the analytic power they bring to bear on it.... In the future, computer assisted analysis will be as common as is statistical analysis today (1982, p.283).

Thus, the use of microcomputer technology for storing, retrieving, managing, and ordering qualitative data holds promise for easing labor-intensive research. However, researchers must ensure that its use is determined by the research project's design needs, and not vice versa. The computer can be a slave to the project, but the research design must direct its uses.

MODELS OF MICROCOMPUTER APPLICATIONS IN FIELD RESEARCH

Daniela and Gerald Weinberg (1972) were among the early users of microcomputers in field research. They wrote that "any anthropologist knows that no two aspects of science could be further apart than the orderly, rational, clean computer and the irrational, dirty job of field work" (p. 10). In spite of this apparent dichotomy, the Weinbergs did report that they used the computer successfully to guide their field work. Sailer (1984) reported successful use for managing field notes, and created a newsletter for exchange of information in computer assisted anthropology research.

Microcomputers, and the logical thinking process which accompanies their use, are tools (like the notebook and pencil) which serve a very specific function. Used appropriately, they can increase the efficiency of the researcher in gathering, storing, and retrieving data. Increased efficiency in data storage and retrieval has important implications for the validity and reliability of the research as well. While not referring specifically to microcomputers, Mills (1959) maintained that careful development and maintenance of fact and data files are essential ingredients in the intellectual craftsmanship which should characterize the scholarly work of the social scientist.

According to Collins (1982), two primary models of microcomputer applications are of interest to field researchers. The first is the use of the microcomputer as an "intelligent terminal" hooked up to a main frame. In such a system, the microcomputer can be taken into the field, often to remote areas, and data can be entered directly as they are collected in the field. A telephone model connects the microcomputer to a mainframe, and at various intervals, data is transmitted from the microcomputer to the mainframe via telephone.

Software is available commercially which allows the interface of nearly any microcomputer with a mainframe computer.

In the second model, the microcomputer is used as a stand-alone system. In this case, the model^M is only necessary if communication with another terminal is desired, as in the case of multi-site research. The limitations of the microcomputer as a stand-alone system are capacity and speed. Microcomputers are able to store far less data than a mainframe, and they process data more slowly. Nevertheless, as Collins (1982) points out, social science research usually includes a relatively small number of cases, and the capacity of the microcomputer is adequate to handle the data.

Dow (1982) used this system while studying the Otami Indians in rural Mexico. Even in this remote setting, he found that the available electric power was sufficient to operate a portable 64-kilobyte Osborne-1 microcomputer and modem. The only adaptive equipment he found necessary was an electric surge suppressor to protect the equipment from variances in electric power. Dow did regret not having included word processing capability in his system.

Dow used the microcomputer to develop and store data files. He used the microcomputer in an intermediate role which included recording, indexing, and presenting data prior to final analysis. According to Dow, this intermediate role made it unnecessary for the researcher to know precisely how the data will be analyzed at a later point in the project (1982).

In the model used by Dow, the microcomputer is used to record, maintain, and provide access to a file or files of information gathered during field work. Data storage and retrieval functions are simply transferred to an electronic medium; it is still the human

researcher who analyzes the data and performs the creative tasks of field research. Other researchers, such as Weinberg (1974) do consider the computer a tool for analysis. However, the computer must be programmed in order to complete any task, and the program is ultimately of human design.

PRACTICAL ISSUES: HARDWARE AND SOFTWARE

The technology of the microcomputer is rapidly expanding the capacity of hardware. The Apple IIe and Apple III are currently available with 516 kilobytes of memory, and thus the capacity to handle far larger amounts of data than the 48-kilobyte system of which Collins wrote. In Apple IIe and MacIntosh systems, 128 kilobytes of memory, nearly three times the capacity of Collins' system, is standard. Microcomputers, such as the Apple IIe, can be equipped to run on hard disks, thus further increasing the capacity and quality of data storage, and the speed of storage retrieval.

Although the mainframe actually processes data faster, the cost of owning and operating one is beyond the means of most individuals. Mainframes are usually owned by businesses or institutions, and users must share time on the equipment. Time-sharing necessitates batch processing of data, which increases both the turnaround time and the possibility of error. In spite of its slower actual processing time, the microcomputer provides more rapid feedback to researchers, often while they are still in the field. This resulted in more precise data checking (Weinberg and Weinberg, 1972), heightened team morale, interest, and enthusiasm in the project, and a sharpened research focus (Kirk, 1981).

Whether the microcomputer is used as an "intelligent terminal" or a stand-alone system, it is relatively easy to use. While the

mainframe requires specialized personnel to program and operate the hardware (personnel often disinterested in the research), the microcomputer can be operated by the researcher using any of a number of commercially prepared programs which can be modified by the user. This prevents what Collins (1981) refers to as the "... alienation of the social scientist from his means of production" (p.439).

The microcomputer offers the social science researcher an efficient new tool for the storage and retrieval of research data. The equipment is easy to use, within the budgets of most social science researchers, and has a number of advantages over the notebook and pencil at one end of the spectrum, and the mainframe computer at the other end. Careful application of computer technology to qualitative study can free the researcher from routine activities and manage data efficiently. The rapid feedback capability of the microcomputer enhances motivation and interest, and allows for the adjustment of research methods or research design.

DECISIONMAKING FOR USING COMPUTERS: TWO RESEARCH PROJECT EXAMPLES THE ASPM PROJECT

The Alternative State Policy Mechanisms (ASPM) Project is a multi-site field study which has as its focus the process by which education policy is formulated at the state level (Mitchell, Wirt, and Marshall, 1982). The primary working hypothesis is that all important state education policies rely on some combination of policy mechanisms to pursue one or more of three fundamental policy goals: equity, efficiency, and/or quality.

The policy mechanisms are:

1. School Organization and Governance: the assignment of

authority and responsibility to various groups and individuals.

2. School Finance: decisions controlling who pays for education and how the costs of education are distributed, and how human and fiscal resources are distributed.

3. Buildings and Facilities: rules for minimum standards and procedures affecting the physical surroundings for education programs.

4. Personnel Training and Certification: the nature and extent of preparation required to get or keep various jobs in the school system.

5. School Program Definition: decisions governing program planning and accreditation, or otherwise specifying what schools must teach and how long they must teach it.

6. Curriculum Materials Development and Selection: determination of the quality and quantity of textbooks and instructional materials.

7. Student Testing and Assessment: the timing and consequences of testing, including the subjects covered and the distribution of test data.

The study seeks to achieve three objectives: to identify and describe the basic state policy mechanisms as they operate in each of the sample states; to determine how policy choices are influenced by fundamental values; to explore how various social, economic, political, and/or educational conditions effect policy choices within each state. The research will attempt to describe the full range of policy mechanisms available to state level policy makers in their efforts to control and improve public schools.

Six states have been chosen as being representative, based on the political culture, demographic characteristics, level of fiscal stress

of each state, and the level of activity with regard to the state policy mechanisms. The sample states were chosen because they struck a balance with regard to economy of data collection, maximizing the diversity of state characteristics, and access to the necessary data. In each of the states there is evidence of recent activity in several policy areas.

Since the aim of the research is to investigate a complex process, it is ideally suited to field study techniques. The research combines qualitative and quantitative methods in comparative case studies. In the initial phase of the project, an exploratory study will be made of each state's policy making process, and a descriptive narrative will be generated.

Data are drawn from three main sources: documents, reports, and the perceptions of key policy actors and knowledgeable outside observers associated with the policy making process in each state. The study conducted by Marshall and Lynch focuses on the education policy formulation process in Pennsylvania. The research aims both to test the categories which form the working hypothesis, and explore for additional data categories. It is essential that early and frequent feedback be provided to the researcher so that adjustments in design or data collection can be made where indicated (Kirk, 1981; Huberman and Miles, 1983). Also, the large amounts of data that will be generated necessitate the careful and orderly categorization and storage of research data (Levine, 1982; Huberman and Miles, 1983). For these reasons, the study seems ideally suited to the use of microcomputers.

Microcomputer Application to the ASPM Project. The suitability of the research project itself is only one aspect of the decision to

use a microcomputer to manage qualitative data. Several other things must be considered as well. A primary consideration is access to microcomputer hardware, and the knowledge to use the hardware. If microcomputer management of qualitative research data is to be effective, the researcher must have free unrestricted access to computer hardware. Ideally, the researcher owns the necessary computer hardware. A less desirable, but suitable alternative is the computer lab, an increasingly common phenomenon in school and university settings. In such an arrangement, the researcher would have free access to the necessary computer hardware through the school or university with which s/he is associated.

An additional consideration is the skill level of the researcher in using the microcomputer. An important point of this paper is that the social scientist need not be a computer programmer or technician to use the microcomputer successfully in qualitative research. Nevertheless, it is important that the researcher have, or be willing to develop, some basic user literacy with the computer equipment to be used in the research. Additional time may be required for the researcher to become familiar with the specific data management program selected.

The selection of a data management program is an important consideration which is closely tied to the design of the study. The purpose of using the computer in the ASPM study was to sort data according to clearly defined categories which would allow for efficient storage, high accessibility, maximum manipulability and ensure research feedback. The computer program selected impacts heavily on how data are organized, stored, manipulated, retrieved, and ultimately fed back to the researcher. Huberman and Miles (1983)

state that

...qualitative data need to be reduced for any kind of analysis to occur, and the choice of a reduction strategy or heuristic will determine what kind of analysis is possible and will thus foreclose others (p.286).

The computer program is, in effect, a data reduction strategy and heuristic. It is therefore necessary to determine what job the researcher wants the computer to perform in the research. For example, an archeologist who is excavating primitive artifacts may wish to catalog items according to physical characteristics. This task requires a file program. The anthropologist conducting participant observation may need a program which allows for rich contextual description as a means of discovering categories. A word processing program is better suited to such needs. Researchers may discover the need for more than one type of program depending on the design of the study. The anthropologist may need to catalog cultural artifacts as well as describe behavioral phenomena, and the archeologist may wish to describe in rich detail certain artifacts, or the techniques used in unearthing them.

Selecting an appropriate computer program then, requires that the researcher answer the questions, "What kind of data do I have?" and "What do I want to do with them?" The main sources of data gathered at the Pennsylvania ASPM site are elite interviews and document analysis. Some participant observation has also been conducted, but it involves verbal interchange and has yielded data similar in nature to interview data. Data are coded as they are collected and stored, using categories derived from the theoretical framework of the study. Nevertheless, there is an important exploratory aspect to the study

which required the ability to respond to information which continually arises from the field. The research design and the means of sorting and analyzing data had to remain flexible. The need was for a program which would store interview data in a file format which maximized both the length of each record and the manipulability of records and files.

The truly ideal program would be one written specifically for the ASPM project. That would require a programmer with sophisticated skills. Since neither Marshall nor Lynch had such skills, and since the research budget precluded the possibility of hiring a trained programmer, a commercially prepared program had to be selected. As Wirt (1980) has pointed out, "As wisdom and wealth are finite for every person, some trade-offs are required in any research, and these provide the mixes of which strategies are made" (p.182).

Making strategic research decisions requires a solid grasp of qualitative research methodology, since, as Wirt points out, trade-off decisions must be made. Such decisions will inevitably affect the design of the research and must be made with the utmost care and deliberation. A consideration of the design characteristics and data management needs of the ASPM project resulted in a profile of an ideal program.

The ASPM project required a program which was quick to learn and easy to use, since the researchers had little experience with computing. Also for that reason, the program had to have what Collins (1982) considers the hallmark of a quality interactive program: it had to query the user in closed-ended questions which moved the user through the steps of entering, reviewing, changing, saving, and retrieving data. The ideal program would allow for data to be manipulated according to many variables, and would interface with a

word processing program so that reports could be generated which would contain both text and data. The ideal program also allows for large file and record capacity, and the ability to move data between and among records and files without manually re-entering the data.

The selection of the Quickfile II filing program became the type of strategic decision of which Wirt spoke. Programs are commercially available which are more sophisticated than Quickfile II, but each has other characteristics which make it a less desirable alternative than Quickfile II. For example, dBase II (Tate, 1980) has far greater capacity in each record and file, but it requires a very powerful computer, is not available for the Apple IIe which the researchers were using, and requires knowledge of programming. In addition, it costs about four times as much as Quickfile II. dBase III, an up-dated version of dBase II is menu-driven and easier to use, but it is very expensive. DB Master allows for great flexibility and capacity in storing, manipulating, and retrieving data, but it requires frequent changing of disks in and out of disk drives. This can be confusing, annoying, and can result in the inadvertent erasing of data disks. It is far more complicated to use than is Quickfile II.

dBase II (1980), dBase III (1984) and DB Master (1984) allow the researcher to transfer records from one file to another electronically, and to combine files. Files can be electronically moved with Quickfile II, but they cannot be merged electronically, and individual records must be moved from one file to another by hand. Nevertheless, cost, ease of use, and simplicity of the required hardware make Quickfile II the most desirable alternative. PFS (Apple, 1982) provides far more room for data in each record, but the

data cannot be manipulated in as many ways as Quickfile II allows.

Quickfile II is a program which meets most, but not all of the major criteria. The program is designed exclusively for the Apple IIe computer, and is a highly flexible file program which is quickly learned and easy to use, and allows the user to modify both file and report formats. The program allows the user to arrange information according to user determined conditions. Information can be added, deleted, or changed easily, and reports can be written in formats designed by the user.

Quickfile II requires an Apple IIe computer with at least 64k capacity, an 80-column monitor, at least two disk drives, with one controller card for every two drives, the Quickfile II program disk, and the Quickfile II manual. The system will operate without a printer, but a printer allows hard copy reports to be generated.

The Quickfile II system disk, which is inserted into disk drive #1, "boots up" the system, formats the data disk in drive #2, and contains the programming instructions which allow complex manipulation of the data. The disk which is inserted into drive #2 contains all the information entered into the computer by the user. Through a series of simple instructions and specific questions, the user structures the files by defining categories, and enters, changes, or deletes data. The user follows a similar process to set the conditions by which data is retrieved and reported.

An important program accessory is the manual, which is written in clear, simple language. It describes the step-by-step process involved in creating, manipulating, and reporting on files. The manual contains a special chapter on how to interface Quickfile II with the word processing program Applewriter to generate reports which contain

both text and data.

It is important that files contain enough space so that data are not artificially reduced or disjointed by the file structure. One data disk has the capacity to hold twenty-six files. A single file can contain up to 140 records per file, assuming an average record of seventy-five characters and 64k capacity. Most of the ASPM records are considerably longer than seventy-five characters, and thus each file holds fewer than 140 records. This is one limitation of the program, and it must be compensated for by creating more files. Each record has a capacity of 1040 characters arranged in up to fifteen lines of text. Each line can be designated as a separate category.

File Structure. The ASPM records have been designed to reflect the theoretical construct which forms the working hypothesis of the study. Kirk (1981) emphasized the need to design the file structure prior to entering the field. Merritt and Coombs (1977) stated that the kind of comparative field study which is needed in education is based upon the hypothesis that certain independent variables are associated with certain dependent variables. A design of this type allows for a systematic cross-system comparison, which Merritt and Coombs(1977) maintain is essential to the development of theory.

Wirt (1980) has developed a model for comparative research which focuses on the selection of units of analysis which, he maintains, must be guided by theory.

But when we compare, our attention must be directed to the same level of government, the same processes by which state education policy is made, and the same professional and lay groups.... The point to be made is that theory guides us to the units of analysis--the governmental bodies and processes,

pressure groups, and policies--which must be compared to test that theory (p.177).

According to Wirt (1980), it is only by rigorous application of comparative methodology that the researcher is able to test for causal relationships which may be only implied in a complex process such as policymaking. Without such rigor, theory can be neither generated nor tested (Burlingame and Geske, 1979).

The ASPM file structure reflects this concern with comparable units of analysis, and what Wirt (1980) calls "an essential consequence of the guiding theory" (p.182). Nevertheless, it retains the ability to respond to information which arises from the field during data collection and data analysis. The original record structure had fifteen designated lines of data. (See Figure One.)

The first line of each record (REF) identifies the informant, and gives the location of the raw data. The "CODE" lines indicate codes by which the data may be retrieved. Initially, these codes were taken from the policy mechanisms and policy goals which form the basis of the working hypothesis. By organizing the records according to these codes, several points of sound research are addressed. Categories for data collection are taken from theory and are established prior to entering the field. This insures the collection of comparable data from site to site and from researcher to researcher. In addition, the codes serve as the basis for systematic comparison of individual pieces of data.

As data collection proceeds, codes may be added, deleted, or modified. The Quickfile II program will save up to nine previous versions of a file on the same disk, labeling them with the prefixes "OLD-1" through "OLD-9". This allows the progress of analysis to be

tracked through several modifications, an important feature if it becomes necessary to retrace the decisions which effected data collection or data analysis.

Data categories are easily changed at various points in the analysis by selecting the "Review/Add/Change" option from the program menu. A single letter or word can be changed without disturbing the rest of the file, or the whole file can be changed or deleted without disturbing other files. Thus, the program is well suited to field study, which is characterized by continually emerging analysis, and the constant manipulation of data.

As previously indicated, Quickfile II gives the researcher the ability to change any entry bearing the codes of those mechanisms which have been modified without disturbing any other files. However, at a later point in the analysis, it may be necessary to review the data with all seven mechanisms included. Quickfile II gives the researcher two options: an old version of the file can be saved, and the extraneous data deleted from the newer version; or the data on all three eliminated categories can remain on disk but will not be retrieved when the data is reported on the screen or in hard copy. The first option conserves valuable disk space, and so is preferable.

The need to conserve file space precipitated the need to make another modification in the file structure. Using category indicators on each line is necessary in order to retrieve information. Nevertheless, the indicators use space which could be used for data. Reducing the characters of category indicator to one character per line saves disk space. In any given record it may save only a few characters, but over the course of an entire file, it may mean the difference between a full disk, and the space to add a few more

records. The new file took the format seen in Figure Two.

The reference line indicates that this entry came from the first round of data collection in Pennsylvania. The number 35 identifies the informant. The raw data can be found on tape #62, side 1, at approximately the point indicated by #117 on the counter. Thus, the record is still easily understood, but fewer characters have been used to structure the file. This leaves more space on the file for data. The only difference is the space which is saved by the modified file structure. Data which exceeds the 1040 character-per-record limit can be spread over two or more records. The notation "Cont'd" is included in the y reference line. Coding multi-record entries with identical codes insures that the entry will be retrieved completely.

The data from each interview are stored in a separate file. The large amount of data and the restricted space in each file necessitate that data be spread over several disks. While Quickfile II allows for only one file to be opened at a time, files from alternate disks can be accessed without re-booting the system, and files can be transferred electronically from one disk to another without erasing them from the original disk. Also, individual records from any number of different files can be printed out in a single report, thus allowing for the consideration of individual pieces of data in juxtaposition. Interview data and document data use the same basic record and file structure.

Retrieving and Reporting Data. Quickfile II is at its best when given retrieval and report commands. Information can be retrieved according to any designation in the fifteen line record. Data can be retrieved according to informant name, policy mechanisms, or by word, number, or symbol in any line of the text. Data can also be retrieved

according to two or more variables under specified conditions (e.g., "y contains 1 and 4" or "y contains 1, or 4, or 5", etc.). Full directions are included in the Quickfile II manual.

As indicated previously, data can be reported as labels or as tables. The labels format prints the full text of each record, while the tables format is structured to provide a quick glance at the information in the first several lines. The ASPM files have been structured to include the y and z reference lines in a table report format. This provides a quick reference to the data contained in a specific file. Full instructions for generating reports are included in the manual and examples are included in Appendix B.

THE ASSISTANT PRINCIPALSHIP STUDY

This section describes the research design decisionmaking that led to the choice to not use computer-assisted data analysis, even though, like the ASPM Project, it was a qualitative study involving multiple sites and several researchers.

The Assistant Principalship study, conceived and managed by Marshall to include field study methods, gathering data by using four field study researchers in 24 sites, was to explore, discover, and describe the processes by which entry level administrators learn, on the job, the behaviors, norms, and attitudes of administrators and form an orientation to the role of educational leader (Marshall, 1984 and 1985b). It aimed to develop conceptual categories to guide analysis from juxtaposition of the words, actions, and subjective meaning-making of assistant principals with theory of adult socialization and related literature on the administrative career.

The Assistant Principalship study was conceived within an overarching theoretical framework but each researcher had a particular

strand or focus. One focused on the way in which managing the discipline function enhanced or limited an assistant principal's opportunity for mobility and orientation to the administrator role. One focused on the assistant principalship as part of the recruitment, assessment, and selection system in administration. A third focused on the functioning of the assistant principalship on women's access to the administrative career. The fourth researcher focused on the instructional leadership function to see how it is assigned and managed, and how it affects the role orientation and mobility of assistant principals. In addition, all of the researchers were exploring questions about the assistant principal and special education management, community relations and politics management, and policy implementation.

The research design facilitated the exploration both within these foci as well as across the cases and the foci. Thus, in analyzing data from a subject who spends a great deal of time on instructional leadership, the research project could also explore questions about assessment and mobility systems. Similarly, while focusing on the issue of women in administration, the researchers could explore for any connection between the gender issue, modes of policy implementation, and the meaning of politics for assistant principals. Each of the 24 cases could have multiple utility and would allow indepth analysis of each focus across all cases. In addition, the research design provided for the discovering of connections and allowed for the within-research design decisions to alter foci and follow up on intriguing leads.

Thus the research design allowed intensive and extensive exploration for meaning and connections and benefitted from the

multiple insights of the project director and each of the four researchers, in planned team analysis sessions as well as in each focus. All of the researchers had received instruction in field study methodology and qualitative data analysis. They were all education practitioners. Each had similar conceptual frameworks, derived from a common reading list on professional socialization and on the administrative career. Each was doing her/his dissertation within the project. The team also established structures to facilitate the sharing of data and insights, including "Request For Data" forms, "Analytic Memoes," "Site Summaries," "Construct Descriptions," "Data Displays," and "Assistant Principalship Project Meeting Minutes." Many of these structures were fashioned as adaptations from Miles and Huberman's models. These structures were constructed following the advice of Louis (1982) and reflection on cross-case analysis in large qualitative research projects.

The Assistant Principalship Project was developing methods for cross-case analysis at the same time that Marshall and Lynch were developing methods for computer-assisted data analysis for the ASPM project, so it seemed natural to consider using computers in this project as well. The research design decisionmaking, leading to the decision to not use computers, serves as an illustration that explicates the essential questions and issues.

Practical Issues: Access, Hardware, and Software. The Assistant Principalship Project was unfunded, and built upon coordinated dissertation research, in which each researcher provided his/her own resources. Several, but not all, had access to computers, but of different brands. Therefore, the search for appropriate software

would be encumbered by this incompatibility. While one researcher might develop methods for some of the cases, it would be difficult to enforce a demand that everyone buy a specific computer and the same program. Additionally, these researcher varied in their ability to learn computer use quickly, to grasp and apply the logic of field study methods and qualitative data analysis and at the same time, to make wise decisions in using the computer as a tool. In using the computer the researcher must make decisions--about conceptual categories, about the bulk, length, or size of the data bits to be stored, about the ways to build in desired flexibility while designing files. In this way, the computer will indeed be a useful servant to a wise master. In this Assistant Principal project there was the risk that deceptive simplicity, and its complexity, would divert the researchers from the main tasks.

Methodological Issues. Another related risk was that the researcher would be led away from exploration and discovery by the computer program's abilities to organize and report on demand. This research project aimed to explore and discover connections, distinctions, and create categories from analytic induction, from rich and complex data from many sites. Without methodological sophistication and total grasp of the distinction between research that aims to explore and research that means to test-in-context, the researchers risked being led by the computer's innate skills into unpromising but mechanically neat analyses. (See Marshall, 1985, for this distinction between qualitative research that explores-for-meaning and that which tests-in-context.)

Ideally, cross-case analysis in a large project should be accompanied by nearly simultaneous data collection, structured as well

as free flowing communication, and continuous, equally shared data analysis. Researchers should have times where, with early data in front of them, they explore whether guiding hypotheses fit or not, what are new hypotheses, what are probable workable ways to categorize data, what new data are needed, and what new analytic questions are emerging from this early analysis. The team, with early data from a range of sites, would go through this process together.

However, the Assistant Principal researchers differed in the amount of time and energy they could devote, at any one time, to the research. Consequently, one individual would burst ahead with data collection and analysis, while another was still examining background literature or identifying potential subjects. While this is not the ideal set up for cross-case analysis, ensuing problems might be exacerbated by use of the computer. The rushing-ahead researcher, aided by computer programs and the ability to put data into neat retrievable files under analytic categories, might close in too quickly, or set in place prematurely, her/his analysis, leaving the slower researchers to merely search for further data within the focus already arrived at.

Thus, the decision was made, that computers would be used only for word processing of site summaries, and for creating easily-altered matrices. Clearly, the opportunity still exists for computer-assisted secondary analysis. Perhaps computers can be used if the Assistant Principalship Project discovers and describes the kind of clear categories and focused direction of the ASPM project. The important point to be made, however, is that computers should not be used if they would threaten the integrity, viability, and the quality for exploration that characterize many of the studies which use

qualitative methods.

SUMMARY

The microcomputer offers field researchers a valuable tool for managing qualitative research data either as an intelligent terminal connected to a mainframe computer, or as a stand-alone system.

The price of the microcomputer puts it within the ability of most social science researchers to own. This allows the use of the microcomputer exclusively for a single research project. Having a helpful tool facilitating data storage and analysis provides relief to labor-intensive qualitative research, motivation to continue researching and helps guide subsequent data collection.

The microcomputer operates according to a logic which it imposes on the data which are stored within it. Properly applied to qualitative research data, the microcomputer and the logic which accompanies its use can enhance the overall rigor of qualitative research, and improve the efficiency of the researcher. A key to the effective use of the microcomputer is its integration into the overall design of the research. This is accomplished through a series of strategic decisions which define the role of the microcomputer with regard to the ends of the research.

The ASPM project is an example of microcomputer applications in field study. By using the working hypothesis as a framework for data collection and by capitalizing on the flexibility of the Quickfile II program, the ASPM project is able to increase the efficiency of data storage and retrieval. As a result, the analytical process is enhanced as well.

The Assistant Principalship Project presents some conditions where the disadvantages of using microcomputers outweigh the

advantages. This example of practical as well as research design issues may aid other researchers as they consider the risks and benefits of computer-assistance.

The microcomputer cannot replace the human researcher. The more complex and creative tasks must still be the work of the human mind. Nevertheless, the logic which governs the programming and operation of the microcomputer imposes a framework on the research process which necessitates that research decisions and research strategies be explicit and logical. The explicit and logical progression of the research will enhance methodological rigor and improve the capacity of the research for generating and testing hypotheses (Iannaccone, 1975; Burlingame and Geske, 1979; Huberman and Miles, 1984). Furthermore, it will allow other researchers to trace the logic of the research process, bringing it out of the realm of the mystical.

As demonstrated by the ASPM project, the microcomputer merely transfers to an electronic medium the more mundane tasks of data storage and data retrieval. In doing so, it frees the researcher to complete the complex task of analysis. The microcomputer is a flexible and efficient tool for assisting the social science researcher in the process of inquiry.

FIGURE ONE

REF:Senator Jones Tape 3A #476

CODE:Governance

CODE:

1 I came here in 1961. The theory was to set a generally decent
2 state standard but allow a lot of latitude locally. We're
3 always criticized for it being the reverse, but that was
4 really not true. Now we're seeing what it's like when it is
5 in the reverse.

6

7

8

9

10

11

12

FIGURE TWO

xPA/01/35;T62,S1,117-1205Q

z4AJQR

xI would respect the Secty's and the Govr's position as far
xas I could go with it. Support it, move it, not raise hell
xw/the state board on Ch 5 because I thought the Secty and
xthe Govr were pleased with it the way it was going. I knew
xthe other house wasn't, but I understand that too. I won't
xcreate a war over it...What would I create a war over? So
xfar I can't think of anything.

x

x

x

x

x

x

References

- Apple Computer Company. (1982). Quickfile II. Cupertino, CA.
- Applewriter (1981). Cupertino, CA: Apple Corporation.
- Burlingame, M., & Geske, T. B. (1979, Spring). State politics and education: An examination of selected multiple-state case studies. Educational Administration Quarterly, 15(2), 50-75.
- Collins, T. W. (1981, May). Social science research and the microcomputer. Sociological Methods & Research, 9(4), 438-459.
- db master, Four Plus Version. (1984). San Rafael, CA: Stoneware.
- dbase 2 (1980). Ashton Tate.
- dbase 3 (1984). Ashton Tate.
- Dow, J. (1982, December). The combined use of computer and audio tape recorders in storing, managing, and using qualitative verbal ethnographic data. A paper presented at the 81st annual meeting of the American Anthropological Association, Washington, D.C.
- Glaser, B. G., & Strauss, A. L. (1967). The discovery of grounded theory: Strategies for qualitative research. New York: Aldine Publishing Company.
- Huberman, A. M., & Miles, M. B. (1983). Drawing valid meaning from qualitative data: Some techniques of data reduction and display. Quantity & Quality, 17, 281-339.
- Huberman, A. M., & Miles, M. B. (1984, May). Drawing valid meaning from qualitative data: Toward a shared craft. Educational Researcher, 13(5), 20-30.
- Iannaccone, L. (1975, May). The field study in education policy research. Education & Urban Society, 7(3), 220-238.
- Kirk, R. C. (1981, May). Microcomputers in anthropological research. Sociological Methods & Research, 9(4), 473-492.
- LeCompte, M., & Goetz, J. P. (1982, Spring). Problems of reliability and validity in ethnographic research. Review of Educational Research, 52(1), 31-60.

- Levine, H. G. (1982, December). Data storage and retrieval systems for use in participant observation. Paper presented at the 81st meeting of the American Anthropological Association, Washington, D.C.
- Louis, K. S. (1982, September/October). Multi-site multi-method studies. American Behavioral Scientists, 26(1), 6-23.
- Lutz, F. W., & Iannaccone, L. (1967). Understanding educational organizations: A field study approach. Columbus, OH: Charles E. Merrill Publishing Company.
- Marshall, C. (1984, April). The enculturation of the vice principal. Paper presented at the annual conference of the American Educational Research Association, New Orleans.
- Marshall, C. (1985a, March). Appropriate criteria of trustworthiness and goodness for qualitative research on education organizations. Quality and Quantity.
- Marshall, C. (1985b, November). Managing role shock: An enculturation task for the vice principal. Education and Urban Society.
- McCall, G. J., & Simmons, J. L. (1969). Issues in participant observation: A text and reader. Reading, MA: Addison-Wesley Publishing Company.
- Merritt, R. L., & Coombs, F. S. (1977, June & October). Politics and educational reform. Comparative Education Review, 21(2 & 3), 247-273.
- Mills, C. W. (1959). The sociological imagination. New York: Oxford University Press.
- Mitchell, D., Wirt, F., & Marshall, C. (1982). Alternative state policy mechanisms for pursuing quality, equity, and efficiency goals. Unpublished manuscript and grant proposal to National Institute of Education, University of California, Riverside.
- P.F.S. (1982). Software Publishing Corporation, Apple Computer, Inc.
- Piotrkowski, C. (1978). Work and the family system: A naturalistic study of working class and lower middle class families. New York: The Free Press.
- Sailer, L. (1984, October). Managing field notes. Computer-Assisted Anthropology News, 1(1) 2-6.
- Sproull, L. S., & Sproull, R. F. (1982). Managing and analyzing behavioral records. Explorations in non-numeric data analysis. Human Organization, 41(4).

Weinberg, D., & Weinberg, G. M. (1972). Using a computer in the field: Kinship information. Social Science Information, 11, 6, 38.

Weinberg, D. (1974, Fall). Computers as research tools. Human Organization, 33(3).

Wirt, F. M. (1980, June). Comparing educational politics: Theory, units of analysis, and research strategies. Comparative Education Review, 24(2, part 1), 174-191.