1-1-1986

Designing and implementing a staff development project for microcomputer utilization to enhance learning in three public elementary schools.

Ruth A. Rubin
University of Massachusetts Amherst

DESIGNING AND IMPLEMENTING A STAFF DEVELOPMENT PROJECT FOR MICROCOMPUTER UTILIZATION TO ENHANCE LEARNING IN THREE PUBLIC ELEMENTARY SCHOOLS

A Dissertation Presented

By

RUTH A. RUBIN

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirements for the degree of

DOCTOR OF EDUCATION

September, 1986

Education

DESIGNING AND IMPLEMENTING A STAFF DEVELOPMENT PROJECT FOR MICROCOMPUTER UTILIZATION TO ENHANCE LEARNING IN THREE PUBLIC ELEMENTARY SCHOOLS

A Dissertation Presented

By

RUTH A. RUBIN

Approved as to style and content by:

Byrd L. Jones, Chairperson

Portia C. Elliott, Member

Jon L. Sicks, Member

Mario Fantini, Dean
School of Education

DEDICATION

This work is dedicated with love to:

My brother, David, whose open arms, gift of love and artistic rendering carried me through the looking-glass;

and

My brother, Arthur, who against all odds, made the impossible possible and brought us home at long last.

ACKNOWLEDGEMENTS

I wish to express my deepest gratitude and appreciation to the following people whose assistance and support contributed to the accomplishment of this endeavor:

Byrd Jones, for the wisdom, guidance, encouragement and support that gave me direction and sustained me throughout.

Portia Elliott, for her valuable expertise, creative inspiration, and for her influence on my thinking.

Jon Sicks, for his knowledge, cooperation and understanding.

Ulysses Byas, who gave me confidence, encouragement and support, along with the focus for my work and this challenge to tackle.

Roosevelt Board of Education for their endorsement and support of the Roosevelt/UMASS Staff Development Program.

Earl Mosely, Barbara Williams, Charles McIlwain and the Roosevelt staff members who participated in the FOCUS group, whose contributions, hard work and faith really made everything possible.

Roosevelt administrators, teachers, parents, students and central office staff for their encouragement, inspiration and assistance.

My parents, for their devotion, nurturance, teaching and love.

Al Lamberti, for sharing a dream, taking the journey and believing in miracles.

Sir Petrian Damond, for his faithful companionship and instinctive support.

Martha Kibbey, my lifetime beacon, for her tender loving care, and for always keeping a bright light on in the front window.

William Fiore, for his numerous contributions to the project, and more importantly, for sharing his energy, lending "and ear," and lifting my spirits.

Perletter Wright and Terricita Watkis, for their professional assistance, friendship and comradeship.

Susan Savitt, for the many conversations that "fanned the fires," and for "preparing the oatmeal" and "rationing the scotch."

Joan Zabawa, for her uppermost ability to measure the tides.

Barbara Boyd, for her helpful editorial and proofreading skills.

ABSTRACT

Designing and Implementing a Staff Development Project For Microcomputer Utilization to Enhance Learning in Three Public Elementary Schools

September 1986

Ruth A. Rubin, B.A., Queens College

M.S., Adelphi University

Ed.D., University of Massachussetts

Directed by: Dr. Byrd L. Jones

Schools face a clear need for effective staff development to encourage computer utilization. This dissertation describes a staff development project for microcomputer utilization to enhance learning in three public elementary schools in a predominantly Black school system. It describes processes, activities and curriculum materials developed, and it suggests pedagogical strategies for using computers with students in various subjects, namely mathematics, writing and reading in social studies. The process strives to create an environment in which administrators, staff and students share in learning, planning and decision-making activities designed to generate motivation and more active learning.

The activities conducted in the study are shaped by two tenets of action research. One of these involves drawing upon the past work of others. Thus the staff development program incorporates as many research-tested features as possible. The other involves collecting data both to evaluate the wisdom of past decisions and to guide the process of making future decisions.

As a result of the staff development activities conducted, first with a FOCUS (Focus On Computer Utilization Strategies) planning group and second, with teachers in grades 3, 4 and 5, staffs from three schools conducted projects with their students in word processing, LOGO and data base applications. The projects were found to have a high effect on (a) stimulating motivation, (b) increasing pride in work, (c) sharing, (d) decreasing boredom, (e) generating enthusiasm and excitement about learning, and (f) increasing frequency of positive interaction with peers.

Based on the experience and insights gained from the planning procedures engaged in this study, the following conclusions were supported: (a) staff development needs must be determined by staffs in individual schools; (b) the broader the planning group, the greater the support; (c) preliminary activites that examine and set issues are important for establishing a framework for understanding; and (d) hands-on experience and practice over time is essential

for learning. Because there is an underlying feeling of powerlessness among teachers, it is the sense of professional growth and school improvement as evidence of teacher power to affect their environment that is crucial.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

FIGURE

Such a price do the gods
exact for a song,
to become what we sing.

C H A P T E R I

INTRODUCTION

> Alice asked the Cheshire Cat, "Would you tell me, please, which way I ought to go from here?" "That depends a good deal on where you want to get to," replied the Cat. "I don't know where . . . , " said Alice. "Then it doesn't matter which way you go," said the Cat (From Lewis Carroll's Alice's Adventure In Wonderland.)

Alice's quandary is tantamount to that of the educator who ponders the question of which way to go in the wonderland of microcomputers. To perplexed and inquiring teachers, the Cheshire Cat might well reiterate: "That depends a good deal on where you want to get to." In answer to the question, "What ought we be doing with computers?", the Cat may likewise say, "That depends a good deal on where you want to get to."

Recent attempts to introduce innovations in the public school system have met with various fates and differing degrees of success. That some failed while others were sustained was determined by factors related to the program's impetus, public opinion, funds and timing. But perhaps the greatest determining factor was the way in which school people responded. For example, Title I programs, initiated in response to a growing realization in the 1960s that schools were not adequately serving the needs of all students, continue to experience some favorable results in spite of major fiscal cutbacks. Other innovations, such as

the introduction of television into the public schools during the same decade, as well as the open education and "new" math movements of the 1970s, generally floundered more than flourished.

The technological revolution of the 1980s has brought the microcomputer to the school. The entrance was accompanied by voices of skepticism warning that the computer represented merely another "fleeting fancy." However, recent advances in technology, newly mandated computer curriculums and commitments to substantial investments are haunting reminders of the computer's arrival to the wishful thinker who earnestly, although in vain, wished the computer away.

A 1985 John Hopkins survey conducted by Becker (cited in Bork, 1986) showed over one million computers in the nation's primary and secondary schools, with this number doubling every 15 months. However, a proliferation of computers does not imply that they are effectively used. The value schools place on computer utility will determine how effectively computers will be utilized. Moreover, those computer usage determinations will be made school by school, perhaps teacher by teacher based on the degree to which teachers can effectively incorporate software into the curriculum.

The problems posed in designing and implementing staff development for computer utilization are embedded

within a larger set of problems associated with introducing school change. Every school system will face the issues of which software and hardware to purchase, where and how computers will be used and how equity will be ensured. The complexity of the task dictates a need for a comprehensive look at the kinds of problems and obstacles educators face in creating staff development programs for computer utilization in the context of school change.

Sarason (1982) viewed schools as having a distinctive culture that must be understood if changes are to be more than cosmetic. He wrote:

> Any attempt to introduce change into the school setting requires, among other things, changing the existing regularities in some way. The intended outcomes involve changing existing regularities, eliminating one or more of them, or producing new ones (p. 96).

Unless computers affect "cultural" roles, they may make some, but not much difference. Software, like all media, is extraordinarily difficult for teachers to review in order to individualize. The odd thing is that by scanning and thumbing through materials which are typically available in teacher "friendly" ways, assigning textbook, workbook and ditto master seatwork is remarkably efficient for teachers looking for some appropriate exercises. If computer use consists of teachers "assigning" specific items to do in the drill and practice mode, then outcomes will be limited by what teachers can handle.

Microcomputers offer a tool with amazing capabilities to help teachers and students in and out of school. However, this will probably require significant changes in regularities of schools. Many revolutionary changes have been touted and failed. Consequently, it will take a good deal of inservice effort and discussion on the part of teachers to make use of the full potential of microcomputers. The undertaking chronicled in this dissertation describes the researcher's efforts to introduce teachers to an exploration of what seems to be some very promising computer applications.

Statement of Problem

Overview

The need for better utilization of microcomputers necessitates devising ways to work within a school district, specifically by defining a process to encourage and facilitate microcomputer use by providing assistance and support for staff members. At the same time, there is no straightforward recipe to bring about more effective utilization of microcomputers nor is there any preplanned technical strategy that will achieve results.

Analysis

School change, staff development and computer

utilization have served as independent topics for educational research. Uniting our knowledge in these areas would give rise to an operational theory to guide our practices in bringing about effective change in the school setting to result in more favorable conditions for learning, particularly with computers. In working to connect these three areas, educators face different problems associated with each.

In regard to school change, it is critical that the implementation of a new curriculum confront the attitudes, conceptions and existing regularities of those in the setting (Sarason, 1982, p. 49). For instance, Sarason believed the "new math" movement was not sustained in the public school setting because the impetus for the movement came from a university culture and not from the people indigenous to the schools. This view of the "new math" movement provided some insight into the computer movement's potential for error. In other words, the degree to which a computer curriculum could be sustained would be contingent on the degree to which those delivering the curriculum were involved in its development.

The problems associated with staff development have created a confusing situation for advancing professional learning and attempting to change human behaviors given the tendency of school people to resist change. Teachers have not been an exclusive group in resisting change.

Nevertheless, particularly in computer education, the advancement of professional learning has moved at a snail's pace in contrast to the swiftness of the advances made in technology. Additionally, the rapid obsolescence of knowledge as computer applications progress has inhibited teachers from learning something that may prove outdated in a couple of years. Lastly, the current literature surrounding the computer movement in education has been laden with technological jargon. These conditions have strengthened resistance to learning and discouraged many potential enthusiasts.

Today almost all teacher preparation courses finish with teachers having a course in computer training. However, teacher training before the last five years rarely had familiarization with microcomputers as part of their undergraduate preparation. As a result, the movement of computers into the school system will serve to divide new teachers and those who are not familiar with microcomputer utilization. Training based on the inservice needs of staff may avoid the generation split of users and nonusers that has occurred at the university level.

Research on computer utilization has centered on issues ranging from teacher attitudes about computer learning including feelings that they are inadequately prepared, to societal roles for students, to concerns regarding equity in the use of microcomputers and the impact

of microcomputer use on Black students in urban settings. "A Study of Computer Literacy in Science Education" (1980) by the Minnesota Educational Computing Consortium (cited in "Practical Applications," 1982) found that (a) teachers strongly support minimal understanding of computers and the societal role for students, and (b) teachers feel inadequately prepared to make decisions about computer use. The same study concluded that students, while learning about computers, are learning only about 60 percent of what is generally considered to be included in computer literacy.

A study titled "School Use of Microcomputers and Its Impact on Minorities: A Paralysis Of Analysis" (Murphy, 1984) investigated uses of microcomputers in schools and their impact on minority students. As the findings indicated, the critical issue was the perspectives of students, teachers, administrators and parents regarding school use of microcomputers as they impact on minorities. The results of the study further indicated that (a) minority students were involved in drill and practice programs rather than problem solving programs, (b) fewer minority students were enrolled in computer science courses than white students, (c) quantitative as well as qualitative inequities existed, (d) little encouragement was given for minority students to study technology, and (e) fewer female students studied computer science than males.

Murphy (1984) found no effort to analyze the use of

microcomputers as it impacted on minorities. As Murphy has concluded, educators seem to be paralyzed in their approach towards equitable solutions. Furthermore, many educators denied the problem (p. 5). Present enrollment in computer classes reflects the consistent and substantial white, male dominance of elective math and physical science courses in the past. Ensuring equity in computer instruction requires a careful analysis of how computers are utilized with Black students for whom equal education has historically been denied.

University instructors, public school administrators, program directors and supervisors, and finally classroom teachers themselves share the responsibility for reversing this situation. This responsibility comes at a time when teachers are overburdened by classroom demands, undervalued by public opinion and suffering a diminished self-image.

Some educators enthusiastically embrace microcomputers. However, the haste with which computer training is put together reflects a sense of urgency. "Hard" content such as mathematics, science and now computers, always seems to focus on content mastery issues first, losing sight of process concerns. Good staff development principles should not change just because the content changes (Zigarmi & Corwin, pp. 3-4).

This author's study seeks resolution of these

problems by developing a unifying approach--or FOCUS--to bring a cultural understanding of school change, together with, a staff development project for computer utilization committed to equity.

School Improvement Via Staff Development

School change efforts should focus on individual schools rather than entire systems--a longstanding tendency of most critics of schools. For example, Goodlad's study (1984), A Place Called School, conducted over a period of eight years, assumed a holistic approach and a comprehensive view of schooling in the United States. The study was presented not as a research report, but rather a discussion made real by illustrative use of data.

As Goodlad (1984) noted, significant improvement as opposed to "mere tinkering" required focusing on individual schools, but in their entirety rather than on single elements. Because all elements in a school are interconnected, changing any one element affects the others. Schools vary in their characteristics. Therefore, recommendations are not equally relevant to all schools (pp. 11-14). Specifically addressing the increasing role of technology in schools, Goodlad pointed out that while many school districts have purchased microcomputers, their role

in the instructional process has been ill-defined (pp. 340-341).

Much of the research accumulated and examined from "maverick" schools in urban settings associated good staff development programs with urban school success. A study by Phi Delta Kappa (1980), Why Do Some Urban Schools Succeed?, formulated generalizations on factors coexisting with successful urban settings. One conclusion specifically addressed staff development. That was:

> Successful schools and programs frequently use staff development or inservice training programs to realize their objective . . . . The greater the specificity or focus of the training program, the greater the likelihood of its success (p. 205).

Referring to computer training programs, Elliott (1973/1974) suggested that computers can assist teachers in clarifying their own thoughts. Further, they can foster an environment which is success oriented and unthreatening for teachers. Improved self-confidence and critical thinking might overcome teachers' feelings that they are inadequately prepared to deal with computers (p. 32).

Working with the instructional staff is a critical part in the process of creating more effective schools. More specifically, it entails engaging groups in extended dialogue aimed at establishing a sense of a common mission and some goal agreement in order to build consenus. The quality of learning that takes place in a school is commensurate with the level of interaction between the

related groups within it. It follows then, that the set of procedures set forth to bring about change should incorporate mechanisms which allow for communication between staff members, i.e. principals, teachers and paraprofessionals. This process thus defined, serves as an underpinning for the theories which guide the procedures engaged in this author's study.

Rationale of Study

The rationale for this work was based on three assumptions:

1. That through a collaborative staff development program committed to improving urban school settings, a primary group of individuals in key positions could mobilize some resources and make meaningful changes;

2. That there would be a secondary group of other staff members who would subscribe to the project as a result of being actively involved in the entire process; and

3. That motivation of students could be stimulated by an environment enriched by more active learning experiences and that this increased motivation would be associated with achievement levels for elementary students, particularly those students who have previously been labeled as the underachieving and often disenfranchised segment of the school population.

The first assumption clearly suggested that the changes made would be most important in bringing about favorable conditions in which effective staff development could flourish. The second assumption held promise that by actively involving staff who work directly with students, projects could be developed which would serve as models from which teachers in other schools or districts could adopt and adapt appropriate ideas. The third assumption suggested an investigation into ways in which the computer can be utilized to enhance affective development, specifically to stimulate motivation resulting in more active learning and greater cognitive gains for students.

Statement of Purpose

The specific purpose of this document, therefore, is to describe a staff development project for microcomputer utilization to enhance learning in three public elementary schools. It describes the process, the activities and the curriculum materials developed and suggests pedagogical strategies for using computers with students in various subject areas, namely mathematics, writing and reading in the area of social studies. The activities aim to meet the needs of students in a predominantly Black school system. The process strives to create an environment in which administrators, staff and students share in learning,

planning and decision making activities designed to generate motivation and more active learning for students.

Research Questions

The study will answer a set of central questions, i.e. a main question and a group of subsidiary questions. These are the central questions:

Main Question

What are the planning procedures and processes that enable administrators, teachers, paraprofessionals and students to come to some shared resolution of their varied perceptions on computer utilization?

Subsidiary Questions

1. How do the administrators, teachers and paraprofessionals communicate to build a consensus of mission and to attain agreement on a plan of action?

2. Are there things that connect these various groups within a school and if so, what are they?

3. What do teachers need in order to use computers effectively in the service of instruction?

4. What do the students need in order to use computers effectively to enhance their learning?

The answers to these questions constitute the

concluding chapter of this document. Chapter II explores three major sets of research studies--that of school change, that of staff development and that of computer utilization by examining the literature that is related in the interconnection of these three areas in search of an operational theory to guide the practices and procedures employed. The heart of this document chronicles staff development activities in Chapter III while Chapter IV describes the outcomes of those activities. A major part of the assessment consists of straightforward logs which describe what takes place as the steps in the process unfold.

Methodology of Study

The activities conducted in the study are shaped by two tenets of action research. One of these involves drawing upon the past work of others. Thus the staff development program incorporates as many research-tested features as possible. The other involves collecting data both to evaluate the wisdom of past decisions and to guide the process of making future decisions.

The activities center around the implementation of a program designed with the input of staff members to bring about the desired outcomes. In general, those outcomes deal with engaging staff members in uncovering issues important

to microcomputer utilization and in planning and implementing change strategies to make more effective use of computers to enhance student learning. At a relatively early point in time, the Superintendent of Schools wanted computer use introduced in the schools. This introduction was followed several years later by newly mandated computer curriculums issued by the State Education Department. However, the specific outcomes of computer utilization would ultimately be shaped by teacher and student input. Therefore, the planning activities engaged in this study involve various groups in identifying needs based on perceptions, prioritizing those needs and then devising and implementing an action plan.

The process maintains a particular focus on students with special needs. One assumes that those most likely to learn in the school setting would be students presently and comfortably existing in the mainstream of school life. While this project engages the total school population, evaluation of the objectives developed and implemented with the staff hinges on achieving them for a sub-group of students--those not achieving success according to traditional measures in the educational setting.

The nature of the process is shaped in an ongoing fashion in response to the outcomes of meeting, dialogue, needs assessment and feedback assessment data. The process of changing computer practices focuses on establishing a

clearer definition of the laboratory setting via a consensus of the various groups working within the schools. The staff development aspect focuses on teachers and paraprofessionals as well as appropriate support staff members. The documentation of this process serves to chronicle a staff development project which actively involves staff in the planning and implementation stages of change efforts, specifically by providing a forum for extended dialogue and exchange.

Evaluation of the objectives set forth for the staff development activities makes use of a formative evaluation process having as its constituents, the program participants. The participants not only serve as judges for the degree of effectiveness of the activities and outcomes, but also gather and provide much of the data concerning attitudes and impressions. Feedback assessments are administered to the participants following each staff development session to glean opinions to determine the effectiveness of the activities, to identify new problems and obstacles and to ascertain the degree of satisfaction of the participants. In a larger context, the feedback assessments serve to stimulate continuous dialogue in an effort to foster mutual adaptions for conceptual clarity and goal agreement.

Sarason suggested that effective change cannot take place without altering the present behaviors and existing

regularities within the setting. This document centers on the computer laboratory because it offers hands-on, individual activities for learning and suggests direct ways in which students and teachers can interact.

The intended by-product of this staff development project is to generate change that can be translated into more effective utilization of computers in the school setting. Collabortive efforts of groups working within the school have fostered a climate supportive of the affective areas of learning, particularly for those students for whom there is little promise held.

The Roosevelt Community and Its Schools

During the past two decades Roosevelt has evolved from a predominately white, suburban residential district into a predominantly Black, self-contained K-12 district. Prior to the establishment of the high school in 1962, students completed their years in neighboring districts.

> Within the memories of many teachers and residents, the schools have served a new and different student population from less than 10 percent Black to 98 percent Black. That change has profound implications for the curriculum and group interactions, not because students are basically different, but because adults and children alike experienced some of the effects of de facto segregation. . . .
>
> Furthermore, the recent history of changes in Roosevelt's population has reflected some of the larger forces of economic class and racism that have shaped metropolitan developments in this century. .

> . . personal life experience had been shaped by the transformations of schools that seem to follow from the Brown vs. Topeka Supreme Court decision of 1954. Students are still affected by those changes and forces, and it will continue to take a united community effort to achieve equal rights and an equal chance to compete for the promises of American life (Jones, 1983, pp. 6-7).

Roosevelt residents support approximately one-third of the district's financial resources approved annually by the voters. For the last nine years, a majority of voters have supported proposed school programs by passing the school budget. The tax rate, among the highest of 56 school districts in Nassau County in 1977-1978, has changed very little while others have hiked their rates. As a result Roosevelt is now ranked 43rd out of 56 districts in the county.

The Superintendent of Schools together with the School Committee, have worked to establish a positive direction for the school system and support for its schools. The Roosevelt Board of Education has supported programs for physical plant and grounds, microprocessors and technical education and staff development aimed at school improvement. At the same time, teachers' salaries have lagged behind those in nearby, comparable districts and certain support services suffered cutbacks.

While many residents in Roosevelt have a strong commitment to quality education, approximately 17 percent of the total school-aged population residing in the district

attend private and parochial schools. This statistic reflects some feeling that the public schools cannot offer the quality education many parents wish for their children. Some long term residents apparently believe that the schools have declined.

> The outside perception that Roosevelt is a homogeneous community compounds the task of the Roosevelt School Committee and staff. Roosevelt has become a class divided community in a metropolitan district (Nassau-Suffolk Counties) that is largely divided on class or income lines so that communitites are homogeneous in family background even when appearing more "integrated" along racial or ethnic lines. On the one hand there is a significant number of Black families sending children to private schools, while another segment of the population is transient and unable to establish a working relationship with a single public school. Problems in representing residents' interests are compounded by the presence of single parent families, families with both adults holding full time employment, and older residents with grown children (Jones, 1983, p. 9).

Computer Facilities

The Superintendent of Schools, in conjunction with the Board of Education of the Roosevelt School System is committed to an ongoing Computer Education Program resulting in a computer laboratory at each of its three elementary schools, namely the Centennial Avenue School, the Theodore Roosevelt School and the Washington Rose School. Additonally, the Primary Center has been equipped with two microcomputers in each of its kindergarten through grade 2 classrooms. The Roosevelt Junior Senior High School

contains two laboratories differing in structure, as well as individual microcomputers in special education rooms, the technical program site and the alternative school (Project NEED).

At the onset of this undertaking, the elementary school laboratories housed three different types of microcomputers, most with cassette loading capacity and with memory size ranging from predominantly 16K to several with 32K or 48K. There was a tendency for many people to both exaggerate the computers' importance, viewing them as magical, and/or to underestimate their full potential.

Previous inservice training for staff had consisted of twenty hours of instruction in BASIC programming using Radio Shack's TRS-80 16K machines each summer for several consecutive years. Nevertheless, responses from a needs assessment conducted with the elementary teaching staff between November 8 and November 19, 1982 by members of the University of Massachusetts/Roosevelt Public Schools Staff Development Project indicated computer inservice training as the priority area for professional development. Responses further indicated that teachers wanted (a) input when decisions are made about new programs that directly affect them, (b) opportunities to share concerns openly, and (c) improved communication between different groups within the schools.

Delimitations of Study

The study was conducted within the following delimitations:

1. Staff development activities were conducted in three public elementary schools.

2. Activities at any point in time were conducted using exisiting software and hardware that were particularly outdated prior to the allocation of resources for upgrading equipment.

3. The researcher worked with the Superintendent, Principals, Curriculum Coordinators, Teachers, Paraprofessionals and Students in grades 3, 4 and 5 of three elementary schools, and various district administrators and support personnel.

Limitations of Study

The primary limitations affecting this study were posed by factors related to the availability of resources. Other limiting factors related to local conditions and time frames. Specifically, the limiting factors of this action research study were as follows:

1. Any decision regarding the number and schedule of the sessions conducted with staff depended on providing released time for teachers and/or the availability of monies

for materials and payment to participants.

2. The selection, made from the choice set of activities that would bring about goal attainment, was contingent on the available resources.

3. The activity choices made for each session were continually affected by the hardware limitations at that point in time. (However, the possibility for enlarging the choice set improved over the duration of the project as the hardware was updated.)

4. Any choices made were further dictated by local conditions, time frames and personalities.

5. There was no attempt to control for other variables that could have caused achievement increases.

6. There was no control for research bias as the researcher designed and conducted all sessions.

7. Follow-up studies at each project site would have to be conducted over a sufficient period of time to determine the extent to which the project affects student achievement levels. Additionally, the existence of other programs and projects aimed at school improvement and the fluctuating and diverse climate and conditions within each school, all impacting on student achievement would make it almost impossible to attribute changes in achievement levels to any one change effort.

Significance of the Study

The significance of the study exists on two levels--theoretical and practical. On the theoretical level, the study develops a FOCUS Theory to serve as an operational platform to guide practices in advancing effective computer applications in the context of school change via staff developement. Any particular focus relies on the key portions of three bodies of research relevant to the problem defined.

In practice, the significance of the study is inherent in the potential usefulness of the consequences for staff and students in terms of affective, social and cognitive gains. Stimulating motivation holds potential for achieving cognitive gains for students by investigating ways in which computers can be used effectively as tools in the learning process.

The staff development aspect promises that effective change can occur through the collaborative efforts of people in key positions and other staff members subscribing to the project as a result of being actively involved in the planning and implementation phases of the projects. Any positive changes that can be achieved will be important in bringing about favorable conditions in which effective staff development can flourish in a structure allowing for continuous modification.

Based on our current understanding of staff development and school improvement projects and of schools as "loosely coupled" systems, other teachers and other school districts cannot directly impose this plan on their setting and school. However, others can find within it suggestions, experiences and connections with their own situations on a level of reality that would be meaningful. Summarily, while others cannot borrow directly from this action plan, they can borrow the context and procedures to approach school change realistically.

In Search of a Focus

In searching for a theory to guide school practices to bring about effective change and favorable learning using the computer, three major and generally separate sets of research bear examination--that of school change, that of staff development and that of computer utilization.

A mathematical metaphor would render three sets of elements, or bodies of research. Each body of research alone, examines a set of elements which may or may not be relevant to elements in the remaining sets. The task becomes first, to ferret out, then to focus on how the elements connect with or between one another.

Focusing on the connective parts of three bodies of research may encourage the type of reflectivity that may be

important for human development (B. L. Jones, personal communication, September, 1985). Different perspectives can serve to build better understanding. Because people are so engrossed in school culture, it is often difficult to see the reality of a situation. For example, when questions are raised about the computer's capabilities, one may be forced to look at computer usage differently.

Similarly, after reviewing literature on adult learning, rather than remaining locked into the notion that teachers must be told how to teach, one begins to understand that teachers, like students, want to be treated as responsible learners and not as children. Principles of adult learning indicate: (a) that learning is more likely to occur when there is unfreezing of prior attitudes, thoughts and behavior patterns; (b) when individuals have frequent practice and feedback; and (c) when learners see concrete goals and develop action plans. Literature on the adult learner further indicates that the learning experience will be enhanced if all parts of the whole person (cognitive, affective, and behavioral) are activated and integrated (Bunker & Hrusha, 1982, p. 15).

The connective process allows one to look to the relevant parts of each body of research--focus in, step back after a time, and then refocus again to allow for changes over time. Any given focus at any point in time would reflect a guiding philosophy which takes into account what

we believe, what we value and what we know about school change, staff development and computer utlization practice.

References

Bork, A. (1986, April). Computers in the future of our schools. School Administrator, pp. 23-24.

Bunker, R. M., & Hruska, M. (1982). School based staff development: Definitions, documents & directions (Worchester Public School Staff Development Project). Amherst: University of Massachusetts, School of Education.

Carroll, L. (1865). Alice's adventures in wonderland. London: MacMillan.

Elliott, P. C. (1974). Elementary mathematics teacher training via A Programming Language. (Doctoral dissertation, University of Massachusetts, 1973). Dissertation Abstract International, 35, 297A.

Goodlad, J. (1984). A place called school. New York: McGraw Hill.

Jones, B. L. (Ed.) (1983, January). A Report on Roosevelt Public Schools: Strengths and Potential Improvements. (Available from the School of Education, University of Massachusetts Amherst)

Murphy, R. K. (1984). School Use of Microcomputers and its Impact on Minorities: A Paralysis of Analysis.

Phi Delta Kappa. (198Ø). Why do some urban schools succeed? The Phi Delta Kappa study of exceptional urban elementary schools. Bloomington, IN: Phi Delta Kappa.

Practical Applications of Research. (1982). A Newsletter of Phi Delta Kappa's Center on Evaluation, Development, and Research.

Sarason, S. B. (1982). The culture of schools and the problem of change (2nd ed.). Boston: Allyn & Bacon.

Zigarmi, P., & Corwin, R. B. (Eds.). (1983). Journal of Staff Development: Staff Development for Computer Literacy, 4(2), 3-4.

C H A P T E R I I

EDUCATIONAL MARKSMANSHIP

A Conceptual Framework

The conceptual framework for the literature reviewed in this chapter is illustrated in the diagram below (see figure 1). The same framework serves as the foundation on which the study stands when the procedures in the process are set forth.

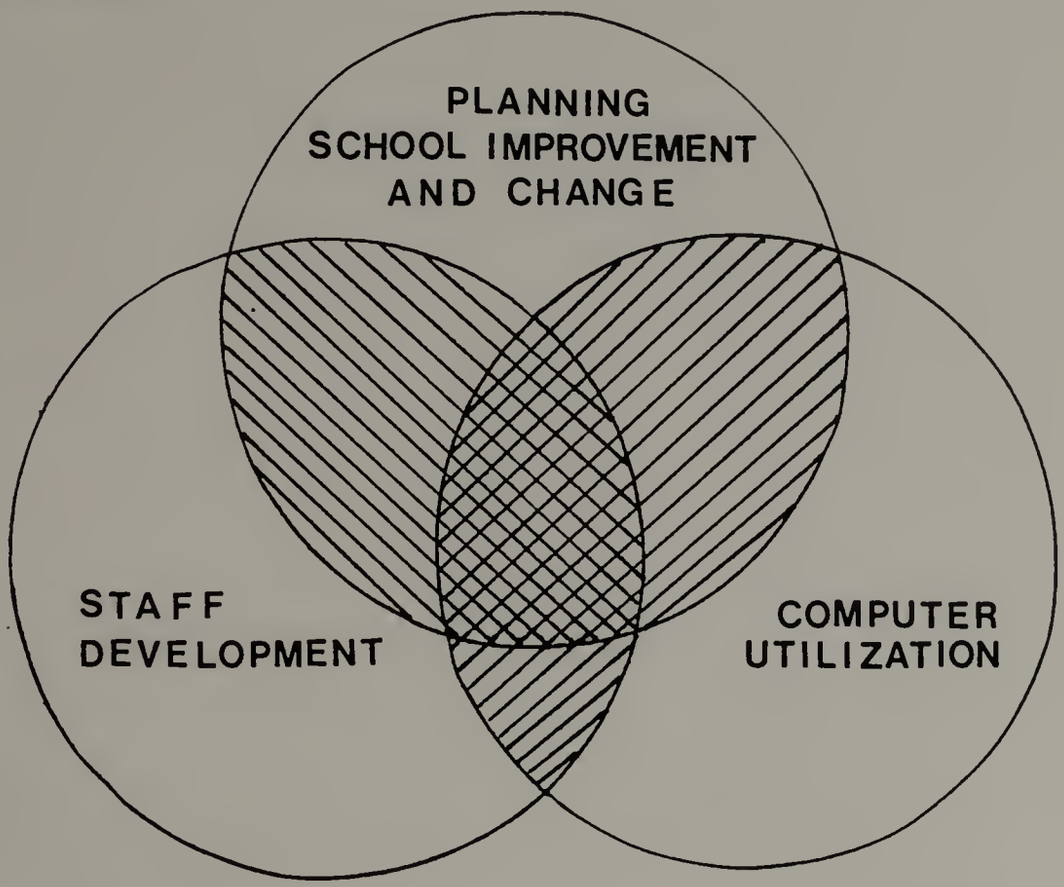


Figure 1. Research areas diagram.

This conceptualization draws on three general areas of research--school change, staff development and computer utilization. The literature review will discuss all of the intersected areas. The connection grows out of the process

of engaging staff members in dialogue, planning and hands-on experiences in a computer lab setting with the goal of enhancing student learning through effective computer utilization. Additionally, for the purpose of the study, it was important to find useful and workable precepts. Therefore, each major section of the review refers to some basic tactics considered preeminent for goal attainment.

The project conducted in this study evolved from a "marksman approach" which entailed drawing the targets, taking aim and shooting the arrows later as the project was launched and in flight. Thus the areas depicted in figure 1 are transformed into a set of concentric circles to represent the framework for change targets (see figure 2).

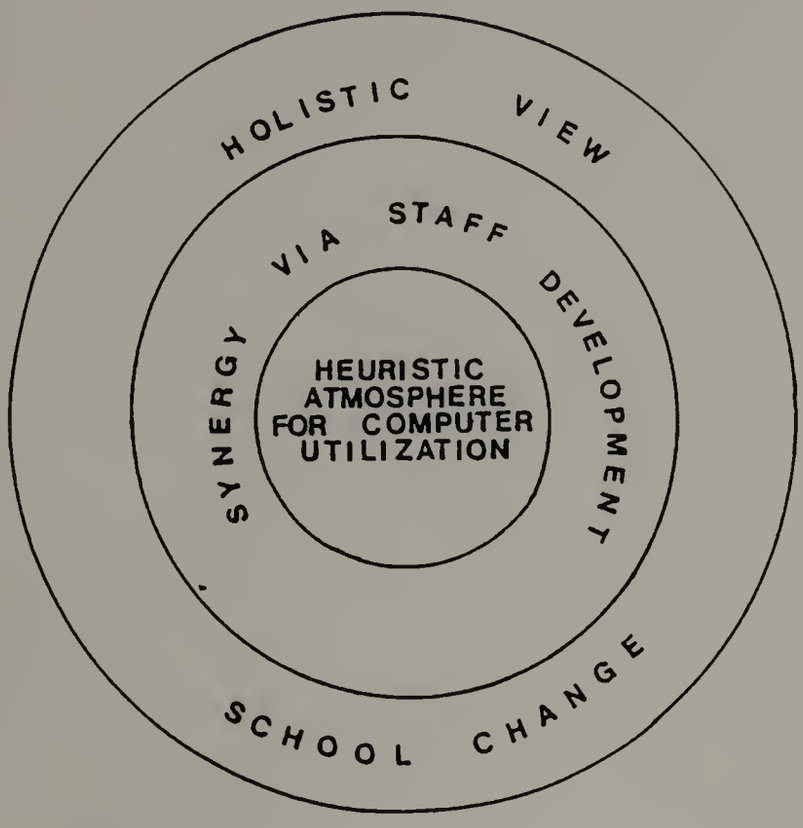


Figure 2. Framework for change targets.

Movement toward the target, both figuratively and realistically, is generated from the outside in. The outer circle focuses on the overall context in which the study is placed and sets the stage for the action. It assumes a holistic rather than fragmented view of schooling. Therefore, the literature review in this area attempts to narrow the field by identifying the key figures whose contributions to school improvement have influenced this study.

The staff development circle refers to previous studies, specifically those dealing with staff development in the context of organizational change. This review focuses on staff development techniques which have proven effective and which maintain a stronger emphasis on process than on product. The process aims to establish a synergy via ongoing communication and cooperative learning.

The computer utilization circle constitutes the core, or the heart of the project around which the staff development centers. The target motif is a series of concentric circles, the center being the same for all the circles. Here a heuristic atmosphere prevails to guide the activities toward more active learning experiences for students and to aid and lead on toward discovery, following teaching methods that will induce learners, be they teachers or students, to make their own decisions.

Too much teaching and inservice has assumed learners lack "information." But literature on staff development and school change has pointed to the importance of process and active involvement. By involving learners in hands-on experiences, roles are redefined. The emphasis is not placed on the information the leader imparts but on which processes and activities involve teachers and students in learning and what feedback allows for corrections and reinforcements.

School Change Reviewed

Seymour Sarason helped educators structure a sense of school change. Specifically, his analysis of the problems inherent in bringing about school change was that teachers live in a complex institutional culture whose regularities are poorly understood by both insiders and outsiders. This analysis was predisposed to the view that our conception of schools should be culturally determined. Moreover, this view attributed much of the problem in change to the prevalance of a narrow and self-defeating conception of the school system which "continues to exercise its pervasive strength" (Sarason, 1982, p. 14).

Sarason discussed the incongruency between conceptions of schools and perceptions of schools within the last century in parallel with schools having been under

pressure to change. As a result of this pressure, actions were forced and were accompanied by disappointing outcomes because, as Sarason explains, the cultural sources of our conceptions were never understood. This argument was articulated when Sarason wrote:

> As a result of our disappointment we remain imprisoned in conceptions that are based on assumptions that never get verbalized and, therefore challenged . . . . Today we support this effort at change, tomorrow that one, or we may do both at the same time, but when we see that the more things seem to change the more they seem to remain the same we direct blame outward because we cannot entertain the possibility that we and those we blame basically have the same conception of what schools are and should be (p. 28).

Parodoxically then, in the opinion of what schools should be there is little difference between school personnel and those on the outside who seek to improve schools (p. 19).

In Sarason's (1982) analysis of the acculturation process, four points were essential: (a) Our view of the present and future is related to the past and we tend to think of a break from the past as wrong, (b) This view is flawed and has unconsciously contributed to a long school-society conflict, (c) Because people treasure and protect their beliefs to challenge those beliefs means people may have to change, and (d) Institutions like individuals are resourceful in avoiding and resisting change (pp. 19-20).

Educators committed to school improvement are compelled to search for effective tactics which would help

in managing change and in eliminating or minimizing the resistance encountered in that process. In any situation, activities should confront the attitudes and conceptions of the individuals in the setting.

Gray and Storke (1984) wrote about managing change utilizing concepts important in understanding how change processes can be managed effectively--concepts such as motivation, leadership, groups dynamics, organizational politics, conflict, determinants of behavior and communications (p. 552). The authors outlined the levels of change as individual, group and organizational, and classified change targets across those levels as:

1. Changes in Patterns of Interaction (budgets, schedules)

2. Changes in Role Expectations (training programs, changes in authority structure)

3. Changes in Values and Orientation (rewards system, different leadership approaches or styles)

4. Changes in Basic Motives, Achievement, Process and Affiliation

The cognitive versus emotional content of the change involved in each level was inversely proportionate, with "change in patterns of interaction" being highest in cognitive content, and "change in basic motives" being highest in emotional content. Cognitive changes can occur over a relatively short period of time. However, greater

behavior changes are required to alter fundamental motives of people. Therefore, changes in group behavior require more time and are more difficult because they involve attitudinal and individual behavior changes (Gray & Stork, 1984, p. 557).

Teachers have diverse reasons for opposing school change but because they cannot overtly oppose improvements these reasons are often covert. Some are nearing retirement or planning a career shift so that a new curriculum seems burdensome. Some see in a new emphasis a relative loss of prestige for their specialty age group or instructional strengths. Others led support for previous change and take a new proposal as a rejection of their work. Because resistance threatens to block change efforts, it behooves leaders to look at effective models for analyzing resistance in their search for strategies to increase the chances for bringing about change.

Researchers have used models as effective tools for analyzing resistance to change, (e.g. Gray & Stork, 1984; Huse, 198Ø). Much of this research has been influenced by theories dealing with change in open systems which laid the groundwork for much of the thinking on group behavior and social change. Kurt Lewin (1947) viewed the present behavior, or situation, as a dynamic equilibrium of forces moving in direct opposition and developed the "Force-Field Analysis" as a technique to analyze and describe these

forces operating in a social system that either keep the current behavior at status quo or bring about change. The theory holds that a state of "quasi-equilibrium" exists when the sum of the forces that operate for change (driving forces) is equal to the sum of the forces that operate for resistance (restraining forces). This accounts for behavior existing at its present level. A habit continues, though it might fluctuate slightly over time, because neither set of forces has been perceptibly altered. Thus significant change does not occur.

The concept of "Force-Field Analysis" illustrates the dynamic relationship of the forces and is useful in analyzing change situations. For ease of illustration, figure 3 shows this dynamic relationship of forces.

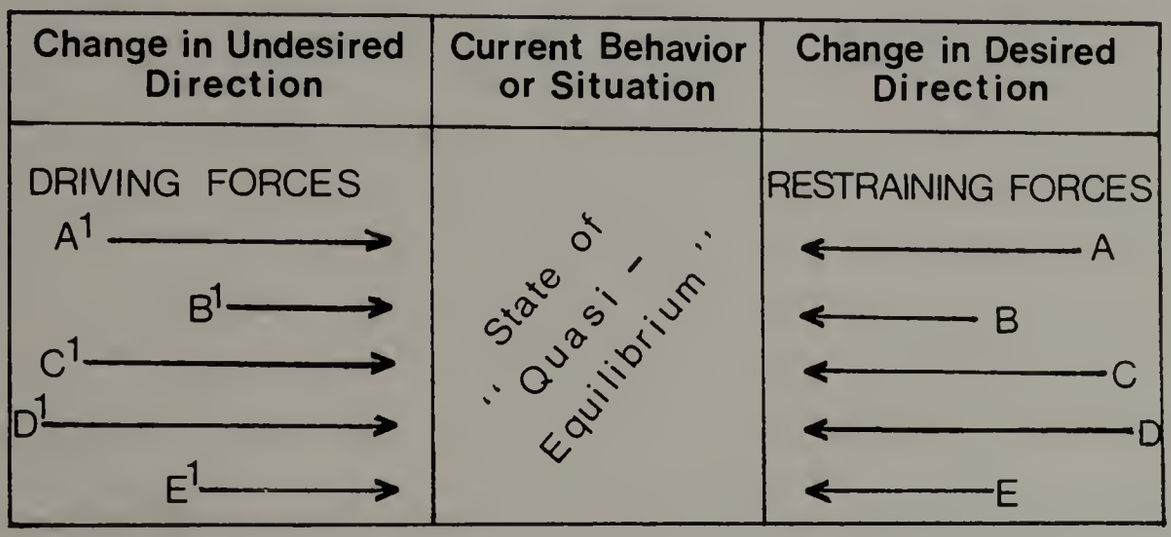


Figure 3. Arrows represent the vectors (forces) which play upon the present behavior.

Change involves a multitude of factors associated with and impacting on the entire system. Huse (1980)

discussed Lewin's analogy of this phenomenon to a river flowing with a particular velocity in a particular direction at a particular time. Mathematically, as shown in figure 3, the length of each vector is equivalent to its strength so that as long as the algebraic sum of the vectors remains equal, the behavior will not change. If the strength on either side is increased, the balance point will change until the sum is again equal. A change is brought about in one of three ways by (a) changing the strength of a force, (b) changing the direction of a force, or (c) adding a new force or removing one.

Regarding the first approach, Lewin's caution was explained when Huse (1980) wrote:

> However . . . increasing one set of vectors without decreasing the other set of vectors will increase the tension and degree of conflict in an organization. Reducing the other set of vectors may reduce the amount of tension. Since increasing the vectors about a certain level may result in higher tension, greater emotionality, aggression, and lower constructiveness, it is clear that decreasing the forces against change is preferable to applying greater pressure (p. 63).

Whereas the "Force-Field Analysis" model recommends a concrete, practical approach to group behavior and social change within an organization, other noted educational leaders have defined change in less formal but nevertheless, equally relevant terms. In their discussion on "Levers for Change," Dwight W. Allen and John C. Woodbury (1970) had this to say about the process of change:

> Today, we need change for the sake of change--or to be more diplomatic, we need change for the sake of perspective. We have a monolithic school system which proceeds from a standard set of assumptions, and we have no alternative perspective on those assumptions (p. 1).

This view does not contradict nor does it exclude the use of concrete tactics. In fact, Allen and Woodbury pointed out a number of suggestions concerning how the educational system might be used to advance itself in undertaking internal reforms referred to as levers for change. The suggestions included roughly eighteen useful levers, four of which were preponderant to this author's study and therefore, were examined carefully. The first dealt with the principle of "juxtaposition" which aims to establish an alien structure or an alien curriculum, forcing a big enough change that people have to take it seriously. Thereby, the change is demanded. To elaborate, "If you demand a new curriculum of human relations, communications, aesthetics and technology--that degree of change in the way things are taught would probably be sufficient" (Allen & Woodbury, 1970, p. 5). The authors specifically addressed alien technology pointing out that before introducing technology, typically, one must justify how it is intended to be used "in triplicate." The "alien technology" strategy recommended placing the equipment into the hands of several teachers for their full-time use. Eventually, the interest of those without the equipment was sparked to request the same.

The second and third levers for change both address the notion of commitment, namely "open-ended commitment" and "long-term commitment." The former implies a willingness to "get on the train even though we don't know where we're going" and a desire to "start because we want to start because we are not satisfied with the status quo." The need for this type of commitment arises because educators are often too goal oriented, failing to see that every category of the system is arbitrary and the designated system is only one of many alternatives. The "long-term" commitment implies that in experimental situations agreement not to reverse the program should be secured in the beginning as that agreement could never be secured in the middle when the situation becomes more difficult. Additionally, this strategy holds that people should be told to expect difficulty--that the experiment may or may not work but not to expect that everything will run smoothly (pp. 8-11).

Lastly, taking the "initiative" lever confronts the failure of many innovations as a result of allowing the opposition to seize the initiative. This lever for change requires considerable boldness defined as "capitalizing on precipitating the unexpected" or "putting up a moving target" so that by the time they shoot at you, you are no longer there. Allen and Woodbury point out that most educators are inclined to try small changes, making it easy for people to find them and hit them. The message is that

sometimes large changes can be effected where small changes would be thwarted (p. 12).

The levers for change discussion pointed out that a major problem in effecting change was that no one group, teachers, school boards, administrators, students or parents control enough of the fabric of education. Each group has only a single strand of thread in the whole fabric (p. 1). Change is a complex process involving the interaction of all these groups.

Much of the research on effective schools, specifically the Rand Change Agent Study (McLaughlin & Marsh, 1978) found that reform efforts have been disappointing because teacher training needs have been seriously underestimated. Moreover, as the study concluded, the most effective planning strategies were those which were collaborative and broad-based. The subsequent section of this chapter reviews the literature on staff development which interconnects via the process engaged in this study.

Staff Development Reviewed

Numerous studies in recent years have attempted to identify characteristics of effective schools in urban settings. Generally, the research indicated that while no single factor accounted for school success, exemplary pupil performance resulted from many policies, behaviors and

attitudes that jointly shaped the learning environment (Robinson, 1985).

In a summary of his presentations to educators interested in translating effective school research into action, Robinson (1985) pointed out that while formulas for success differed across studies, "research disclosed important similarities between many instructionally effective schools" (p. 5). The summary reported three fundamental factors common to effective schools, (a) a belief in and commitment to student learning, (b) a pervasive sense of control over the learning environment, and (c) evidence of concrete action plans. Of these, belief, commitment and sense of control were not seen as inducers of success but rather as premises on which actions are based. Moreover, as Robinson concluded:

> School effectiveness resulted from concrete actions taken in response to the premise that students could and would learn. In each case, successful schools had action plans that involved setting clear goals, devising specific ways to reach the goals, directing school resources forward, achieving goals, and creating a school environment supporting goal attainment (p. 7).

Elliott Eisner (1984), professor in the School of Education at Stanford University, echoing other scholars, voiced the criticism that educational research has failed to improve schools (cited in Hechinger 1984). His doubts arise from his observation that many prestigious schools are preoccupied with research leaving the less glamorous job of training teachers to lesser institutions. However, Eisner

primarily objects to educational research that does not improve practice. In short, he advocates applied research as opposed to remote scholarly exercise (Hechinger, 1984).

Educational research helps provide a heuristic framework from which decisions can be made. This author's investigation rests on the findings which call for educators to look closely at individual schools (Goodlad, 1984) and, more specifically, those findings which support the use of effective staff development programs toward improving them. Staff development is not an end in itself. On the contrary, it is a means to bring about change supported by a heuristic atmosphere to enhance student learning (U. Byas, personal communication, December, 1984).

A study conducted by Rutter et al. (1979) concluded that effective schools tend to have staff consensus, i.e. a commmon mission which they can articulate well with one another. Good staff development strives to create a synergy via collaborative efforts which necessarily involves participants in the planning and decision-making stages of the process. This type of collaboration aims for the attainment of goal agreement, an essential element for initiating change.

The "School Change Review" section of this chapter addressed one of the problems inherently associated with planned change, namely managing, eliminating or minimizing the resistance encountered in that process on the

organizational level. In most schools teachers and principal have reached a fairly stable loggerhead situation so hierarchical change is blocked. Teachers are all ostensibly peers and colleagues, although internally they are well differentiated by personalities, past history and effectiveness.

In educational settings individual teachers have direct, continual and consequently powerful influences over learning atmospheres. Neglecting to recognize teachers' impact on the learning environment, their needs and their attitudes, as well as the failure to consider the importance of the "teacher as learner," all contribute to disappointing staff development efforts.

Some research points to teacher qualities which are in opposition to change. Dan Lortie's sociological study on teacher characteristics (cited in Barth, 1980) revealed three dominant traits. These traits were: (a) conservatism, a preference for the familiar; (b) presentism, a tendency to live from day to day; and (c) individualism, a quality of loneliness and isolation (p. 146).

While many reformers view these qualities as the teacher's problem to overcome, Barth (1980) sees these characteristics as symptomatic responses of teachers to an unhealthy school environment. He suggests that those who want to change schools by changing teachers would do better to address the conditions under which they work (p. 146).

When staff development is conducted within the school setting, the conditions under which staff learn are the same conditions under which they work. Therefore, the school conditions will affect the quality of learning that occurs for teachers as well as students.

Factors related to the adult learner (Wood, Thompson, & Russell, 1981) also determine the quality of the change program. Bunker & Hrusha (1982) suggested that these factors be considered in designing and implementing programs, specifically that adults will commit to learning when: (a) goals are job related and useful; (b) experience meets their professional needs; (c) there is accurate feedback; and (d) they are involved in the selection of objectives, content, activities and assessment.

The Rand Change Agent Study (McLaughlin & Marsh, 1978) emphasized learning for staff as part of ongoing program building in an organizational context. The study suggested a number of implications to guide staff development activities. First, the study suggested that teachers in a school ordinarily have the necessary clinical expertise to improve instruction and school climate. Second, the study described the process by which innovations are brought to the local setting as being adaptive and heuristic. A third assumption was that professional learning was a long-term, nonlinear process. Fourth, the study suggested that mutual adaptions foster conceptual

clarity. Finally, successful implementation depended on the organizational climate and the leadership of the school. Active involvement of both principal and school district leadership was vital to the maintenance of change (pp. 87-91).

Regarding teachers, microcomputers and inservice training Wilson (1983) wrote:

> One of the most amazing aspects of any innovation, this time the microcomputer, is that it creates amnesia. We immediately forget everything we know about effective inservice. We forget what we read in the Rand Study about the critical role of the principal in the successful implementation of innovations (p. 80).

Corwin (1983) echoed this view in stating that those of us who are actively involved in school improvement should apply what we know about effective staff development rather than thinking about the "best" model for teacher education in computer literacy (p. 6). Corwin outlined the parameters of staff development to minimally include (a) program goals, (b) allocation of funds, (c) instructional methods, and (d) long term support (p. 9).

Computer Utilization Reviewed

This study focuses on utilizing computers effectively to enhance learning by creating a heuristic environment for learning which would foster development in the affective, social and cognitive domains. These domains

cannot be viewed in isolation as they are interrelated. Development in one area spills over into and stimulates or generates gains in one or both of the others. The question that logically follows is--what gains can be achieved in the three domains that would constitute effective use of computers to enhance the learning process?

The Prophecies

Affective

First, in the affective domain, computers hold promise for increasing enthusiasm for learning. Assuming that motivation is associated with achievement, if computers can serve to stimulate motivation then we can expect that stimulating motivation over time will likely result in cognitive gains.

Affective development is influenced in a positive or negative way by the attitudes students hold toward learning. Papert (1980) believed that what students learn depends not on the content but on their relationship to the content (p. 9). There must, Papert expanded, be a relationship of "love"--a sense of warmth and value as well as cognitive competency--between the student and the material (p. 54). Papert spoke generally about learning, but specifically about LOGO. The LOGO language, developed at the Massachusetts Institute of Technology, allows young students

to learn to program quickly, since the language more closely resembles the form and richness of normal speech than does other languages such as BASIC. Even though Papert spoke more about LOGO as a programming language, teaching students any computer language aims to let students know they have the power to be proactive learners rather than passive recipients of the curriculum.

Social

The affective issues Papert (1980) spoke of held implications for the learner's social development as well. Sarason (1982) held the view that the observers of schools had a kinship to anthropologists in that they study various cultures. Similarly those who work in schools deal with the cultural aspects of our society. From this focus, Papert viewed the entrance of computers into culture as a part of the reality of a society undergoing increasing disillusionment with traditional education (p. 181).

Moreover, a greater critical social issue--that of equity as it relates to computer use--demands careful examination. Papert posed the question, "Will we use the computer to democratize education or will we allow them to perpetuate past inequities?" (Nova, 1983). Equity goes beyond ownership of computer equipment found in more affluent schools as compared to poor rural or inner-city schools. The real issue in ensuring equity in computer

instruction is not the quantity of microcomputers found in a school, but rather how those computers are used with students. Lipkin (1983) discussed Daniel Watt's view (1982) that:

> When computers are introduced into suburban schools, it is often in the context of computer programming and computer awareness. In less affluent rural or inner-city schools, Computer Assisted Instruction of the drill and practice variety is used almost exclusively. Affluent students are thus learning to tell the computer what to do while less affluent students are learning to do what the computer tells them (p. 26).

This practice strongly hints at the subtle racial differences that institutions perpetuate in their persistent pattern of racism as practiced by white Americans. It translates into unequal conditions and low expectation levels for Blacks. In his discussion of "Change and Institutional Racism," Jones (1972) wrote:

> As long as schools successfully impose obedience and respect upon Black children, there will be no opportunity for those children to demonstrate initiative, ability and responsibility. Teachers who have excused the failures of urban schools on the basis that "those" children cannot learn, no longer expect their classes to learn (p. 84).

Levels of expectations for black students will remain low as long as views persist of students as passive absorbers of subject matter and recipients of force-fed national curriculum (Nash & Ducharme, 1983). Furthermore, many educators, reformers and critics of schools have ignored the outcomes of schooling such as sharing, decision-making and self-evaluation skills.

Cognitive

Computers hold promise for facilitating growth in the cognitive domain. Jerome Bruner (1960) considered the goal of education to be to help the child become an effective, independent learner. Thus placing the emphasis on process objectives versus content objectives in achieving that goal has its roots in Bruner's theories. These process objectives strive to make the learner self-initiating (i.e. skilled in sensing problems), self-operating (i.e. skilled in gathering and manipulating data) and self-evaluating (i.e. skilled in evaluating and assessing their growth). Of these, the computer holds the greatest potential for fostering self-operating skills. The computer can be used as an effective tool in helping students gather their own data and in seeing the relationships between and within the data (A. P. Mattaliano, personal communication, November 19, 1983). Thus engaging students in this type of computer application promotes thinking skills and offers practice in using those skills.

The quest to enhance learning follows a course in search of those computer applications which will best foster development in both the affective and social domain and which will at the same time serve students as effective tools for developing the cognitive aspects of their learning in specific subject areas. An educator's task becomes one

of "match-making" between the most potentially powerful, most promising computer applications and their students' academic needs.

Educational Promise

In mathematics, recent research (Carpenter, Corbitt, Kepner, Lindquist & Reys, 1980) indicated that problem solving was the area most in need of attention in the curriculum. This conclusion was based on results from the second mathematics assessment of the National Assessment of Educational Progress (NAEP) which stated that "although students are learning many basic algorithmic or computational skills, they have difficulty applying these skills to solve even simple nonroutine problems" (p. 562).

Of the 70,000 students in the NAEP sample, ages 9, 13 and 17, students at all age levels frequently attempted to apply a single mathematical operation to whatever numbers were given in a problem. According to the findings (Carpenter et al., 1980) only 10 percent of the 9-year-olds and 30 percent of the 13-year-olds correctly solved this exercise:

> Mr. Jones put a wire fence all the way around his rectangular garden. The garden is 10 feet long and six feet wide. How many feet did he use?

An error analysis revealed that those failing to answer correctly usually approached the problem by adding the

numbers 10 and 6.

Teaching problem solving has long been a source of frustration for mathematics teachers. Generally, teachers consider problem solving as difficult to teach as it is for students to learn. Whimbey (1980) referred to the work of Bloom and Broder (1950) which attempted to learn more about how successful college students think compared to how unsuccessful students think. Bloom and Broder found (Whimbey, 1980) that successful students actively attacked problems and when a question was initially unclear, they often engaged in a lengthy sequential analysis to arrive at the answer. This was in contrast to unsuccessful students who were mentally careless and superficial in solving problems, spent little time considering a question and tended to be passive in their thinking (pp. 560-561).

LOGO holds promise for developing skill in problem solving and mathematics. LOGO is an ideal medium for learning some mathematical concepts particularly in the area of geometry. Moreover, there is research (Maddux, 1984) supporting Papert's belief that LOGO is capable of improving the quality of children's thinking by lowering the developmental boundary between child and adult thinking. As Maddux pointed out, this contention is controversial and represents a departure from traditional Piagetian theories which "hold that a child's inability to engage in adult thinking is the result of an interaction between the

complexity of logical structure of certain cognitive tasks and the absence of needed neurological maturity." Maddux wrote:

> Papert acknowledges the importance of complexity and of development, but he suggests that adult thinking can also be delayed by cultural factors. . . . that this may help account for the fact that in our culture, the ability to do combinational thinking occurs quite late in a given individual's development. . . .
>
> Papert believes that computers can be used to bring previously abstract cognitive tasks to the school child in abundant, concrete form . . . . If Papert is correct, computers in education could be the tools required to improve the quality of children's thought processes and make adult cognitions available to younger ages than we ever thought possible. Such a result would surely be regarded as the most significant educational development in this century (p. 82).

Although to date, little research has been done concerning the effects of LOGO on learning, a project incorporating research components in a Minnesota urban public school system found that LOGO benefited all their student populations as evidenced not only by academic success but by students' increased enthusiasm for learning (Dog, 1985). The St. Paul Public Schools began with 26 classrooms in 1982 and has expanded to include 250 teachers working in various settings, including special and remedial education, mainstream classrooms and schools whose economic base ranged from very poor to predominantly middle class (p. 45). The project capitalized on the modified discovery-learning format of LOGO emphasizing the salience of the "teachable moment" type of teacher intervention (p.

46).

The research component measured how teachers and students responded to LOGO and focused on questions of (a) how computers can be used to engage all types of students, and (b) who is responsible for the quality and effects of the computer's impact on the classroom enviroment (p. 45-46). The findings showed that approximately half of all students were thought by their teachers to have improved in some aspect of their academic performance and that ten percent improved dramatically as a result of their experience with LOGO (p. 46). Moreover, the findings indicated that there was no way to subclassify the students who showed significant improvement. Further analysis revealed that:

> Students in the lowest two achievement quintiles demonstrated improvement at about the same rate as students in the highest two quintiles. Likewise, there was little or no difference (less than 10 percent) between male and females in level of improvement . . . .
>
> Another analysis revealed that none of the student characteristics usually considered to be traditional predictors of academic success or failure (i.e. disruptiveness in the class, initiative, independence, cognitive style, and emotional development) were predictive of improvement through LOGO (Dog, 1985, p. 47).

Ultimately, the educational promise of the computer will not be fulfilled by using them simply to transmit content nor in the repetition of drill and practice type use. The promise lies in utilizing the microcomputer as the medium for engaging in processes which lend themselves to

enhancing learning and promoting academic success.

As to the effects on the student of computer use in composing, the empirical evidence is presently somewhat limited and inconclusive. Futhermore, there are those who caution over rating the effects of word processing on the composing aspect of writing (Collier, 1983). Nevertheless, there are still a number of theorists and researchers who claim optimism about the impact and the benefits of writing with computers (i.e. Kane, 1983; Daiute, 1983; Loheyde, 1984).

Research finding and conclusions differed as to the effect of the computer on young writers versus mature writers. In general, there has been more evidence of a positive effect and more optimism expressed for the younger writer. As to the question of the extent to which computer use in writing instruction improved composition, in a pilot study to determine its effect on the revision strategies for college students, Collier (1983) found it to be a distinct advantage for superior writers, a moderate advantage for average students and a disadvantage to inexperienced writers. However, the number and complexity of written drafts increased for all students and all expressed positive reactions to using the word processor (pp. 149-155).

In one of the few studies devoted to examining the effects of word processing in the composing and revision stages for young writers, Kane (1983) concluded that (a)

students increased involvement with text may in itself improve writing, (b) speed of use allowed students to use earlier drafts to explore ideas, (c) more attention was given to organizational matters, (d) students were motivated to learn new strategies as a result of the ease of revising with a word processor, and (e) peer conferencing was facilitated. Word processing certainly promises to overcome some of the problems students face in the revising. As Daiute (1983) noted, word processing has the ability to relieve some of the physical and psychological constraints of composing. Daiute refers here to the slow and painful nature of the physical act of writing which often discourages young writers from experimenting with different versions of their work. Furthermore, Daiute noted that (a) the freedom from recopying allowed writers to focus on ideas rather than on mechanics, and (b) word processing relieved some of the burden placed on short term memory during the composing process (pp. 134-145).

Regarding the advantages of using word processing for teaching writing, Loheyde (1984) pointed out one of the often cited advantages for elementary-aged children: that children usually struggle laboriously for a neat and perfect copy of their writing. Loheyde illustrated this point referring to the common habit children have of discarding their paper to start anew after making errors that push them to the theshold of frustration. As Loheyde noted,

researchers have consistently found that those writers who compose on the computer write more. Loheyde goes on to list the other benefits of computer use in the teaching of composition as being: (a) student work is far easier for the teacher to read so that evaluation decisions on a composition will not be colored by the struggle to decipher a student's handwriting; (b) the response of youngsters to their own work in print had proved a great motivator because the writer takes increased pride in the production of their work; (c) the ease of revision, i.e. insertions, deletions and spelling corrections is well accommodated by the word processor thus more is accomplished; and (d) the speed of text generation minimizes the strain on memory and main ideas can be put up quickly on screen and details attended to later (p.82).

Conclusions

The research on computer applications, for example, the effect of word processing on writing, remains limited. At the same time there are educators who would debate the frequently heralded effects of LOGO. However, the literature reviewed in this chapter suggests that such activities hold tremendous promise for fostering development in the cognitive, affective and social domains. Moreover, active involvement in word processing and LOGO applications

can foster a learning environment in which students are motivated, achieve success and gain a sense of control to become self-directing, self-operating and self-evaluating independent learners.

Levels of expectations for black students will remain low as long as students are denied opportunities to demonstrate initiative, ability and responsibility. The level of commitment to ensuring equal conditions will be decided by our determination in creating a heuristic learning environment for all students regardless of any subclassification according to sex, homogeneous ability grouping or past performance.

The primary source of student learning is the teacher. The active involvement of teachers in hands-on learning activities and the application of sound staff development principles represent a realistic approach for combatting teachers' feelings of inadequacy regarding computer technology.

The process of engaging school groups in dialogue, program design and planning, collecting and evaluating their input and providing them with hands-on experiences serves as the conduit for successfully connecting computer utilization issues with staff development activity. Because the quality of a school and the learning that takes place therein reflect the values and level of interaction between staff members, any set of procedures should promote meaningful

exchange across group lines. This process of continuous response and communication can provide the means to establish goal agreement and common mission toward creating more effective schools.

References

Allen, D. W., & Woodbury, J. C. (1970). Levers for Change. (Typescript photocopy, School of Education, University of Massachusetts Amherst)

Barth, R. S. (1980). Run school run. Cambridge: Harvard University Press.

Bloom, B. S., & Broder, L. (1950). Problem-solving process of college students. Chicago: University of Chicago Press.

Bruner, J. S. (1960). The process of education. Cambridge: Harvard University Press.

Bunker, R. M., & Hruska, M. (1982). School based staff development: Definitions, documents, & directions (Worcester Public School Staff Development Project). Amherst: University of Massachusetts, School of Education.

Carpenter, T. P., Corbitt, M. K., Kepner, H., Lindquist, M. M., & Reys, R. E. (1980). Problem solving in mathematics: National assessment results. Educational Leadership, 37(7), 562-563.

Collier, R. M. (1983). The word processor and revision strategies. College Composition and Communication, 34, 149-155.

Corwin, R. (1983). Looking for a model of computer literacy training. Journal of Staff Development. 4(2), 6-13.

Daiute, C. A. (1983). The computer as stylus and audience. College Composition and Communication, 34, 134-145.

Dog, P. F. (1985). Exciting effects of logo in an urban public school system. Educational Leadership, 43(1), 45-47.

Eisner, E. W. (1984, March). Can educational research inform educational practice? Phi Delta Kappan, pp. 447-452.

Goodlad, J. (1984). A place called school. New York: McGraw Hill.

Gray, J. L., & Storke, F. A. (1984). Organizational behavior concepts and applications (3rd ed.). New York: Charles E. Merrill.

Hechinger, F. M. (1984, April 3). Scholar harshly criticizes educational research. New York Times, p. 45.

Huse, E. (1980). Organizational development and change. St. Paul, MN: West.

Jones, B. L. (1972). Change and institutional racism. In B. L. Jones (Ed.), Urban education: The hope factor (pp. 83-124). Philadelphia: Saunders.

Kane, J. H. (1983). Computers for composing. (Bethesda, MD: ERIC Document Reproduction Service No. ED 230 978)

Lewin, K. (1947). Frontiers in group dynamics. Human Relations, 1, 5-42.

Lipkin, J. (1983). Equity in computer education. Educational Leadership, 41(1), 26.

Loheyde, K. M. J. (1984). Computer use in the teaching of composition: Considerations for teachers of writing. Computers in the Schools, 1(2), 81-86.

Maddux, C. D. (1984). The educational promise of logo. Computers in the Schools, 1(1), 79-89.

McLauglin, M. W., & Marsh, D. D. (1978). Staff development and school change. Teachers College Record, 80(1), 69-94.

Nash, R., & Durcharme, E. R. (1983). Where there is no vision, the people perish: A nation at risk. Journal of Teacher Education, 34(4), 38-46.

Nova, (Public Broadcasting Station). (1983, October). Talking turtle [Science broadcast]. New York.

Papert, S. (1980) Mindstorms. New York: Basic Books.

Robinson, G. E. (1985). Effective schools research: A guide to school improvement. Concerns in Education (February Report). Arlington, VA: Educational Research Service.

Rutter, M., Maughan, B., Mortimore, P., Ouston, J., & Smith, A. (1979). Fifteen thousand hours. Cambridge: Harvard University Press.

Sarason, S. B. (1982). The culture of school and the problem of change. (2nd ed.). Boston: Allyn & Bacon.

Watts, D. (1982). Education for citizenship in a computer-based society. In Computer Literacy (p. 59). New York: Academic Press.

Whimbey, A. (1980). Students can learn to be better problem solvers. Educational Leadership, 37(7), 560-565.

Wilson, M. A. B. (1983). Teachers, microcomputers and inservice. Journal of Staff Development: Staff Development for Computer Literacy, 4(2), 80-92.

Wood, F. H., Thompson, S. R., & Russell, F. (1981). Designing effective staff development programs. In Staff Development/Organization Development (pp. 59-89). Alexandria, VA: Association for Supervision and Curriculum Development.

C H A P T E R I I I

THE FOCUS PROJECT

Introduction

Between October 10, 1984 and June 10, 1985 a series of seven workshops were conducted in three Roosevelt elementary schools to test the ideas of how positive change in computer utilization practices would occur using staff development as the vehicle. Staff development techniques were applied to involve administrators, teachers and paraprofessionals in working together. This chapter chronicles the initial steps taken to negotiate a feasible plan for carrying out staff development activities followed by the objectives, procedures and feedback results involved in each session as it took place.

In this and subsequent chapters, references to this author take one of three forms depending on the role asssumed at that point in time of the project. Project Researcher refers to the role of conducting activities or gathering data for research purposes in the study. Workshop Facilitator refers to the role of presenter in the sessions conducted with staff. Project Director is used to refer to situations where the role assumes a coordinating or supervising capacity.

Initial Planning

A district needs assessment was initiated from the Superintendent's office in June of 1984, the results of which served as the basis for the activities in the first session (see Appendix A). The activities in subsequent sessions evolved from the feedback of the previous session and ideas gleaned from the dialogue that took place therein between participants. The scope of the activities was initially determined by the equipment limitations, but later when new equipment was acquired, activities were broadened to meet the needs more specifically.

Initial communication involved dialogue between the Superintendent of Schools and the Project Researcher in August and September of 1984 to bring forth shared perceptions on the status of the computer program at that point in time to (a) identify problem areas, (b) build goal consensus, and (c) reach agreement on the best schema for the workshop sessions with staff members. The exact content of the intended workshop sessions could not be determined at that point because their content necessarily depended on feedback from preceeding sessions. However, there was a consensus that the computer labs were not operating with maximum efficiency and to the fullest potential to enhance learning. It was determined that staff development efforts represented an appropriate and expeditious means for

promoting teacher involvement aimed at improving computer practices to impact more favorably on parts of the curriculum and to motivate students to achieve at higher levels.

In concert with these initial conversations, the Project Researcher met with Principals from the district's three elementary schools. The primary purpose of these meetings, in addition to detailing the logistics of the proposed staff development sessions, was to build support and to generate enthusiasm for the project from these key persons. These discussions centered around the needs assessment data from the respective schools in an attempt to gather input and build support for conducting activities aimed at improvement. In conjunction with that goal, the Project Director discussed staff development needs with Principals who agreed that the initial workshop/planning group be composed of a cross section of representative staff members from each school to participate in planning and training sessions. Principals organized a group of key school personnel by recommending three staff members from their school to serve as initial participants of a FOCUS (Focus On Computer Utilization Strategies) group--a nucleus of staff members for the planning and workshop sessions.

This committee included three math coordinators, the three computer lab paraprofessionals who managed the labs and one classroom teacher from each school selected by the

principal. This group remained intact as active participants throughout the entire project. As the sessions continued, membership grew and fluctuated depending on the content of the session. For example, the schools' reading coordinators, their assistants and the District Writing Coordinator were involved in sessions on using word processing. A special education teacher expressing interest in the project was involved early in the process, and developed and implemented a mini-project with her class during the 1984-1985 school year.

Focus Session 1

On October 12, 1984, twelve participants including three math coordinators, one reading coordinator, one classroom teacher, three computer lab paraprofessionals, two reading paraprofessionals and two visitors from the Roosevelt Cooperative Extension gathered in the Theodore Roosevelt School's computer room for the first planning session. Fewer classroom teachers attended than were expected since class coverage could not be arranged. This problem was dealt with in subsequent sessions so that teachers could be released from teaching duties. However, coverage continued to be a consideration in the planning of the sessions.

Objectives

The specific objectives of session 1 were:

1. To outline the role of the FOCUS group;

2. To generate dialogue on computer utilization issues moving toward establishing some agreement on values;

3. To begin building goal consensus and goal clarity;

4. To analyze and prioritize needs assessment data and target objectives.

Procedures

The following activities corresponded by number to the objectives as stated:

Activity 1--Outlining role. The session opened with discussion on the role of the group which outlined five major responsibilities. The role of the FOCUS group was advanced as follows:

1. To serve as a planning group and as initial workshop participants;

2. To provide input in analyzing and prioritizing the results of the needs assessment;

3. To evaluate curriculum issues as well as advising the development and implementation of an action plan to actualize the objectives;

4. To investigate and evaluate software;

5. To evaluate criteria for hardware selection based on plans for software.

Activity 2--Computer utilization issues. The inclusion of this activity was based in part on findings from effective school studies, namely Michael Rutter. Rutter et al. (1979) emphasized staff ethos in working together and found that when head teachers or trainers selected their own staff there was greater cohesiveness. Programs were most effective (a) when the staff agreed on a sense of the curriculum which they could articulate, and (b) when those ideas were widely shared. Rutter's findings supported the Workshop Facilitator's belief that any course of collaborative action for improvement should be founded on a shared sense of philosophy, articulated by each party, which could be sustained as an underlying doctrine for the activities engaged.

Dialogue centered around issues that were believed to be prerequisite in developing activities for students. Specifically, these issues addressed how computers should be utilized in schools relative to the learner. The following beliefs gave direction to the activities and were advanced in connection with the utilization of computers in the educational setting.

The use of computers in the educational setting should:

1. Relate to the developmental stages of the learner;

2. Support the preparation of the student to assume a responsible societal role;

3. Ensure equity by providing equal access to computers for all regardless of different ability levels, sex or socio-economic status (In practice, this belief dictates that we emphasize how computers are utilized rather than the number of computers in use and requires attention to an equitable balance in a program of both male and female participants.);

4. Give students some control and some responsibility in the learning process beyond being passive recipients of the curriculum.

Activity 3--Consensus building via utopian thinking. Group formation was subject to the stipuation that a cross-section of staff members from different schools would comprise each group to foster interaction and exchange of ideas between schools. In groups of three to four, participants brainstormed for ten to fifteen minutes with responses compiled by group-appointed recorders. Groups were asked to complete the following statement:

Ideally, computers should be utilized in the educational setting for elementary students to . . . .

Collective responses of the three groups were listed as follows:

Group 1

1. Solve problems and enhance creative thinking

2. Reinforce curriculum

3. Introduce computer applications other than C.A.I. (Computer Assisted Instruction)

4. Foster keyboarding skills in typing, reinforcing letter and number recognition

5. Familiarize students with computer use in business

6. Take advantage of the best software

7. Assist the teacher rather than replace her

8. Provide individual attention to address student strengths and weaknessess

9. Integrate learning with computers into subject areas, i.e. integrate vocabulary germane to computers into language arts instruction

Group 2

1. Inform students of the history of computers as well as present and future uses

2. Instruct students in how computers operate

3. Teach word processing

4. Provide hands-on experiences

5. Expand utilization beyond C.A.I.

6. Provide an awareness of different computer languages

7. Apply computers to skill areas; integrate into subject areas

8. Provide teacher inservice

9. Provide workshops for parents

10. Integrate computer terminology into reading and language arts

Group 3

1. Build self-confidence and self-esteem

2. Teach students programming

3. Reinforce class work

4. Reinforce number facts, concepts

Activity 4--Needs assessment data sorting. The Workshop Facilitator presented the needs assessment responses to the group in the form of a composite list. The list revealed various perceptions of computer program needs, some of which turned out to be tentative as opinions shifted with closer analysis, more active involvement and being confronted with the realities of attempting to implement one's philosophy. Focusing on one item often required the re-thinking or eliminating of another as change began to occur in perceptions and in settings. The following items were cited as pressing needs:

1. Workshops in using word processing and line printers

2. Workshops to train staff in computer applications

3. Workshops to train staff in programming language(s) and techniques

4. Promotion of more active teacher involvement

5. Familiarization of staff with software

6. Acquisition of more software for primary grades and for reading, science and social studies where software was considered to be most limited

7. A more efficient means of prescribing software in labs

8. Selection of more appropriate software

9. A central reporting system

10. District-wide conformity

11. Using computers with students in ways other than for C.A.I.

12. Replacement of stolen equipment

13. Removal of BOCES machines not operating

14. Placement of computers in resource areas, labs and libraries

15. Offering classes in computers for advanced students

16. Having a "Computer Fair"

Teachers evaluated the data to determine which items should constitute short-range goals, which should constitute long-range goals and grouped them likewise. Each group ranked each item under one of the two respective goal categories in priority order, beginning with 1 and numbering in ascending order. Finally, each group selected one item from each list that held high priority and at the same time was realistically obtainable and stated the item in the form

of an objective. The activity generated the following objective selected as a priority from each school:

	Short-range	Long-range
Theodore Roosevelt School	Conduct workshops to train staff in computer uses	Conduct workshops to train staff in programming languages
Washington Rose School	Replace missing machines	Conduct workshops to train staff in computer uses
Centennial Avenue School	Conduct workshops to train staff in computer uses	Conduct workshops to train staff in programming languages

Activity 5--Workshop in BASIC. This activity was planned to give participants some hands-on experience with computers but was not completed as time did not permit. This resulted from the Workshop Facilitator's tendency to attempt too much in one session. Also, a forum had not existed in the past for sharing ideas outside of the individual school boundaries, so that the dialogue exceeded the anticipated time frames. Because the Workshop

Facilitator viewed the dialogue as critical, the hands-on activity was yielded in favor of extending time allotments for the first four activities.

Feedback Assessment Instrument

The Workshop Facilitator distributed a feedback assessment instrument including three items, at the end of each of the seven sessions to gather data on the participant's reaction to the session and suggestions for the next session (see Appendix B-1). In the first item, the group rated the session as not useful, somewhat useful, very useful, or extremely useful. In the second item the group indicated which activities they found particularly useful. The third item was an open-ended question included to elicit which kinds of activities the group wanted included in future sessions.

The same format for the feedback assessment was used in each of the subsequent sessions (see Appendixes B-2 to B-7). Only the activities listed under item 2 were altered to match activities conducted in each session. A fourth item was eventually added to the assessment to allow for open commentation.

Session 1 Feedback Assessment Results

Item 1. Eight of the participants responded in writing

to the feedback assessment. Five rated the sessions as extremely useful (62%) and three rated it as very useful (38%).

Item 2. In response to the activity found paricularly useful, the number of participants responding to each item was:

Utopian thinking exercise--8

Talking with people from other schools--8

Discussion of computer utilization issues--7

Needs assessment data sorting--6

Talking with other people in other roles--4

Hands-on with computers--(not completed)

Item 3. The topics identified for exploration in future sessions and the number responding to each were:

Hands-on experience with computers--3

Programming and methods to introduce the same to students--2

Activities to augment C.A.I.--1

Workshops in using word processing--1

Focus Session 2

Because the interest of the group at this point in time centered around hands-on activities, specifically programming, the second session was devoted entirely to the BASIC programming language. The feedback from the first

session served as the most immediate and obvious rationale, beyond which, the decision to include programming rested on related theories of learning and teaching. The rationale called on an adaption of Papert's view that the purpose of teaching programming, regardless of the language, should be to let learners know they have the power to be proactive learners and to afford them opportunities to make decisions and choices--and not necessarily to produce programmers. The possible side effect of sensitizing teachers by placing them in the role of learner, coupled with the attempt to respond to the needs and interests of the group, were considerations in designing this workshop.

On October 26, 1984, seven participants including two math coordinators, two classroom teachers and three computer lab paraprofessionals gathered in the computer lab at the Centennial Avenue School. The Workshop Facilitator conducted activities in BASIC, one of the easiest languages to master and which serves as a good foundation for more advanced languages. Equipment limitations at that time prohibited the use of other languages such as LOGO.

Objectives

The specific objectives of session 2 were:

1. To give the participants a working knowledge of how a computer functions;

2. To instruct participants in a computer language

(BASIC).

Procedures

The following activities cooresponded to the objectives as follows:

Objective 1 ---- Activity 1

Objective 2 ---- Activity 2 and Activity 3

Activity 1--How a computer functions. The Workshop Facilitator made a general presentation as an introduction to programming which dealt with (a) a computer program as a set of numbered instructions, (b) the BASIC nomenclature and syntax, (c) the binary number system as it related to bits, bytes and character codes, (d) memory components (ROM and RAM), (e) commands such as RUN, LIST, NEW and PRINT, and (f) the Input, Output and Central Processing Unit (CPU) of the computer.

Activity 2--Statements in BASIC and some experiements. Teachers applied the BASIC statements INPUT, LET, PRINT, END and GOTO to some simple programs to (a) compute an average of three numbers, (b) print the user's name across the screen using an endless loop, and (c) input, add and print the sum of two numbers.

Activity 3--"Basically Speaking." In this activity teachers reviewed BASIC commands from Activity 1. New topics included (a) error messages, (b) strings, (c) correcting typing errors, (d) using the calculator to

compute numbers, (e) strings and numeric expressions, (f) operation keys (+ - * /), (g) the computers capacity for rounding numbers, (h) exponents, and (g) assigning values to string and numeric variables.

Participants concluded this activity by using the computer to complete exercises in a packet including ten experiments in BASIC involving (a) printing formats in a loop, (b) counting, (c) counting with limits, (d) reading and printing from data statements, and (e) a multiple choice input program using IF. . .THEN statements to evaluate the input.

Session 2 Feedback Results

Item 1. Seven participants responded in writing to the feedback assessment. Four rated the sessions as extremely useful (57%) and three rated it as very useful (33%).

Item 2. The second item on the assessment sheet was modified to determine which information from the material covered should be incorporated into the curriculum. The number of participants responding to each item was:

What a program consists of--7

The computer's memory--6

Statements in BASIC--6

Screen formatting--6

Input/Output/CPU--5

The binary number system--3

Item 3. The topics identified for exploration in future sessions were:

Word Processing--4

LOGO--1

Programs to teach math operations--1

Advanced programming--1

Use of different computers--1

Focus Session 3

By the date of the third session on November 30, 1984, the Project Director was planning with the Superintendent for the purchase of new equipment. Conversations and meetings with district administrators and with consultants from NOVA NET (a computer consortium to which Roosevelt had become one of six members in the Nassau County cluster) centered around (a) developing computer education plans, (b) hardware recommendations, and (c) software applications to meet our instructional goals. Agreement and approval for purchasing the equipment had not been finalized. Because the choice set of desired activities hinged on the acquisition of the hardware and software, these activities had to be postponed. Therefore, this session addressed some of the secondary responses on the feedback assessment from the second session, namely, the use of different computers and a continuation of programming

including graphics. In concert with the administration's efforts to develop a district plan, a Force-Field Analysis exercise was also included as an activity to gather additional input from the staff in the planning process.

Eleven staff members including two math coordinators, three classroom teachers, one special education teacher, three computer lab paraprofessionals, the Principal of the host school and the Superintendent of Schools gathered with the Workshop Facilitator in the Washington Rose Computer Lab.

Objectives

The specific objectives of session 3 were:

1. To familiarize participants with cursor movement and screen graphic techniques on the Commodore PET;

2. To review and expand on statements in the BASIC programming language;

3. To set objectives, diagnose the helping and hindering forces acting on the present situation and to plan action steps to reduce or change the relative forces.

Procedures

The following activities corresponded by number to the objectives stated:

Activity 1--Cursor movement and graphics. This activity involved learning the nine cursor controls on the

Commodore PET and drawing on the screen. The keys and corresponding movements were:

KEY	MOVE
CRSR UP/DOWN	DOWN
SHIFT+CRSR UP/DOWN	UP
CRSR L/R	RIGHT
SHIFT+CRSR L/R	LEFT
INST/DEL	ERASE LAST CHARACTER
SHIFT+INST/DEL	INSERT BLANK SPACE
CLR/HOME	HOMES CURSOR
SHIFT+CLR/HOME	CLEARS SCREEN, HOMES CURSOR
SPACEBAR	RIGHT, ERASE

The graphic symbols on the front side of the PET keys used with the shift, allow the user to create pictorial images on the screen, insert line numbers followed by PRINT commands and execute as a program. This technique renders an animated graphic such as the one illustrated in figure 4 which can be useful in motivating students to begin programming on the PET while learning the keyboard and its control keys.

```
10?"
20?"
30?"
40?"
50?"
60?"
70?"
80?"
90?"
100?"
110?"
120?"
```

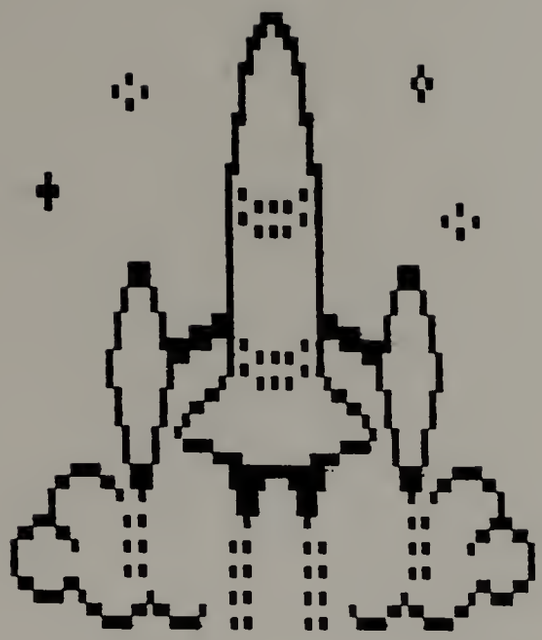


Figure 4. Program to animate graphics. (The program is executed, printing lines 100-120. The image scrolls on the screen giving the illusion of movement.)

Activity 2--BASIC. In this activity, teachers reviewed strings and their variables, and the GOTO and IF...THEN statements. The BASIC vocabulary was extended to include the REM statement, used in programming to describe parts of the program.

Activity 3--Force-Field Analysis. The Force-Field Analysis activity was borrowed from the University of Massachusetts [Adapted from Joan M. Brandon, & Associates (Ed.). (1982). Networking: A Trainer's Manual. Amherst: Community Ed. Resource Center. Other references include pp. 45-50 of "Planned Change as an Educational Strategy" (Xerox)

and Richard A. Schmuck et al. (1977). The Second Handbook of Organizational Development in Schools, pp. 293-306] and was based on the theories of Kurt Lewin (1947) which viewed behavior as a dynamic equilibrium of forces working in opposite directions. The steps employed in conducting the Force-Field Analysis were as follows:

Step 1--Setting objectives/setting an ideal. The objective selected for this exercise was "A group of instructional staff cooperates directly or indirectly to modify present computer utilization practices so as to create an environment which will motivate and bring about more active learning for students."

Step 2--Diagnosing forces. In order to plan appropriate strategies for change the nature of the forces must be identified and understood. Therefore, in this step participants (a) identified the helping and hindering forces affecting achievement of their objective, (b) listed those forces, and (c) reported back to the group at large.

Step 3--Selecting forces within the range of influence. Participants reviewed their list of forces. Not all forces are equally important nor are they of the same weight of their counter-force or other forces on the same side. Each group identified the three forces which they felt they had the power to influence constructively.

Step 4--Action planning and building support. Here participants listed as many concrete action steps as

possible which might be taken to reduce or change the direction of a restraining force or increases the power of a driving force. Responses generated from step 3 and 4, by school were:

Centennial Avenue School

Forces	Action Steps
1. Positive attitudes	Conduct workshops
	Place computers in classrooms
	Encourage input from teachers
2. Standardize hardware	Reassign equipment
	Network computers
	Update equipment
	All software for one type in one school
3. Class Involvement	Expose primary-level students
	Integrate computer terms into curriculum
	Place computers into classes
	Encourage student input
	Establish computer clubs

Theodore Roosevelt School

Forces	Action Steps
1. Better software	Preview prior to selection
	Share successful programs
2. Change attitudes	Provide staff development
	Learn about differences in hardware
	Vary applications
	Learn to program
	Place computers in classrooms

Washington Rose School

Forces	Action Steps
1. Change attitudes	Workshops for teachers
	Catalogue software
	Change scheduling of students into lab
	Preview software
2. Standardize hardware	Discuss with administration
	Reach a consensus on one type
3. Integrate with classroom	Place in rooms

Use supplementary material

Use peer teaching

Session 3 Feedback Results

Item 1. Nine participants responded in writing to the feedback assessment. Six rated the sessions as extremely useful (67%) and three rated the sessions as very useful (23%).

Item 2. Responses to item 2 indicated individuals felt the material which should be integrated into the curriculum should be:

Cursor key functions--6

Graphics--5

Statements in BASIC--2

Item 3. In question 3 participants indicated which activity they found particularly useful. The following activities were checked by the number of participants indicated below:

Force-Field Analysis--8

Graphics--2

Cursor key functions--2

Reviewing materials--2

BASIC-Ø

Item 4. The topics reported for exploration in future sessions were:

Graphics--2

Programming--2

LOGO--1

Word Processing--1

Mini-workshops at individual schools--1

Focus Session 4

By the date of the fourth FOCUS session, the Project Director had submitted a requisition for the purchase of 16 microcomputers with 64-128K memory, printers and plotters for each school and a network system for the Radio Shack computers at one school, along with a developmental plan detailing how the equipment would be used in the instructional program. Because the network system would make use of the old equipment and could be used effectively for loading word processing software and sending and receiving documents, this session dealt with word processing. Discussion of educational plans focused on developing school projects as well as the best means for bringing about a smooth transition in changing over to the new equipment.

On February 8, 1985, 15 staff members including three math coordinators, three classroom teachers, one special education teacher, three computer lab paraprofessionals, four reading paraprofessionals, one

reading coordinator and the District Writing Coordinator assembled in the computer room at the Theodore Roosevelt School.

Objectives

The specific objectives of session 4 were:

1. To familiarize participants with word processing techniques;

2. To gather input regarding educational plans for the soon to be acquired hardware;

3. To generate ideas for projects for utilizing general tool programs such as word processing, LOGO and data bases in the curriculum areas.

Procedures

The Workshop Facilitator devoted most of this session to word processing techniques because it required a significant block of time. While the word processing programs available for the new equipment were less complicated and easier to use, the SCRIPSIT Word Processor was used initially because it was already on hand as part of the software library. Also, it provided an alternative to better utilization of the existing equipment. Because the functions of word processing are basically similar, learning could be easily transferred to other word processing programs. The second activity consisted of dialogue on

objectives 2 and 3.

Activity 1--Word processing. Word processing techniques were introduced in this activity through the following exercises in SCRIPSIT (Radio Shack, 1979):

Loading and booting SCRIPSIT

Use of special function keys

Use of basic error correction methods and cursor movements

Practice exercises for correction and cursor movement

Setting and checking screen status

Practice exercises for correcting text

Using print and print formatting instructions

Setting video parameters

Exchanging text

The Workshop Facilitator explained the special functions such as insertions, deletions, exchanges and text markers for words, lines, paragraphs, blocks and pages. Participants practiced text error-correction methods, such as overtyping and deleting characters with sample words and sentences and checked and changed screen status for print width, print length, and paragraph indentation. In a sample text, participants corrected text by making changes in paragraph indentation and by inserting and deleting words and characters. The Workshop Facilitator introduced format

lines to set printing formats as well as to set tabs before teachers printed their exercise. Finally, the group completed an exercise involving the exchange of words and paragraphs within text.

Activity 2--Discussion on computer education plans. The general discussion centered on the need to develop a district plan which would include major comprehensive goals, as well as overviews of individual school plans for improvement as components of the district plan. Thus, each school project would represent an extension of its respective overview in the district plan but would be expanded to include the specific objectives of each project.

Rather than trying to implement all three computer applications in three schools at once, several participants suggested that each school initially focus on developing one program as a project. A major goal of the group was to incorporate these computer applications and their related materials and activities into the district plan.

The applications for which there was the most interest were word processing, LOGO and data bases. Most participants believed the word processing activities had influenced their thinking about how this tool could assist them in their own writing, making the implications for its use with students more obvious. While LOGO had not been explored with hands-on at this point, the possibilities it held for teaching problem solving strategies was seen as a

definite advantage to meet this pressing need. Additionally, previous discussions on LOGO, its widespread use and educational promise, served to sustain an interest in its use. The use of data base programs was suggested as a convenient way to begin integrating computer use with subject area material, specifically in social studies.

By this time, new equipment had been ordered--16 microcomputers with 64K, plotters, printers and a network system for one school. The FOCUS group shared ideas about the best way to bring about a smooth transition in changing over to the new equipment.

The group proposed a plan for allocating the equipment. Budget recommendations for the forthcoming school year included the purchase of at least 18 more computers for the elementary schools. It was suggested that this equipment be allocated to two of the three schools. The 16 microcomputers were enough to completely convert the Theodore Roosevelt Lab's PETS to the 64K Apples and to convert half of the PETS at the Washington Rose School by the end of March 1984. Since the school year was soon to end, the Centennial Avenue Lab and the remainder of the Washington Rose Lab would be converted as soon as possible after the upcoming budget vote in May 1984, so that all three schools would be equally equipped to accommodate each project by the fall of 1985.

The discussion also included reviews of some

software programs for word processing, LOGO and data bases. The group discussed the "Voyage of the Mimi" project for Science, Mathematics, and Computer Science developed by the Bank Street College Project in Science and Mathematics (1985) in connection with the CBS television series by the same name, as a project aimed at helping children gain a better understanding of these areas. The project's purpose is to demonstrate the effectiveness of integrating computers in classroom curricula using the subject of whales as the ship's crew struggles to navigate, locate whales and their feeding grounds, record data and survive on an uninhabited island. The group selected this project for adaption and implementation with grade 6 students.

Session 4 Feedback Results

Ten participants responded in writing to the feedback assessment.

Item 1. Nine participants rated the session as extremely useful (90%) and one rated it as very useful (10%).

Item 2. The following number of participants found the activites listed particularly useful:

Word processing techniques--9

Discussion on Computer Education plans--5

Discussion of hardware plans--5

Discussion of software plans--4

Literature on word processing--3

Item 3. Most of the staff requested another workshop on word processing as they felt it necessary for reinforcement. Additionally, the feedback data suggested the following topics for future sessions:

Word processing--3

LOGO--2

Computer Education planning--2

Graphics--1

Programming--1

Data bases--1

Focus Session 5

The fifth session was conducted as a continuation of the previous session for a two-fold purpose; first, to provide participants with more experience with word processing techniques and to reinforce what was learned from the last session; and second, to gather additional input and specific suggestions on implementation strategies for intended changes. The latter included more detailed planning for altering existing regularities, such as scheduling to accommodate and support the projects at each school. Additionally, the feedback data from the previous session suggested that participants wanted more activities involving word processing and planning. Requests for

sessions in LOGO, data bases and graphics were held in abeyance pending the acquisition of the software and activity materials for use by teachers and students thereafter.

On March 1, 1985, 18 workshop participants, the Principal of the host school, and the District Director of Compensatory Education gathered with the Workshop Facilitator in the computer room at Centennial Avenue School. Workshop participants included three math coordinators, one reading coordinator, seven classroom teachers, one special education teacher, three computer lab paraprofessionals, two reading paraprofessionals and one math paraprofessional.

Objectives

The specific objectives of session 5 were:

1. To extend and reinforce word processing techniques;
2. To generate discussion on plans for incorporating workshop activities into instruction with students;
3. To assess present and future goals in terms of tool programs such as word processing and LOGO to support and enhance instruction;
4. To define present and future goals in terms of tool programs such as word processing and LOGO to support and enhance instruction.

Procedures

The first activity was devoted to (a) a review of word processing techniques covered in the previous session, and (b) the application of those techniques by working with a document. The second activity focused on (a) consensus building regarding Computer Assisted Instruction versus general tool programs, (b) defining computer literacy in the context of tool application programs, and (c) discussion on alternatives to computer lab practices.

Activity 1--Review. Participants completed the following exercises in review of keys and their functions, editing techniques and working with a document:

1. Keys to move to beginning and end of the document and to tab;

2. Control keys for executing deletions, insertions and exchange of paragraphs, words and lines;

3. Text markers for page and blocks of text;

4. Editing including: (a) overtyping, deleting characters, words and sentences; (b) inserting words; and (c) exchanging words and paragraphs.

Participants worked with a sample document using techniques for centering text in a format line and setting tabs using the required procedure to: (a) add a title and table of contents to a document; and (b) insert, delete and exchange blocks of text.

Activity 2--Consensus building. Discussion centered

on: (a) incorporating activities in graphics, word processing, LOGO and data bases into computer lab periods for students; (b) the new emphasis in mathematics curriculum on computer instruction; (c) redefining computer literacy to mean the use of tool programs; (d) expanding staff development efforts to include a larger group of staff members; and (e) ideas for integrating workshop activities into student instruction.

The existing format for scheduling students did not promote teacher involvement nor did it lend itself to implementing units of study in the computer applications being advanced. Larger, more concentrated blocks of time were seen as necessary. For example, teachers planned to conduct ten week units of study focusing on a different application at each grade level for grades 3, 4 and 5.

The existing system scheduled students twice a week for C.A.I., once for math drill and once for language arts drill. In the suggested ten week rotating schedule, students would attend for three one hour periods per week for ten consecutive weeks. This would provide ample time for conduting activities with students in each application area and would at the same time, reduce the management problems created by having several different grade levels attending the lab in one week, or in most cases, in the same day. Further, primary grades were not scheduled for regular computer work. This change would permit enough flexibility

to include these students on a more regular basis at which time teachers would develop activities.

By introducing the application programs, the Workshop Facilitator believed that teachers would be more actively involved since they would be responsible for teaching the unit. It was understood that teacher training at specific grade levels would be necessary for implementing the units at the onset of the coming school year. There was some discussion on whether or not report card grades for computer lab performance would be of any benefit. The group agreed that this would not improve student performances, but would only serve as an additional responsibility for teachers who already felt overburdened with record keeping chores. Some discussion took place regarding the new equipment and the development of a plan to move the present equipment into classrooms in the following year.

Session 5 Feedback Results

Fourteen participants responded in writing to the feedback assessment.

Item 1. Eight participants rated the session as extremely useful (57%) and six rated the session as very useful (43%).

Item 2. Responses to those activities found most useful were:

Word Processing--9

Learning fundamentals--1

Future plans--1

All aspects of workshop--1

Item 3. Topics identified for future exploration were:

Working with a document--7

LOGO--2

Data bases--1

Programming techniques--1

More activities on word processing in individual schools--1

Materials available--1

Integration of computers into curriculum--1

Other comments suggested the need for more than two sessions on word processing and possibly a full day workshop session. In addition to the information gathered by the feedback instrument, the discussions which took place in the course of this session generated a number of suggestions. Summarized, they were:

1. Another general session devoted to word processing;
2. An individualized session at their school;
3. Securing a copy of the word processing software used for each school and additional word processing programs for the new equipment as it becomes available to each school.

Finally, in an effort to expand staff development efforts to include a larger number of staff members,

specifically those teachers at each school to be involved in implementing the units of study in each of the respective grades, the group suggested that workshops be conducted by the members of this FOCUS group for appropriate staff members at the individual schools. In connection with this suggestion, group leaders were appointed to plan and conduct a workshop on word processing at each school and to identify the participants for those workshops.

Focus Session 6

A significant number of teachers responded to the feedback assessment by indicating a need for another session on word processing. Therefore, two activities were included in this session in response to that suggestion. Additionally, two activities were included on planning. The first activity addressed planning procedures for staff development, focusing on using computers in the service of instruction, specifically writing. The second activity involved teachers from each school in sharing progress reports on the planning status of their school workshops on word processing.

On March 15, 1985, 14 participants including three math coordinators, one reading coordinator, three computer lab paraprofessionals, one special education teacher, three reading paraprofessionals, two classroom teachers and the

District Writing Coordinator gathered with the Workshop Facilitator in the Theodore Roosevelt School. the Principal welcomed the participants, voiced his support for the project and commended the efforts of the group.

Objectives

The specific objectives of session 6 were:

1. To provide a review of the word processing techniques covered in the two previous sessions and to apply these techniques by revising a document;

2. To generate ideas for activities aimed at enabling an established school staff to modify computer utilization practices to bring about more effective use of computers in the area of writing;

3. To share reports on individual schools including their plans to conduct workshops on word processing as an extension of the workshops held on that topic.

Procedures

The activities in this session corresponded to the objectives as follows:

Objective 1 ---- Activity 1 and Activity 2

Objective 2 ---- Activity 3

Objective 3 ---- Activity 4

Activity 1--Review. This activity was designed to review all word processing techniques previously covered.

Teachers completed review exercises including: (a) loading the program; (b) reviewing key functions and text markers; (c) a matching exercise on edit commands; (d) procedures for exchanging, inserting and deleting blocks of text; and (e) print formatting instructions. The format instructions dealt with format lines, setting and clearing tabs and the command for sending text to the printer.

Activity 2--Working with a document. The teachers loaded a first draft of a two page document and made revisions to conform to the sample final draft. Revisions included (a) centering headings, (b) deleting sentences, (c) inserting sentence changes, (d) making changes in tense, (e) marking new paragraphs, (f) inserting citations and moving paragraphs in text, and (g) correcting and deleting blocks of text. The exercises were intended to demonstrate how word processing can ease the revision stages in the writing process, as well as to reinforce the learning of required key sequences.

Activity 3--Planning staff development. Participants were grouped by school to collaborate on four exercises. The goal was stated as follows: "An established school staff will modify computer utilization practices to bring about more effective use of computers in the area of writing instruction."

Exercise A--Activity design. Participants listed possible activities to reach the stated goal. That the

FOCUS group members would conduct workshops at each school for teachers had been established as a first possibility. Additional suggestions generated from this exercise were:

1. To instruct a special education class in word processing for writing as a pilot project;

2. To train fifth grade writing teachers in word processing;

3. To focus on one grade level for each application;

4. To provide additional training for the workshop presenters;

5. To encourage FOCUS members to practice word processing at their schools prior to launching their training efforts.

Exercise B--Identify key players. This exercise required participants to identify the key players and to name several major considerations for involving these key players.

Item 1. Who are the key players involved in your suggested activities?

The list of individuals varied from school to school. A compilation of the three schools responses included:

1. FOCUS members
2. Computer Lab Assistants
3. Principals
4. Special Education Teacher

5. Math and Reading Lab Staffs

6. Director of Computer Education

7. Teachers

8. Students

Items 2. Name at least two major considerations for involving these key players.

The responses included (a) time limitations, (b) choosing a target area of the curriculum, (c) effective training of teachers to carry out activities with students, (d) additional training for the FOCUS group, and (e) involving principals in all programmatic concerns.

Exercise C--Define task and write a plan for action. The exercise task was "the FOCUS members at each school will conduct workshops for their staff." Participants wrote a plan which answered who would do what, with whom and where, including a time-line for implementation. The plans varied slightly, but included similar steps such as, (a) identifying teachers to be trained, (b) discussing plans with the principal, (c) conducting workshops as part of staff meetings and/or grade level meetings, (d) continuing training in the first weeks after school opening, and (e) implementing the writing program with fifth grade students in one of the four semesters in the upcoming school year.

Exercies D--Anticipated outcomes. In this exercise participants were asked to identify anticipated outcomes in specific, observable and measurable terms. Among the

expected outcomes were:

1. That writing competency levels and test scores will improve;

2. That teacher attitudes will change toward using the computer in the service of instruction to produce favorable changes;

3. That teachers will feel adequately prepared to work with their students in the computer lab;

4. That teachers will be able to train other teachers on other grade levels or at other schools.

Activity 4--School reports. One of the outcomes of a previous activity was that several members had agreed to serve as group leaders to facilitate individual school workshops to provide other teachers with the same training. This activity was designed to provide a forum for sharing the steps that had taken place since the last meeting relative to this goal. The group leaders from each of the three schools reported on their progress. One school group met with the Principal and determined to conduct the workshop. However, the details had not been arranged. There had been some confusion regarding the arrangement for class coverage that was later clarified with the Principal. Rather than conducting the workshop during the school day, it would be conducted as part of a staff meeting. This activity would serve only as an introduction since one session would not be sufficient to prepare teachers

adequately. Another school group had met with the Principal who strongly supported the plan and suggested that the workshops be conducted at one of the two monthly faculty meetings which normally served as a grade level meeting. The third school had met with the Principal who was in favor of the workshop but had not yet identified all of the teachers. A mini-project was also being conducted by the special education teacher who reported at this session.

Session 6 Feedback Results

Eight participants responded in writing to the feedback assessment.

Item 1. Six rated the session extremely useful (75%) and two rated it very useful (25%).

Item 2. Responses to those activities found most useful were:

Working with a document--5

Word processing review--4

Planning staff development--3

School reports--1

Item 3. Topics raised for future exploration were:

LOGO--4

Involvement of Principal--1

SCRIPSIT in more detail--1

BASIC--1

Item 4. The following are a few responses to open

comment:

Beautiful and informative workshop.

A very informative workshop.

I find my retention of material covered needs constant reinforcement with hands-on experiences with the computer. I get discouraged with my forgetfulness. I need more exposure at my leisure to be comfortable with this new material.

I am enjoying these sessions tremendously.

Focus Session 7

Since the last session, equipment had been substantially updated, resulting in the installation of eleven Apple IIe systems at the Theodore Roosevelt School and six at the Washington Rose School. Sufficient resources were available so that a printer and plotter could be purchased for all three schools. By this time, the school budget had passed providing five additional systems for the Washington Rose School and eleven for the Centennial Avenue School at the opening of the upcoming school year.

This initial updating of the equipment at one school provided enough resources at one given location to serve as an interim training site for all three schools for exploration and training in more powerful computer applications. The feedback assessments continued to reflect a desire to explore LOGO since the second session. Therefore, the final session was devoted entirely to LOGO.

On June 10, 1985, 12 participants including three math coordinators, one reading coordinator, three computer lab paraprofessionals, one math paraprofessional and four classroom teachers gathered at the Theodore Roosevelt School.

Objectives

The specific objectives of session 7 were:

1. To provide background information on LOGO including a rationale for its use, ways to integrate the computer lab into the classroom, and the advantages of LOGO for improving problem solving strategies and other aspects of affective and social development;

2. To conduct hands-on practice with LOGO including language commands, screen commands, procedure writing, commands for saving and reading LOGO procedures, editing commands and color commands for screen and pen;

3. To share curriculum materials on LOGO including Computeach, a curriculum guide for LOGO K-6 (LeVine, 1985) and to suggest other commercial materials available to support LOGO instruction;

4. To finalize plans for pilot projects at each school and to plan a week of training to be conducted in the summer to prepare for implementation of the school projects.

Procedures

The activities in session 7 corresponded to the objectives by number.

Activity 1--Introduction to LOGO. The Workshop Facilitator presented information on (a) the genesis and educational theory behind LOGO, (b) the educational promise of LOGO, and (c) advantages of LOGO activities for enhancing learning.

Activity 2--Hands-On. The participants engaged in (a) moving the LOGO turtle forward and backward a number of spaces, (b) changing the heading with right and left commands, (c) hiding and showing the turtle, (d) writing procedures, (e) editing procedures, and (f) experimenting with screen and pen color changes.

Activity 3--Curriculum review. The Workshop Facilitator presented the Computeach LOGO Strand K-6 (Levine, 1985) as a model LOGO program. The teachers perused the components which included (a) the scope and sequence of the objectives, (b) background and LOGO's impact on education, (c) the role of the teacher in LOGO, (d) LOGO and math/thinking skills, and (f) strategies for implementing LOGO.

Activity 4--Project planning and summer training scheduling. Three projects were planned, one for each school, which intended to serve as models. Sessions for training and development of curricula materials was

scheduled for a week in August to prepare for implementation of the projects in the next school year.

At the Theodore Roosevelt School, a project in LOGO was proposed for grade 3 aimed at improving problem solving strategies in the area of mathematics. Project "Notebook" was proposed for the Washington Rose School which involved using a data base program to help students in grade 4 organize information while reading and studying social studies material. The Centennial Avenue School Project proposed to use word processing in writing instruction for grade 5 students. Although the project for grade 6 was held in abeyance, it was suggested that teachers explore the Bank Street College Project in Science and Mathematics (1985), "Voyage of the Mimi."

Session 7 Feedback Results

Twelve participants responded in writing to the feedback assessment.

Item 1. Six rated the sessions as extremely useful (50%) and six rated it as very useful (50%).

Item 2. Responses to the question of which activities were found most useful were:

Exercises with LOGO--10

Discussion on "Why Teach LOGO"--3

Examining materials--1

Item 3. Topics identified for future exploration were:

More experience with LOGO--3

Word processing review--2

Explore other applications--1

Data bases--1

Primary grade computer uses--1

Item 4. The following are a few responses to open comment:

> The entire workshop was extremely useful and should continue next year.
>
> The entire FOCUS program was extremely helpful and well presented. It would be most useful to the entire staff.
>
> I would like some experience in teaching simple programming instructions.
>
> I appreciated the exposure to the multi-faceted aspects of the computer training this year.
>
> Sessions and materials were very informative and enjoyable.
>
> LOGO should be expanded and taught K-6.

Final Assessment

In June 1985, all participants were asked to respond to a final assessment survey on the entire process. The first part of the survey required participants to rate the following on a scale of 1 (lowest) to 5 (highest):

Survey Part 1

1. The overall format of the FOCUS sessions, i.e. combining hands-on experience with discussion of issues and planning activities

2. The process employed, i.e. using participants feedback to plan subsequent sessions and collaborative planning

3. The usefulness of what was learned

4. The degree to which what was done in the sessions was viewed as applicable to the classroom setting

Survey Part 2

The second part of the survey consisted of open comment to the following questions:

5. Have the sessions influenced your understanding of computers. If so, how?

6. Are there things you have learned up to now that could be applied in your teaching? If so, what? (Be specific)

Are there things you would like to do next year that could be applied in your teaching? If so, what?

7. Do you plan to be involved in implementing the projects planned in the FOCUS sessions next year? If so,

how?

8. Would you like to continue the sessions next year? If so, what would you suggest in terms of content and format?

9. Are there ways in which the process could be revised or restructured in order to make it more effective?

10. Based on your experience with the workshops and your own work with computers, what do you now see as the future for computers in schools?

Final Results

The nine staff members making up the nucleus of the FOCUS group grew to thirteen by June of 1985. Of those, eleven completed the final assessment survey. The mean ratings for the first four items were as follows:

Survey Part 1-Ratings

Survey Item	Mean Rating
1. Overall format of sessions	4.8
2. The process employed	4.9
3. Usefulness of learning	4.9
4. Applicable to classroom	4.7

Survey Part 2-Collective Summaries

5. How did the sessions influence your understanding?

In general, the participants wrote that the sessions enhanced understanding by broadening awareness and providing exposure to various applications. Teachers attributed the increased awareness to the hands-on experiences. Most participants mentioned that prior to the sessions they had no knowledge of how word processing could improve writing or how LOGO might by helpful in fostering abstract thinking. Teachers also felt better prepared to integrate computers into the classroom curriculum.

6. What things could be applied in teaching?

Most teachers expressed either a desire to introduce word processing or commented that formal plans were in progress to use word processing in the language arts program. Teachers expected that this would motivate students to write and that students' skills in sentence structure, punctuation and vocabulary would improve. A special education teacher who had already begun using the material with her class, noted that students were generating more text and writing more often.

7. How do you plan to be involved next year?

Participants planned to be involved in various ways

including (a) teaching in a third grade pilot LOGO program, (b) helping other teachers with word processing in a workshop setting, (c) participating on a school planning team, (d) participating in and conducting workshops, and (e) instructing other teachers and providing input into the lab. A reading paraprofessional did not visualize how she could be involved unless the reading lab were assigned a computer.

8. Would you like to continue, and what would you suggest, next year?

All of the participants wanted the sessions to continue the following year. Their suggestions included: (a) planning sessions by school, such as word processing at Centennial Avenue School and data bases at Washington Rose School, with occassional district meetings; (b) lengthier, perhaps full day workshops; (c) specific lessons and activities for use with their grade level; (d) more workshops on LOGO, word processing and data bases; and (e) more involvement with BASIC.

9. How could the process be restructured to make it more effective?

Generally, participants viewed the process employed as very effective but wanted more exposure. Specific suggestions for revisions included (a) a series of mini-workshops for two days by grade level, (b) more

exposure of other teachers to the FOCUS material, (c) longer sessions, (d) shorter sessions, and (e) avoid planning workshops on pay day.

10. What do you see as the future of computers?

Many of the comments addressed the computer's potential to individualize instruction and to enhance, enrich and supplement learning in specific subjects. Some participants expected to see an improvement in the quality of software, directing itself more to finding solutions to real problems rather than drill or "mindless-arcade" type software. The computer was described as a new and exciting way to challenge and interest students. One participant wrote that the more teachers can be motivated to pursue an interest in computers, the more everyone will become involved.

Targets For Change

The group agreed on a plan for the following school year which involved conducting a different project at each of the three schools. Each project would target a specific application for a particular grade level. The plan relied on (a) conducting workshops for those teachers at the respective grade levels, (b) using the FOCUS members as a school-based support group, and (c) developing school teams

with administrative support to implement the plan.

The "Write" Focus

Grade 5 teachers and students would conduct a writing project at the Centennial School. Teachers would apply word processing techniques to the instruction of writing with the goal of enhancing student learning in that area.

Getting Started With LOGO

Grade 3 teachers and students would conduct a LOGO project at the Theodore Roosevelt School. The goal of that project was to foster math skills, particularly problem solving techniques, by conducting LOGO activities with students.

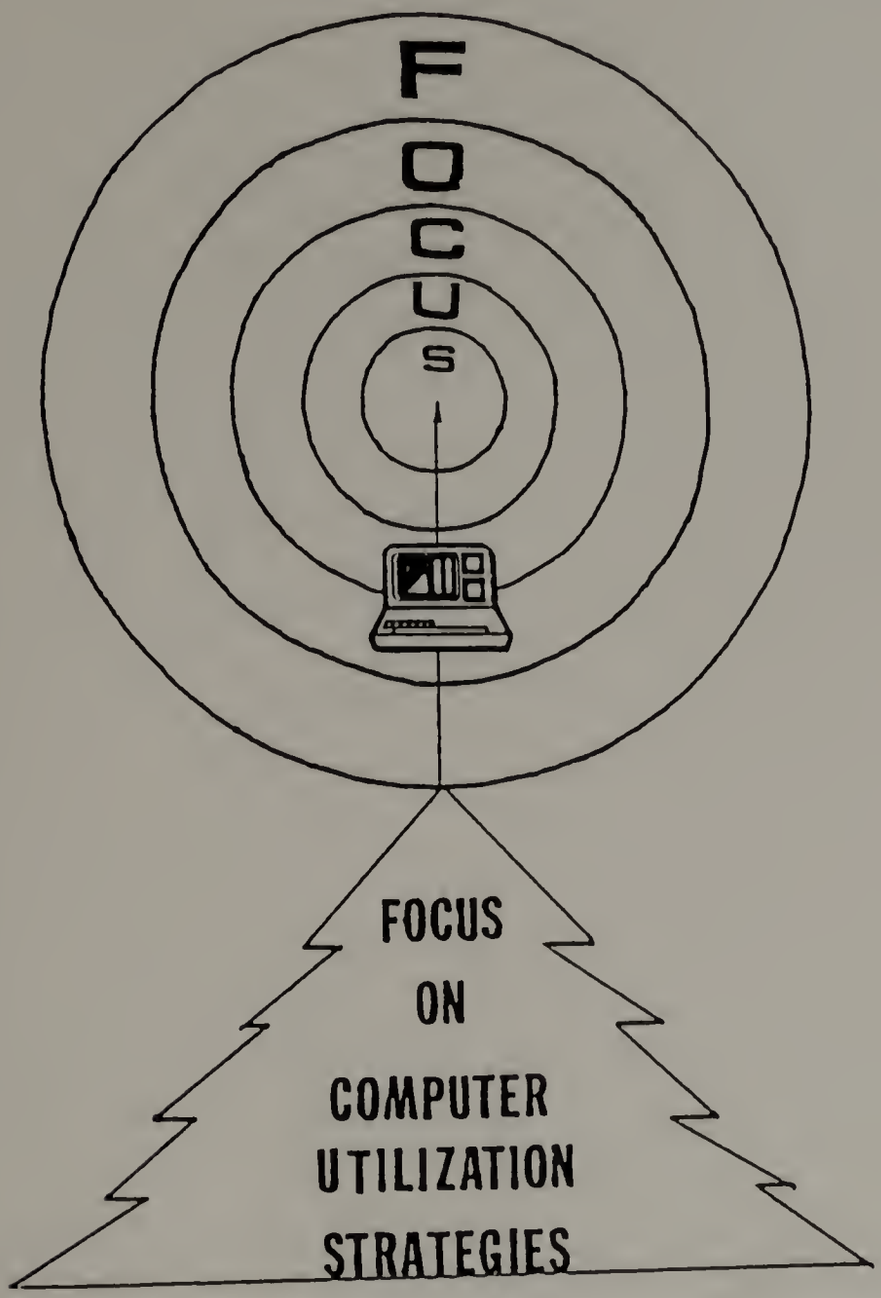
Project "Notebook"

A data base project was proposed for grade 4 teachers and students at the Washington Rose School. The activities would involve the participants in using a data base program to help students gather, organize and report information from their reading of social studies material.

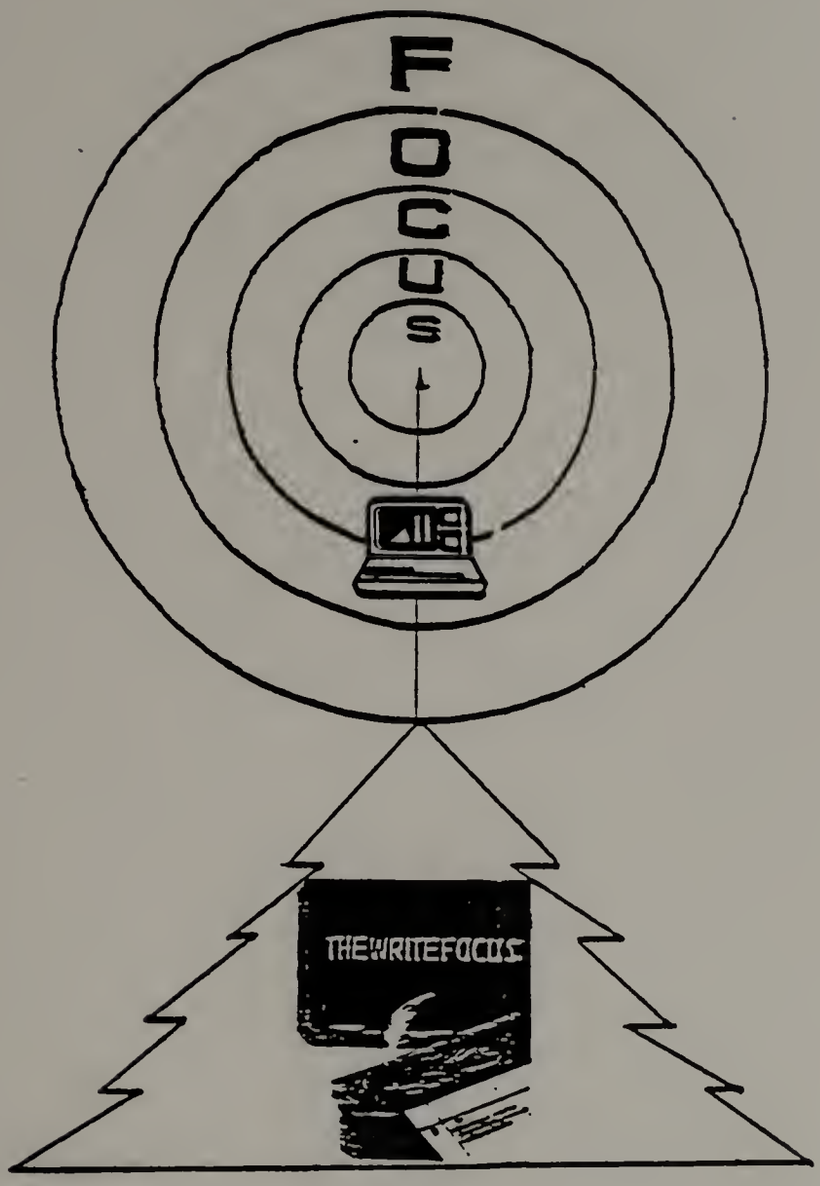
The Project Researcher designed a graphic representation for the FOCUS workshops and for each of the three proposed projects. The following pages depict those graphics used to portray the targets for change.

ROOSEVELT PUBLIC SCHOOLS

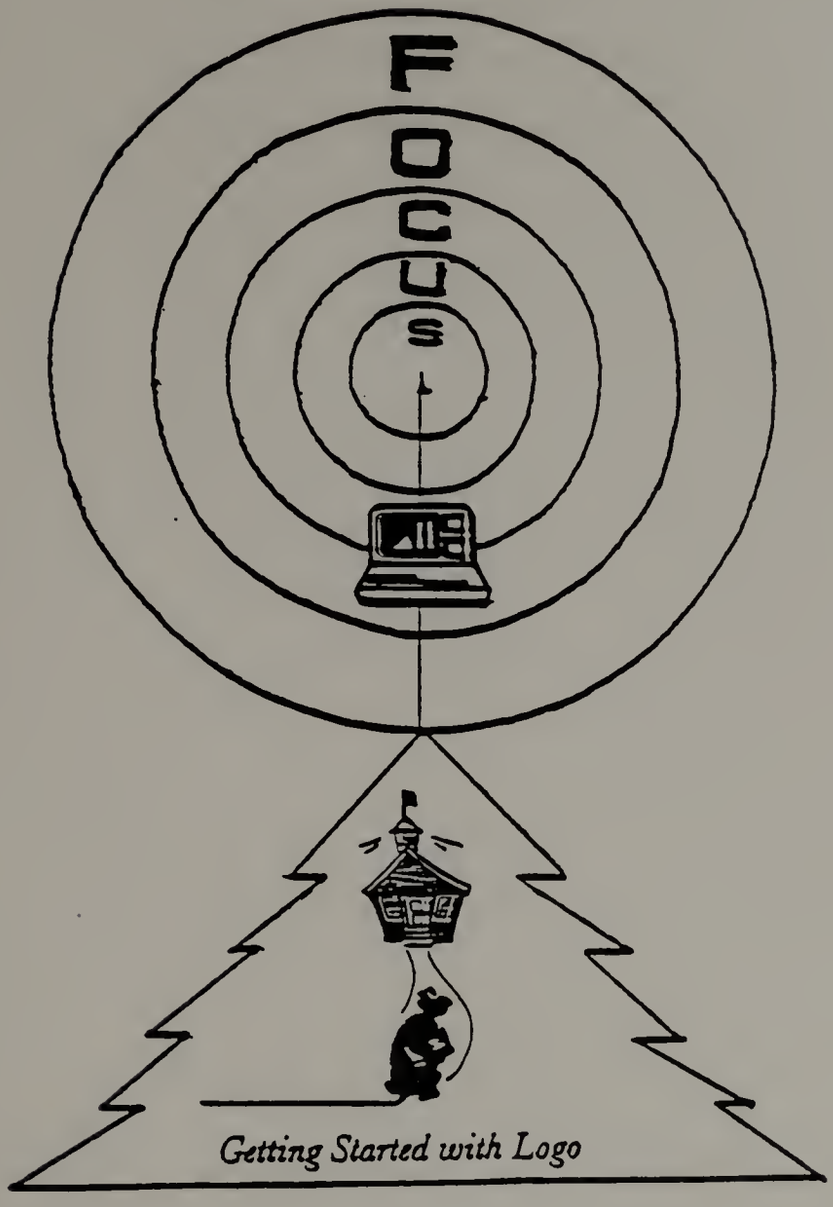
Roosevelt, New York



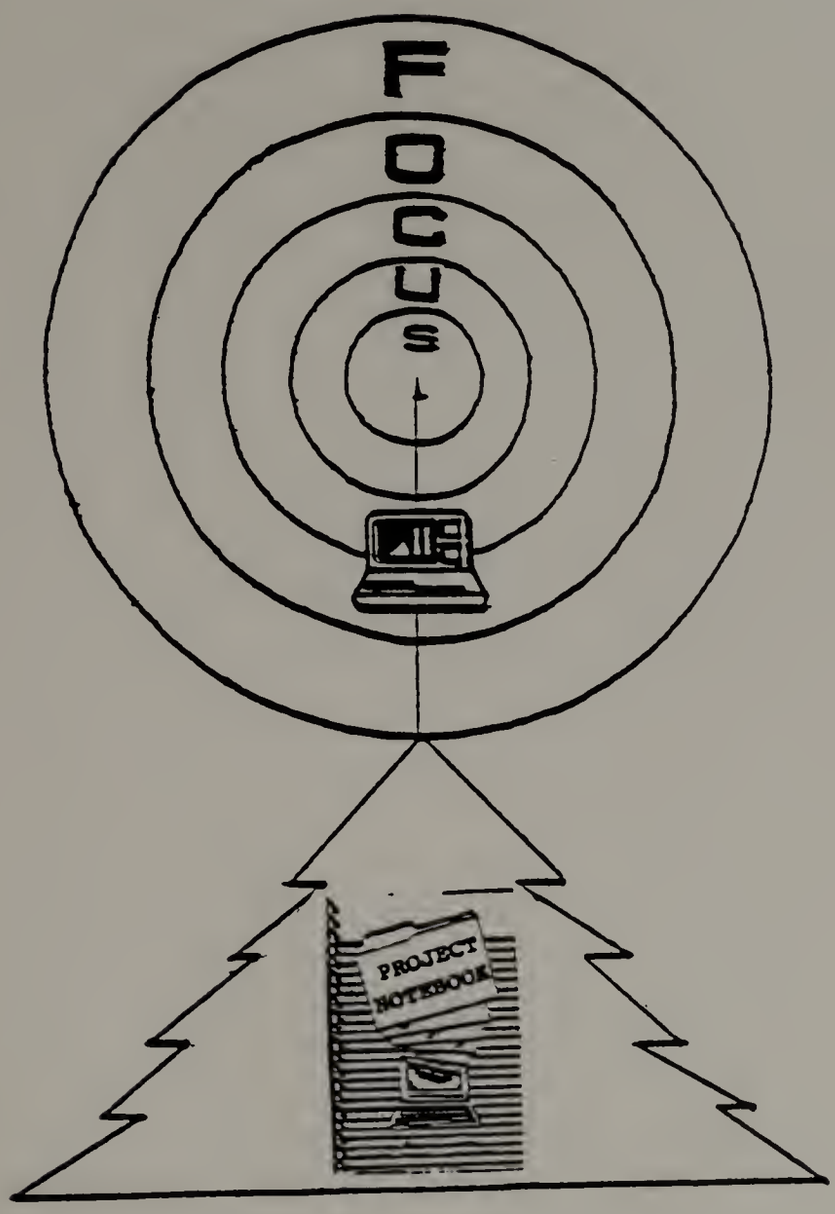
FOCUS ON COMPUTER UTILIZATION STRATEGIES



FOCUS ON COMPUTER UTILIZATION STRATEGIES



FOCUS ON COMPUTER UTILIZATION STRATEGIES



References

Bank Street College Project in Science and Mathematics (1985). Voyage of the Mimi. New York: Bank Street College of Education.

Grammer, V. C., & Goldenberg, E. P. (1984). The Terrapin Logo language [Computer program manual]. Boston: Terrapin.

Levine, G. (Ed.). (1985). Computeach LOGO strand K-6. (Available from East Ramapo Central School District, Spring Valley, NY)

Lewin, K. (1947). Frontiers in group dynamics. Human Relations, 1, 5-42.

Massachusetts Institute of Technology (1981). Terrapin Logo [Computer program]. Boston: Massachusetts Institute of Technology.

Radio Shack (1979). Scripsit word processing system training program. [Computer program]. Fort Worth, TX: Tandy.

Rutter, M., Maughan, B., Mortimore, R., Ouston, J., & Smith, A. (1979). Fifteen thousand hours. Cambridge: Harvard University Press.

C H A P T E R I V

OUTCOMES

Introduction

This chapter describes the outcomes of the FOCUS Project. Specifically, it chronicles: (a) the summer workshops conducted by the Project Researcher with third, fourth and fifth grade teachers to provide more extensive planning and tailored training for the implementation of the projects on the respective grade levels at each school; (b) the process of incorporating the proposed projects into the school improvement plans for each school as components of a comprehensive district improvement plan; and (c) the implementation phase and the subsequent outcomes of the school projects as they were conducted with students in grade 3 at Theodore Roosevelt School, grade 4 at Washington Rose School and grade 5 at Centennial Avenue School.

At the last FOCUS session held on June 10, 1985, the group requested that summer workshops be held. The sessions were scheduled to take place during a two week period preceding the opening of school. The Project Researcher would serve as the Workshop Facilitator. The objectives of the summer FOCUS sessions were (a) to provide two full days of intensive training for the teachers assigned to the grades targeted for the projects, and (b) to analyze

strategies and develop curriculum materials for instructing students. The Theodore Roosevelt School project "Getting Started With LOGO" focused on grade 3 and was aimed at improving problem solving strategies in the area of mathematics. The "Write" Focus Project at Centennial Avenue School proposed to use word processing in writing instruction for grade 5 students. Project "Notebook" at Washington Rose intended to focus on grade 4 using a data base program to gather and store information from social studies material, specifically the grade 4 textbook. In a broader context, these projects represented the outcomes of a collaborative district-wide staff development effort on the part of the Superintendent of Schools, the Project Researcher, Principals, Teachers, Paraprofessionals and other district support personnel.

Summer FOCUS Sessions

Getting Started With LOGO

Theodore Roosevelt School

On August 19 and August 20, 1985 the math and reading coordinators, the computer lab paraprofessional and one of the school's two third grade teachers gathered in the computer room for the LOGO training sessions. The other third grade teacher indicated that she intended to take a

teaching position in the New York City School System and would probably not be returning to Roosevelt at the opening of school. At the same time, the third grade enrollment dictated the establishment of another section of third grade which left two of the three positions vacant. However, the group believed they could serve as a secondary training source given their previous experience on the FOCUS committee, the enthusiasm of the third grade teacher on staff and the principal's support and commitment to the project. The consensus was that this group, in concert with the Workshop Facilitator, would be able to share their training and lend sufficient support to the new teachers. The group agreed to conduct another session at a later date to train the new teachers.

The materials selected were developed for use with Apple LOGO and included modifications for Terrapin LOGO. Because the Apple LOGO which had been ordered had not yet arrived, the summer sessions were conducted using the Terrapin software that was on hand. Computeach, a curriculum guide for LOGO K-6 developed at the East Ramapo New York School District (1985) was previously examined by most participants during earlier FOCUS sessions. The program's components included (a) background information on LOGO and its impact on education, (b) a scope and sequence of skills, (c) suggestions for student lessons and for implementing LOGO, and (d) student activity sheets by grade

level. Previous FOCUS sessions centered on the first three components as those initial sessions had maintained a broader focus and attempted to convey the underlying philosophy as well as the benefits of using LOGO. Because summer sessions were intended to prepare for implementation, the group used the student activity section for kindergarten through grade three, as they became more relevant at this point in time. Additional material included the "Getting Started With LOGO" program (Miller & Thorkildsen, 1983). This program served as the topic for the second day of training conducted by the educational consultant from Developmental Learning Materials (DLM), the program publisher.

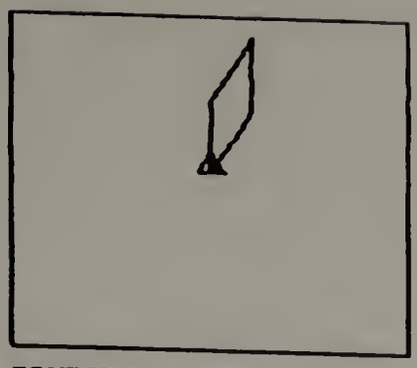
Day 1 Hands-on with LOGO. Teachers reviewed LOGO commands and wrote LOGO procedures. The commands included (a) FORWARD followed by a variable to indicate the number of steps to move forward, (b) BACKWARD followed by a variable (c) RIGHT followed by a variable indicating how many degrees to turn, (d) LEFT followed by a variable, (e) TO followed by the procedure's name for entering the editor where procedures are composed, (f) END to signal the completion of the procedure, (g) REPEAT followed by a variable indicating the number of times a command or set of commands will be repeated, and (h) SHOW TURTLE and HIDE TURTLE.

Once written, LOGO procedures can be stored as a file on disk and retrieved later. To practice the save and

file system features of LOGO, teachers created a file on SHAPES including the following procedures:

Name	Procedure
TO MOVE	FD 100 RT 15 BK 80 RT 25 END
TO SQUARE	FD 30 RT 90 FD 30 RT 90 FD 30 RT 90 FD 30 RT 90 END
TO SQ	SQUARE END
TO TRI	RT 30 FD 60 RT 120 FD 60 RT 120 FD 60 END
TO FOURSIDE	REPEAT 2[FD 60 RT 30 FD 60 RT 150] END
TO HOTPAD	REPEAT 12[FOURSIDE RT 30] END
TO SUN	HT REPEAT 72[FOURSIDE RT 5] END
TO ROW.SQ	REPEAT 3[SQUARE RT 90 FD 30 LT 90] END
TO NINE	HT REPEAT 4[ROW.SQ LT 90] END
TO LACE	HT REPEAT 12[NINE RT 30] END

The teachers created each procedure, executed it, analyzed the steps in each procedure, and observed what occurred when each of the steps in the procedure were executed. The screen output for the procedure FOURSIDE and the procedure HOTPAD, which uses FOURSIDE as a subprocedure, is shown in figure 5 and illustrates one of the powerful features of LOGO--the ability to use a defined procedure as part of the definition of other procedures.



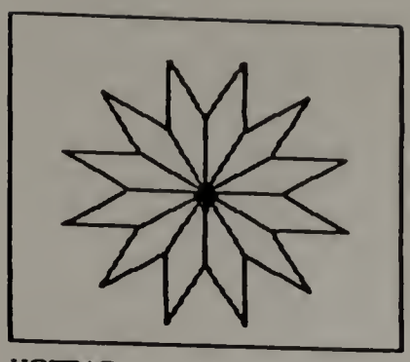


Figure 5. Screen output for FOURSIDE (left) and FOURSIDE used in HOTPAD (right). From The Terrapin Logo Language for the Apple 11 Tutorial (p. A46-A47) by V. C. Grammer and E. P. Goldenberg, 1983, Cambridge: Terrapin.

To illustrate more advanced procedural work, the Workshop Facilitator encouraged teachers to explore procedures using input variables which allow the user to change dimensions, i.e. width, length, and number of turns each time the procedure is executed. For example, consider the procedure:

```
TO BOX :DIMENSION
    REPEAT 4[FD :DIMENSION RT 90]
END
```

Here the DIMENSION variable allows the length of the sides of the square to be entered when the procedure is executed. For instance, typing BOX 50 would create a square with sides of 50 steps in length.

Teachers experimented with other input variable procedures such as this procedure to create polygons:

```
TO POLY :LEN  :TURNS
    REPEAT  :TURNS [FD : LEN RT 360/:TURNS]
END
```

Teachers executed the POLY procedure, each time using different inputs. For example, the difference between POLY 100 4 and POLY 4 100 is illustrated in figure 6 below.

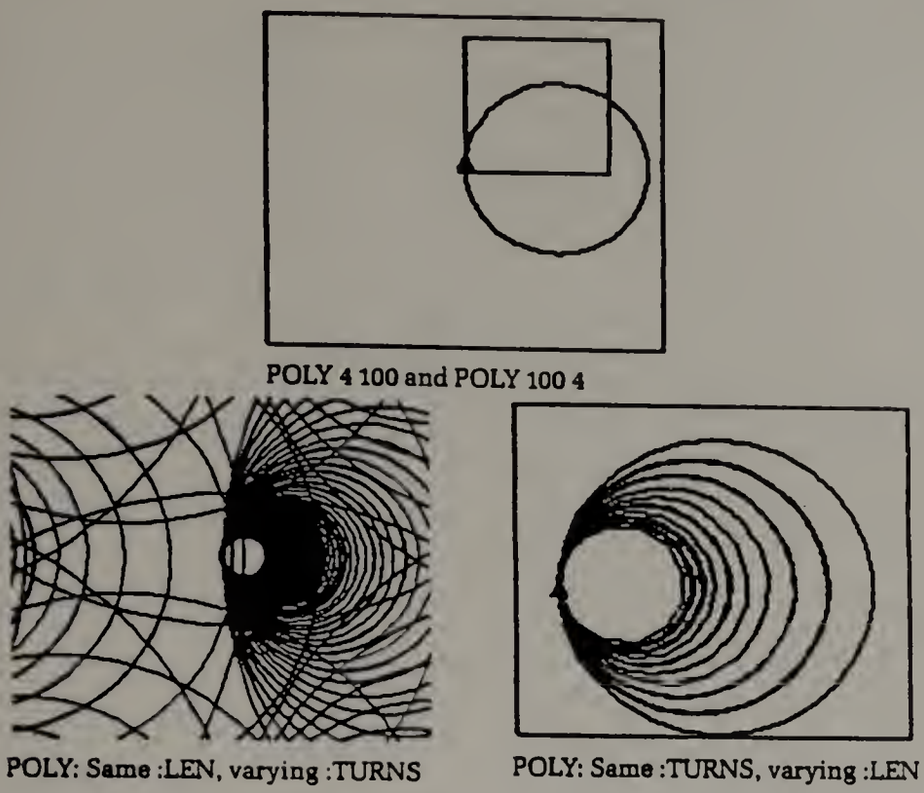


Figure 6. POLY 4 100 (Circle) and POLY 100 4 (Square), POLY with the same lengths and varying turns, and POLY with the same turns and varying lengths. From The Terrapin Logo Language for the Apple 11 Tutorial (p. A66) by V. C. Grammer and E. P. Goldenberg, 1983, Cambridge: Terrapin.

Those teachers completing the experiments with polygons went on to explore procedures with circles and arcs, as well as other recursive procedures like POLY which call on themselves during execution.

Day 2 Curriculum materials. In the opening activity, teachers analyzed and discussed the Computeach LOGO strand. Specifically, the analysis focused on (a) the role of the teacher, (b) the role of the student, (c) lesson organization, (d) methods for implementing LOGO, and (e) the

objectives of the program. Because the third grade students had no previous experience with LOGO, teachers examined the student activities for kindergarten, first and second grade to determine which should be used. The group agreed on a tentative time frame for the LOGO project of ten weeks with students attending four times a week.

The second activity consisted of an introduction and explanation of the the DLM materials for LOGO. This activity was conducted by a consultant from DLM who agreed to assist the Workshop Facilitator by sharing her expertise on the program with the group.

The "Write" FOCUS

Centennial Avenue School

On August 22 and August 23, 1985 the Workshop Facilitator, along with the District Writing Coordinator and seven Centennial Avenue School staff members including the school math coordinator, a math paraprofessional, the computer lab paraprofessional, a reading paraprofessioanl, two fifth grade teachers and a former special education teacher who had served on the initial FOCUS committee, gathered in the computer room for the writing project sessions. In addition to the special education teacher, three of the participants had served on the initial FOCUS committee. Because the project was targeted for grade 5

where school test results had indicated a need for improvement in writing, the Workshop Facilitator in cooperation with the Principal, enlisted the District Writing Coordinator to join the group along with the fifth grade teachers.

Teachers used the SCRIPSIT program (Radio Shack, 1979) for the TRS-80 computer on day 1 and the Bank Street Writer program (Kusmiak, Riggs, & Smith, 1984) for the Apple computer on the following day. Because of equipment limitations, prior word processing sessions had employed SCRIPSIT, a more difficult to learn and tedious to operate program than the Bank Street Writer. The equipment availability had limited the choice set of word processing programs to those available on cassette for TRS-80 computers with 16K memory. Giving teachers experience with both programs enabled them to compare the two in terms of difficulty levels for learning and operating. Also, the FOCUS group had initially planned to use both programs with students, as the lab was equipped with eleven TRS-80 and eleven Apple lle microcomputers. Given class sizes in excess of 24 meant that all students could not use one type of computer. In reality, some classes were well over 30. A solution had not been reached at that time for the problem of accommodating a class of that size on one or the other type of microcomputer.

Day 1 SCRIPSIT. After a general overview of how word

processors work, the morning session was devoted to (a) basic error corrections, (b) cursor movement, (c) changing video parameters, (d) practice exercises in correcting text, (e) exchanging blocks of text, and (f) print commands and formatting.

In the afternoon, teachers reviewed key commands and worked with a document. Each participant created a title page and table of contents page, practiced centering and tab features, and then loaded a sample document HIPPO. Teachers used the HIPPO document to practice inserting and deleting characters, words and sentences and exchanging words, paragraphs and blocks of text.

Teachers utilized a disk-driven host computer and network system making it possible to send the SCRIPSIT program to student units after loading it into the host unit. Similarly, documents could be sent from the host unit to the student units and conversely from the student units to the host. The latter made it possible to store the student documents on disk at the host unit operated by the teacher. Teachers experimented with sending and receiving documents both ways, saving documents on the host, and then retrieving and sending the documents back to the student stations. The Writing Coordinator shared fifth grade writing activities which he had coorelated to topics found in the social studies, science and health curriculum.

Day 2 Bank Street Writer. The Theodore Roosevelt School hosted the second workshop for the Centennial Avenue School Staff. Teachers learned to operate the Bank Street Writer program on the Apple computers. The operations covered included: (a) functions of special keys; (b) cursor movement controls; and (c) operations in the write, edit and transfer modes. The latter involved entering and erasing text, the seven operations in the editing mode and functions in the transfer mode including operations with files such as retrieve, save, delete, rename and print.

The Writing Coordinator shared the fifth grade writing activities which he had developed earlier that summer, along with ideas on how to incorporate those activities into the Bank Street Writer program as part of the project. Teachers left with a copy of student activities correlated to topics found in their social studies, science and health textbooks. The students would be required to use the textbook and to complete some organizational steps in the preliminary stages of writing, leading up to and including the final draft stage.

After extended dialogue on the best practical approach to beginning the project, the group decided to devote the first several weeks to teaching students the Bank Street Writer operations. The writing materials would then serve as a choice set of activities for teachers to use on the computer with students.

Project "Notebook"

Washington Rose School

On August 26 and August 27, 1985 the school math coordinator and computer lab paraprofessional, both of whom served on the initial FOCUS committee, along with the three fourth grade teachers who would implement the project, gathered in the school's computer room for the data base training sessions. The Principal joined the group as an active participant. The purpose of Project "Notebook" was to prepare the fourth grade staff to instruct students in using a data base program with the computer as a means of collecting, organizing and recording information taken from their social studies textbook. Therefore, the project centered first, on activities which engaged students in reading for information, and second, in using that information to develop skills in organizing, manipulating and reporting data on the computer.

Teachers created data file structures based on various sections of the social studies textbook that students could use in conjunction with the text. This would allow students to gather the data from their reading, record the data on a data entry form and enter that data from the form into a data base file on the computer.

Day 1 A computer based social studies program as a model. Teachers explored the D. C. Heath data base files which were designed to supplement and extend the D. C. Heath social studies curriculum for use with the Notebook Filer program disk (Crouch, 1984) on the the Apple lle in conjunction with the D. C. Heath social studies textbook. To augment the interaction between the textbook and the files, the program incorporated a teaching plan, student worksheet and data entry form for each file. Although the D. C. Heath text was not the district adopted textbook for social studies, these materials were previewed and utilized as an introduction to data bases. The program materials were offered as examples from which teachers could design their own files to supplement portions of the textbook being used in their classrooms.

The Workshop Facilitator conducted introductory activities consisting of (a) dialogue on information processing as an efficient way of collecting and organizing data, (b) an outline of the objectives of the program, (c) an explanation of the data base components--files, records and fields, and (d) hands-on experience using a sample file. Specifically, the objectives were to develop students' skills in:

1. Locating and recording data
2. Recovering portions of data as needed
3. Restructuring data

4. Displaying data in new forms
5. Analyzing data
6. Interpreting and evaluating data appropriately
7. Creating new structures for data storage
8. Creating new forms for data reporting

Teachers engaged in hands-on activities including (a) loading the sample file EXPLORERS, (b) using the menu to select and use a file, (c) searching to browse through all records in the file, (d) searching for a specific file by field, and (e) moving backward through the menus to close the file and save the data. The D.C. Heath program contained ten files, two of which teachers borrowed for use with the students. File #1, EXPLORERS, was a completed file given to the teachers as a sample to explore. Teachers also borrowed the fields from file #2, CURRENT EVENTS to create a format for a current event file which students could build by collecting data on events as they occured throughout the year.

In the final activity, teachers created a GLOSSARY file by identifying and formatting the fields. The file was intended for use with the adopted social studies text for grade 4, New York Yesterday And Today (1985). The file consisted of a record for each glossary word appearing in bold print in the text. Students would enter the data into the file, by chapter or by unit, with the option of continuing it as they progressed through the textbook.

Teachers decided on this format for the records in the GLOSSARY file:

FILE #3 GLOSSARY

WORD: _____

MEANING: _____

_____

_____

PAGE: ____

CODE: ____

After creating the format, teachers entered data into the file from the text, sorted the file alphabetically and printed a report. At the end of the day, teachers left with the textbook and an assignment for the following day. Teachers were asked first, to look through the text for one topic within it which would lend itself to a data file. Second, they were to identify the pages containing the data, appropriate fields and length of each field. From this information, teachers would derive a data entry format for the file which the Workshop Facilitator would later transform into graphic form for student use. Third, the teachers were asked to decide on a teaching plan for their file.

Day 2 Teachers create files for the district social studies text. All of the activities on day 2 centered around creating and saving file formats to augment the textbook and compiling other supplementary materials for

instruction which teachers had written to accompany the file, such as the suggestive fields, records and correlate pages in the text. The files were created and saved on disk. Teachers entered the data for the first record of each file to serve as an example for the students. The following fields, records and correlate pages in New York Yesterday and Today (1985) were developed:

FILE #4 NY NATURAL RESOURCES. Chapter 3, pp. 59-62

Fields	Records
RESOURCE:	TREES
LOCATION:	PETROLEUM
USES PAST:	LAND
USES PRESENT:	FORESTS
INDUSTRY:	WATER
MISUSES:	TALC
NOTES:	GYPSUM

FILE #5 REGIONS OF NY. Chapter 4, pp. 70-80

Fields	Records
NAME:	ATLANTIC COASTAL PLAIN
LOCATION:	HUDSON-MOHAWK
MAJOR INDUSTRY:	ST. LAWRENCE-CHAMPLAIN
MAJOR CITY:	GREAT LAKES PLAIN
ELEVATION:	NEW ENGLAND UPLAND
LAND SURFACE:	ADIRONDACK UPLAND
TOURIST ATTRACTION:	APPALACHIAN UPLAND
RECREATION:	

FILE #6 BATTLES OF THE AMERICAN REVOLUTION. CHAPTER 8, PP. 137-145

Fields	Records
BATTLE:	BATTLE OF LONG ISLAND
DATE:	BATTLE OF HARLEM HEIGHTS
SITE:	BATTLE OF WHITE PLAINS

SIGNIFICANT PERSONS:	BATTLE OF ORISKANY
PLAN:	BATTLE OF BENNINGTON
OUTCOME:	BATTLE OF SARATOGA
NOTES:	BATTLE OF JOHNSTOWN
	BATTLE OF YORKTOWN

FILE #7 TIMELINE AMERICAN REVOLUTION. Chapter 8, graph on p.142

Fields	Records	
DATE:	1755	1779
EVENT:	1765	178Ø
PARTICIPANTS:	1766	1781
CAUSES:	1767	1783
KEYWORD FOR CAUSES:	1773	
EFFECTS:	1775	
KEYWORD FOR EFFECTS:	1776	
NOTES:	1777	

FILE #8 ERA OF REFORM. Chapter 1Ø, pp. 177-179

Fields	Records
DATE:	1812 FREE SCHOOLS
EVENT:	1815 CHANGE OF CONSTITUTION
STATE:	1846 ELECTION OF STATE OFFICIALS
PLACE:	1847 ABOLITION OF SLAVERY
PERSONS:	1848 WOMEN'S RIGHTS
CODE:	1849 FREE SCHOOLS
NOTES:	1851 WOMEN'S RIGHTS
	186Ø WOMEN'S RIGHTS

FILE # 9 MAJOR COUNTIES NY. Tables on pp. 3ØØ-3Ø1

Fields	Records
COUNTY:	ALBANY
SEAT:	BINGHAMTON
SQUARE MILES:	BRONX
AREA RANK:	BUFFALO
POPULATION:	KINGS
POPULATION RANK:	MANHATTAN
	QUEENS
	RICHMOND
	ROCHESTER
	SYRACUSE

The teacher-developed material consisted of brief commentary on a teaching plan including some, but not necessarily all, of the following headings for each file:

When To Use The File

A Description Of The File

The Objectives

Getting Started With The Textbook

Getting Started With The Computer

Suggestions For Enrichment

This information was later compiled by the Workshop Facilitator into a booklet for distribution. The fields were converted to a data entry form and distributed for student use. After researching the data, students would record the information on data entry forms prior to coming to the computer room. The forms would also be used to type from when student entered their data into the data base program at the computer.

FOCUS Projects Within A District School Improvement Plan

Because principals play a key role in determining the success of school programs, gaining the principal's commitment to the FOCUS Project was essential, as there was little chance that teachers would commit to the project without it. The Phi Delta Kappa Study, Why Do Some Urban

Schools Succeed? (1980) concluded that principals are particularly important because they are the designated leaders of comprehensive school units and as such they influence the behavior of subordinates and other school participants, initiate programs, set policy and obtain material and fiscal resources. More importantly, principals are frequently the motivation and support for school improvement (p. 203).

Effective September 1, 1985, New York's Commissioner of Education Office mandated that:

> Each member of each board of education through the Superintendent and in cooperation with the professional staff . . . shall initiate measures designed to improve results related to their respective comprehensive assessment reports (New York Commissioner's Regulations Report, 1985).

The New York State Education Department held that successful school practices identified through the effective schools research had demonstrated that school improvement planning and implementation were critical to ensure high student achievement. Further, the Commissioner's Regulations mandated the development of a comprehensive school improvement plan for each school building identified by the Commissioner as being in need of assistance based on state pupil test data and student dropout rates. Although the new Part 100 of the Commissioner's Regulations mandated submission of plans only from schools where there were substantial concerns with pupil performances, it was

strongly recommended that each school in New York State use a collaborative planning process to develop and implement a school improvement plan.

Three years prior to this mandate, the Roosevelt Superintendent of Schools had initiated the use of school improvement plans, requiring each school to submit them yearly. The new regulation (a) helped reinforce the importance of this routine, (b) encouraged collaborative district-wide planning using a uniform format for the plan components, and (c) strengthened the implementation phase of the plans by urging school leaders to monitor, evaluate and modify the plan accordingly on a regular basis. This situation held important implications for the FOCUS Project because it encouraged school leaders to seek improvement programs which provided opportunities for the FOCUS group to integrate their projects into a broader planning process with the school principals and other administrative staff members.

The Commissioner's Regulations outlined procedures for planning including guidelines suggesting a process for developing a school improvement plan. With minor variance, the schools adhered to the following procedures:

1. The school principal organized and co-chaired with one or more staff members, a planning committee to develop and conduct the planning process.

2. The committee identified local, regional, state and

federal resources that could be used to support the plan.

3. The planning committee prepared a plan pertaining to their school which specified how they would: (a) prepare a description of the school's program, staffing, facilities, resources, and pupil performances; (b) identify the strengths, areas needing improvement, and needs of the school; (c) set priorities and goals that were compatible with district policy and that were both realistic and achievable; (d) translate priorities and goals into objectives to address specific needs; (e) establish an evaluation system; and (f) specify activities directed at the objectives.

4. The planning committee conducted activities designed to achieve the objectives.

Each school reported their plan using the same format which incorporated (a) needs, (b) goals, (c) objectives, (d) activities, and (e) formative evaluation as components. Other plans such as the staff development plan and the Chapter I/PSEN (Pupils With Special Educational Needs) comprehensive plan were incorporated as a part of the school improvement plan.

Combinations of the following staff members met to discuss the improvement plans within various settings and time frames at individual schools, at the central adminstration office and as part of several district administrative council meetings: Superintendent, Project

Researcher as District Computer Coordinator, Principals, School Coordinators, Teachers, Paraprofessionals, Writing Coordinator and Director of Compensatory Education. Two of the three elementary schools, Centennial Avenue School and Theodore Roosevelt School, incorported their projects directly into their school improvement plan.

The Washington Rose School plan focused on a reading project utilizing the newspaper. Therefore, the project in this school was proposed separately. The Principal and the Project Researcher co-chaired a committee comprised of fourth grade teachers and the computer lab paraprofessional to plan and implement their project.

Centennial Avenue School Improvement Plan

One component of a two-part school improvement plan for the Centennial Avenue School engaged the entire fifth grade population. This component focused on writing by incorporating the use of the computer and its word processing capabilities to enhance student learning with the goal of improving students' writing skills. The need was determined by (a) a pre-test administered in the spring of 1985 which showed that only 35 percent of the group achieved at the minimum competency level set forth by the State Education Department, and (b) data from a needs assessment survey indicating the staff's desire to expand computer

utilization to better integrate computers into the subject areas.

Staff Development was an integral part of the plan to assist teachers in demonstrating that computers can be useful tools to ease the revision process of writing using the computer's word processing capabilities, namely the Bank Street Writer. The goals of the plan were (a) to improve the achievement levels and writing skills of students in grade 5, and (b) to foster better utilization of the computer by applying word processing techniques to the instruction of writing. The first objective was to improve the writing proficiency of students by improving their skill in gathering and organizing ideas, writing first drafts, revising and editing, and writing final drafts. The second objective was to teach students the necessary skills to operate the Bank Street Writer and to use those skills to write, revise, edit and print in all phases of the writing process. These specialized skills included learning the word processor's three modes, the keyboard, and how to add, correct, erase, move, find, rebuild, format, print, save and retrieve text.

The resources required to meet the objectives were available and included (a) Bank Street Writer software and activity books, (b) materials developed by the writing coordinator, (c) eleven Apple IIe microcomputers, and (d) human resources including Principal, Project Researcher as

District Computer Coordinator, Director of Compensatory Education, Writing Coordinator, Reading and Mathematics Coordinators, the Computer Lab Paraprofessional and Fifth Grade Teachers. The primary activities consisted of hands-on activities with the Bank Street Writer and the computer. Supporting activities included lessons correlated to the social studies,. science and health textbooks on categorizing and sequencing, comparison and contrast and descriptive writing. Other activities were adapted from Activity Book For The Bank Street Writer (Burns & Galen, 1985) on composing.

The following time-line was established for the plan:

August 1985-October 1985 Project Researcher works with staff to implement the use of the Bank Street Writer progam.

September 1985 Principal and school team in consultation with the Project Researcher modify the existing computer lab schedule.

October 1985-November 1985 Writing Coordinator presents workshops for fifth grade teachers on ways to integrate content area textbook materials with writing both in the classroom and in the computer room.

October 1985-June 1986 Students work on word processing and classroom activities in writing with ongoing formative evaluations being conducted by the Writing Coordinator, District Computer Coordinator, Principal and Teachers.

June 1986 Final Assessment.

Theodore Roosevelt School Improvement Plan

The Theodore Roosevelt School Plan involved strategies and activities utilizing computers to enhance learning through an interdisciplinary approach in kindergarten, grade 3 and grade 6. The grade 3 component incorporated the FOCUS Project on LOGO. The need was based on: (a) test data which called for improvment in students' mathematic skills, specifically in the area of problem solving; and (b) data from a needs assessment survey indicating the staffs' desire to expand computer utilization to better integrate computers into the subject areas.

The staff development aspect engaged grade 3 teachers in learning to use LOGO with their students as an active learning approach to teaching problem solving strategies within a heuristic environment. The goals of the plan were (a) to use the computer as a tool to enhance learning in mathematics, (b) to foster student understanding of computer applications to the disciplines, and (c) to bring about more effective utilization of computers with students. The objectives were to improve problem solving skills and critical thinking skills and to promote the understanding of spatial relationships and geometry concepts through the use of LOGO activities. These activities were

aimed at specific skills related to: (a) logical thinking; (b) applications in math, specifically geometry and language arts; (c) estimation; and (d) problem solving.

To meet the objectives the plan made use of the available resources including "Getting Started With LOGO" (Miller & Thorkildsen, 1983), Apple LOGO software, printed materials, the Computeach LOGO Strand K-6 (LeVine, 1985), eleven color Apple IIe computers and the human resources of the Principal, the Project Director, the School Coordinators, Grade 3 Teachers and the Computer Lab Paraprofessional. The primary activities centered around using the Apple version of LOGO in conjunction with supporting activities adapted from commercial and teacher-made materials as well as the activities contained in the Computeach guide.

The following time-line was established for the plan:

August 1985-October 1985 Project Researcher works with staff to implement the use of the LOGO program.

September 1985 Principal and School Team in consultation with the Project Researcher modify computer lab schedule. Teachers orient students to the program.

September 1985-January 1986 Grade 3 teachers conduct LOGO lessons making ongoing assessments, attending the lab 4 days per week for 1 hour periods.

January 1986-June 1986 Grade 3 conducts LOGO activities,

attending the lab 1 day per week.

June 1986 Team evaluates program formatively using the teachers' assessments of students' performance with LOGO and the end-of-lesson reviews contained in the commercial materials.

Implementation of the FOCUS Projects

Implementation of the three school-based projects began in the fall of 1985. In this phase, the Project Researcher worked with each school team consisting of the Principal, the Coordinators, Teachers at the project grade level, other teachers assigned by the Principal to the team and the Computer Lab Paraprofessional. Other district administrators were involved when appropriate according to the setting and the related curriculum. These meetings consisted of dialogue on: (a) the needs, goals, objectives, activities and evaluation respective to each project; (b) modification of the existing computer schedule; (c) the degree to which ongoing training and support was necessary to sustain the project; and (d) ways in which teachers could share with one another materials, strategies, experiences, successes, failures, problems and solutions.

The "Write" Focus

On September 13, 1985, the Centennial Avenue School FOCUS members including the Principal, met with the Project Researcher at the Centennial School to rearrange the computer lab schedule. The committee recommended the schedule be changed so that students in each grade would attend for sixty minutes, four times a week for a ten week period. This change was intended to promote continuity of instruction by setting aside larger blocks of time aimed at improving student recall of material and reducing the number of interuptions and length of time lapses between activities. The three fifth grade classes were scheduled and plans were discussed for modifying the schedule again at the end of the first marking period at which time teachers involved in each project would share their experiences with teachers in the same grade at another school.

Students began computer classes on October 1, 1985. On October 4, 1985, the project researcher as District Computer Coordinator, the Director of Compensatory Education and the Writing Coordinator met with the FOCUS members and fifth grade teachers: (a) to discuss the plan in the context of a comprehensive improvement effort; (b) to outline the procedures for implementing the plan in terms of who would be responsible for each step of the plan, the sequence of

instruction, and use of materials; and (c) to discuss strategies for integrating the Bank Street Writer activities with the writing curriculum and the remedial writing program.

Participants raised questions regarding schedule changes. The group resolved that some decisions would be held in abeyance pending the teachers ongoing assessment of student progress as the program was conducted. Other concerns involved ways to accommodate large class sizes with only eleven Apple computers. The group decided students would pair up at computers while learning to operate the Bank Street Writer. The class would be divided with half working on the other computers or working on drafts while half used the Bank Street Writer on the Apples. The two groups would then alternate at some point during the class period.

The Project Researcher elicited the opinions of the group as to whether or not grades should be issued to students for the computer project. The general consensus was that issuing grades would not be productive. In fact, the group felt grades would be counterproductive to stimulating motivation and excitement. Finally, the group expressed the need for future workshops, meetings and/or evaluation sessions.

A former special education teacher from the FOCUS committee visited the meeting to share her experiences and

report on the word processing activities she had conducted with her class in the previous year. The teacher suggested that students memorize the keyboard by rows and recommended that students be introduced to the keyboard, and later the commands, in the classroom prior to working at the computer. The commands were introduced one at a time followed by substantial practice for reinforcement. The teacher reported that students who had not been able to memorize before, were able to learn the keyboard with relative ease. The teacher emphasized that the painful task of getting students to generate one or two paragraphs was eliminated using the computer. The teacher observed students willingly generating several pages of text with the word processor. Lastly, the teacher reported that students who otherwise exhibited behavior problems actively engaged in productive and prolonged activity on the computer.

Students and teachers conducted the project according to the plan through December 20, 1985. During this time, the Project Researcher visited the site during class time to provide ongoing support and assistance, and to consult with project staff members. The teachers worked toward creating a class publication as a culminating activity for the project.

Getting Started With LOGO

On September 20, 1985, the Project Researcher and the Theodore Roosevelt FOCUS group met in the computer room with the two new third grade teachers for the purpose of (a) sharing the plan with the new staff members, (b) finalizing the schedule, (c) training the new teachers on the basic LOGO primitives, and (d) deciding on a tentative sequence for activities. The third grade staff at this school assumed a team approach to teaching. Therefore, teachers planned to conduct the project, consulting routinely with one another to share materials and experiences.

At the same time the plan for this project was being developed, Nassau Community College, a local junior college, had been selected by the New York State Education Department to offer inservice training for teachers of Mathematics and Science in elementary and secondary schools on Long Island. The grant provided inservice training at no cost to participating teachers. The inservice course paralleled the LOGO project in content, objectives and activites, utilizing a hands-on approach with teachers. The Project Researcher submitted a plan which was approved by the Superintendent to compensate teachers who attended at the district's contractual inservice rate. Seven teachers from the district attended, the majority of whom were third grade

teachers. Two of the teachers conducting the "Getting Started With LOGO" project at Theodore Roosevelt attended the course during the time they were implementing the LOGO project with their students. This linkage served to bolster teacher confidence with LOGO by offering hands-on experience outside of the school setting. Teacher comments were very positive, particularly regarding the advantages created by linking their professional learning to applied teaching. The course provided the ongoing support necessary for the staff, helped to keep teacher enthusiasm at a high level and offered teachers additional ideas, activities and materials for use with their students.

Grade 3 teachers and students conducted the LOGO project from September 23, 1985 through December 20, 1985. The plan originally called for the project to reduce from a four day per week basis to a one day per week basis at the end of a ten week period. However, the Principal and Staff requested that they be allowed to continue until the holiday break, as enthusiasm for the project was high.

On December 6, 1985, the Theodore Roosevelt School Staff, including the coordinators, third grade teachers and the computer lab assistant hosted an experience sharing session inviting the third grade staff from the Centennial Avenue School. Each teacher reported on a different aspect of the project, describing the instructional strategies, methods and activities employed. The computer lab assistant

recorded the teachers' report summarized in the following section.

LOGO project report

Classroom instruction almost always preceded the computer room activity. Here teachers discussed expectations and the purpose of each lesson with students. Students used a practice keyboard in the classroom where teachers stressed which keys had a special purpose that would be used later. LOGO primitives were also introduced one at a time.

Teachers used games such as "Simon Says" and other kinesthetic exercises to teach right-left directionality and to familiarize students with forward and backward movements. Students walked through procedures, turning right or left 90 degrees, 180 degrees or 360 degrees and moving forward and backward a designated number of steps. Each student had a LOGO folder for their work which included oaktag turtles, exercises on graph paper and other supplementary activity sheets and manipulatives.

After experimenting with lines and movement, students were asked to make one shape on the computer and then to change it in some way, either by making it larger, smaller, longer or shorter. Teachers began with the square and drew on what students already knew about the shape and how they could use what they knew about the forward,

backward, right and left turns of LOGO to make a square. Students mapped out the steps of each procedure first on over-sized graph paper, marking the starting box with red. Similarly, students worked with the rectangle and triangle.

Next teachers introduced the drawing pen features of LOGO--PEN UP, PENDOWN and PENERASE. At this point, students were not permitted to clear the screen to correct errors, but were encouraged to use these pen commands to erase their errors and retrace their steps.

Teachers had students begin by entering one command of a procedure at a time and then progressed to writing the set of commands in one line and executing them all at once on the line return. The REPEAT command was introduced as a short cut to repetitious steps. For example, students simplified the square procedure FD 80 RT 90 FD 80 RT 90 FD 80 RT 90 FD 80 RT 90 to REPEAT 4[FD 80 RT 90].

Teachers found it helpful to incorporate instruction on angles of polygons asking students to observe that all angles are the same in a four-sided figure and that all of the interior angles add up to 360 degrees. Similarly, students observed that the sum of the interior angles of a triangle equal 180 degrees.

Finally, the teachers introduced procedure writing as a way to execute all of the commands at one time. Teachers explained that by using the TO command followed by the procedure's name, students could instruct the computer

to do something, and that the command END was necessary to signal the computer when they had finished with the instructions. Later, students were encouraged to experiment by creating and naming their own procedures.

At the conclusion of the session, the LOGO teachers suggested materials and distributed samples of student work and student folders. The visiting teachers commented that the session was well presented and that they would like to visit the lab to observe students at work with teachers. The session was audio taped and the minutes transcribed so that teachers could make future references to the dialogue that took place.

Project "Notebook"

The start of the third project was delayed as a result of several factors. First, because this school operated on a different schedule structure, the computer schedule was more difficult to negotiate than those of the other schools. Second, the Project Researcher's energies were directed initially to those schools whose schedules more readily accommodated the projects enabling them to begin shortly after the opening of school. Third, although teachers at this school were viewed as highly competent, they expressed some reluctance to begin without another training session which they felt was needed to build their

confidence and to review material from the summer. Therefore, the Principal requested a date for another session and made arrangements for teachers to be released from class time.

On November 7, 1985, the Project Researcher met first with the Principal to finalize the schedule and then with grade 4 teachers and the computer lab assistant in the computer room to review the operations of the Notebook Filer Data Base Program (1985) covered in the summer FOCUS sessions. The teachers spent several hours working on the computer and perusing the materials they had developed that summer which the Project Researcher had since compiled.

The teachers left with a copy of the data base program for each Apple computer, eleven data disks containing the nine files they had developed to supplement the social studies textbook and enough copies of the data entry forms for the GLOSSARY file to accommodate their classes. Teachers decided to start students with the GLOSSARY file because the records contained only four fields and collecting the data was a relatively easy task for beginning. The teachers made note of their scheduled computer time and agreed to start the following day by having students complete data entry forms in the classroom.

Students in grade 4 actively participated in the project from November 8, 1985 until January 10, 1986. During this time, students attended the computer room four

times per week for forty minute periods. The teachers paired students having each pair work together in class to collect and record data onto the data forms. Each record included fields for the vocabulary word, its definition, page word appeared in the textbook and a code (S, G, P, R, or T) for categorizing the word as a social, geographic, political, economic or technical term. The same two students collaborated at the computer in alternate order with one student reading the data aloud to the other student entering data at the keyboard.

Teachers requested that the Project Researcher visit their classes in the computer lab during the first several weeks to provide support. On one occasion, students and teachers discovered upon sitting down to resume file work, that the data entered on the previous day had been lost. After reflecting on the steps they had taken, the group realized that they had forgotten to close the file by selecting the "Quit" option. With this step omitted, the data entered the program's memory, but was not recorded on the data disk. The lesson thus learned was not easily forgotten.

Teachers found it helpful to post charts in the room listing the steps for closing a file and saving the data. Later, two other charts were posted, one listing the steps for editing records at the entry level or in retrospect, and the other for removing entire records from a file. Students

were encouraged to refer to the charts when in question. This enabled students to function more independently and allowed the teacher more time to individualize.

By January 10, 1986, all fourth grade students had worked with a partner to build a GLOSSARY file of approximately 100 social studies vocabulary words taken from their textbook. At this point, the staff adjusted the schedule, reducing the computer time to one period a week for each fourth grade class. During their allotted period, teachers sent small groups of students with their partners to the computer room to print a report of their file to take back to the classroom. At the conclusion of this activity, teachers planned to use their weekly computer period to cover the remaining files from the curriculum materials they had developed.

The Agony And The Ecstasy

Over the course of time involved in this study, situations occured that called for modifications as problems arose or mistakes were made that called for modifications. Moreover, many of the anticipated limitations were dispelled either permanently or temporarily while other initially perceived limitations were replaced with unexpected ones. In almost every case, any modification made was restricted to one particular setting. For example, changing the

existing regularities of the computer scheduling was more difficult than had been expected in virtually all settings. However, changing that particular regularity was negotiated differently in each setting.

Necessary adjustments for various schools, teachers and students were made based on the personalities, strengths and needs of individuals in the setting. For example, activities, materials and instructional strategies were modified or improvised according to each setting. The impact of individual personalities was evidenced by the fact that not all teachers at one site were equally committed. There was usually one teacher, who for various reasons, assumed a more passive role than his/her colleagues. In one case, it was the teacher's last year before retirement, whereas in another the teacher suffered with a chronic health problem. Nevertheless, the broad-based planning procedures had generated sufficient "grass-roots" support to carry the momentum forward at least until mid-year when the three projects were to be rotated.

All schools were not able to begin their projects at the same time. Project "Notebook" did not operate with students until early November. The reason was not apparent to the Project Researcher until a conference with the Principal revealed that her conversations with teachers suggested that their reluctance was tied to feelings of uncertainty. This was understandable in view of the fact

that most of the staff implementing the project with students were not involved in the initial FOCUS committee and had no training prior to the summer workshop sessions. One teacher asked the Project Researcher, "How can I answer the questions posed by the students when I myself am not certain?" From a conscientious teacher, driven by the demands of teaching, and burdened with an overcrowded class and too little time, this question was received as an honest response to legitimate concerns. The Project Researcher and Principal assured the Teacher of their support. Almost always, fears were allayed when the project was presented as a learning experience for everyone involved, including the Project Researcher, Principal and Teachers, as well as Students. Learning was advanced in a spirit of discovery, adventure and exploration which called for people to simply begin without prior experience and without knowing the exact destination. The underlying belief that the project would ultimately improve the school's use of computers, stimulate motivation and foster more active learning continued to serve as a source of strength.

Time constraints resulted in the need to eliminate, modify or postpone some of the proposed activities. For example, teachers in the data base project found that spending close to one hour everyday in the computer room left too little class time for students to complete the data entry forms. This problem was resolved by assigning

students the data forms as homework or having students complete them in the time normally spent in recreation, if students elected to do so. The project intended for grade 6 was tabled as a result of the time demands associated with conducting the three projects for grades 3, 4 and 5. However, the Bank Street College consultants were scheduled to begin training sessions for the "Voyage of the Mimi" project in Mathematics and Science with grade 6 teachers in the spring with the intention of implementing the project the following year. Consequently, an alternate project was conducted with grade 6 which engaged students in a graphics program to plan, print and mail invitations for their graduation exercises at the close of the school year.

Each setting dictated a different time frame to meet the goals and objectives of each project. The Project Researcher's original plan to assign a rigid framework of ten weeks for project completion at which time the projects would be rotated with the others was unrealistic and contrary to past lessons about change being dependent on individual settings. Another reason for differentiating time frames was that teachers and students involved in all three projects were reluctant to change projects, as enthusiasm for each project was highest in the home school of its origin. Moreover, adapting the projects at the other schools meant training six additional grade teams at different times in mid-year when receptivity to innovation

was deflated as a result of other pressures placed on teachers. Wherever class coverage had been a problem, it was at this point transformed into a recurring nightmare.

Other events occurred which interfered with the projects being rotated. A fire consumed the portable classrooms of two third grade classes just before the LOGO project was to begin at that school. Both were senior teachers so the materials lost in the fire represented years of work. This event upset the equilibrium of the students, called for drastic changes in the classroom routines and left teachers feeling depressed. However, after several consultations, the teachers accepted the project as an alternative to attempting to instruct students in the make-shift, dreary setting in which they found themselves.

In spite of the drawbacks, the projects were not without their triumphs. The first sight of student activity was as imposing as it was gratifying. Students were observed excitedly and creatively engrossed in LOGO activities. It was equally encouraging to witness students entering data on a daily basis with no observable diminishing of interest or attention. The staff shared the unreserved delight of students on seeing their writing pieces retrieved for the first time and their obvious pride in seeing printed copies of their text circulated throughout the school to fellow students and faculty.

Perhaps the greatest challenge was that of getting a

group of professional educators from diverse backgrounds and with varying needs to think, learn and cooperate together toward a common goal at the same time. Teachers with little or no computer training were trying something new that in some cases they were uncomfortable with. A willingness prevailed on the part of the staff to share ideas and plans about things that worked or did not work with their colleagues, both within their school and in other schools. It was interesting to note the comments of some staff members that they had never visited the other schools or engaged in dialogue with teachers at the other sites prior to their involvement in the FOCUS project. Although leaders were forced to deal with teachers' reluctance to change activities, it was encouraging that the level of excitement remained high enough to incite these mixed blessings of sorts. At the close of each project, staff remarks reflected a sense of satisfaction, with many teachers offering ideas for future activites or improvements.

Student accomplishments were not limited to any particular homogenous ability group. All students in grades 3, 4 and 5 and some from special education classes engaged in the same activities, reaching a productive level in a relatively short period of time. The following pages contain excerpts from a report generated by two fourth grade students on a glossary file of vocabulary words taken from their social studies textbook, and excerpts from a

publication by a fifth grade which represents a cross-section of students based on previous assessments of their achievement and ability levels. The latter included one student who had consistantly qualified for remedial services in both reading and mathematics and one student under consideration by the committee on the handicapped.

WASHINGTON ROSE--GRADE 4
Roosevelt, New York 11575

DATA FILE: GLOSSARY
DATE: JANUARY 15, 1986

WORD	MEANING	PAGE	CODE
ANCESTOR	A PERSON FROM WHOM ONE IS DESCENDED.	291	S
ARTIFACT	AN ITEM THAT WAS MADE AND USED BY PEOPLE IN THE PAST.	291	S,G
ASTRONAUT	A PILOT WHO TRAVELS IN OUTER SPACE.	291	T
BOUNDARY	A LINE THAT SEPARATES ONE STATE OR COUNTRY FROM ANOTHER.	3	G
CLIMATE	THE KIND OF WEATHER A PLACE HAS OVER A LONG PERIOD OF TIME.	291	G
COASTAL PLAIN	FLATLAND ALONG THE EDGE OF AN OCEAN, LAKE OR SEA.	59	G
COMMUNITY	A PLACE IN WHICH A GROUP OF PEOPLE LIVE, WORK AND PLAY TOGETHER.	291	G
COMMUTE	TO TRAVEL BACK AND FORTH REGULARLY.	291	S
COMPASS ROSE	A DIRECTION FINDER.	39	G
CONTINENT	A LARGE BODY OF WATER.	34	G
CONTOUR LINE	THE LINES THAT SEPARATE THE COLORS USED TO SHOW ELEVATION OF LAND.	68	G
COUNTY	THE LARGEST TERRITORIAL DIVISION FOR LOCAL GOVERNMENT WITHIN A STATE.	294	G

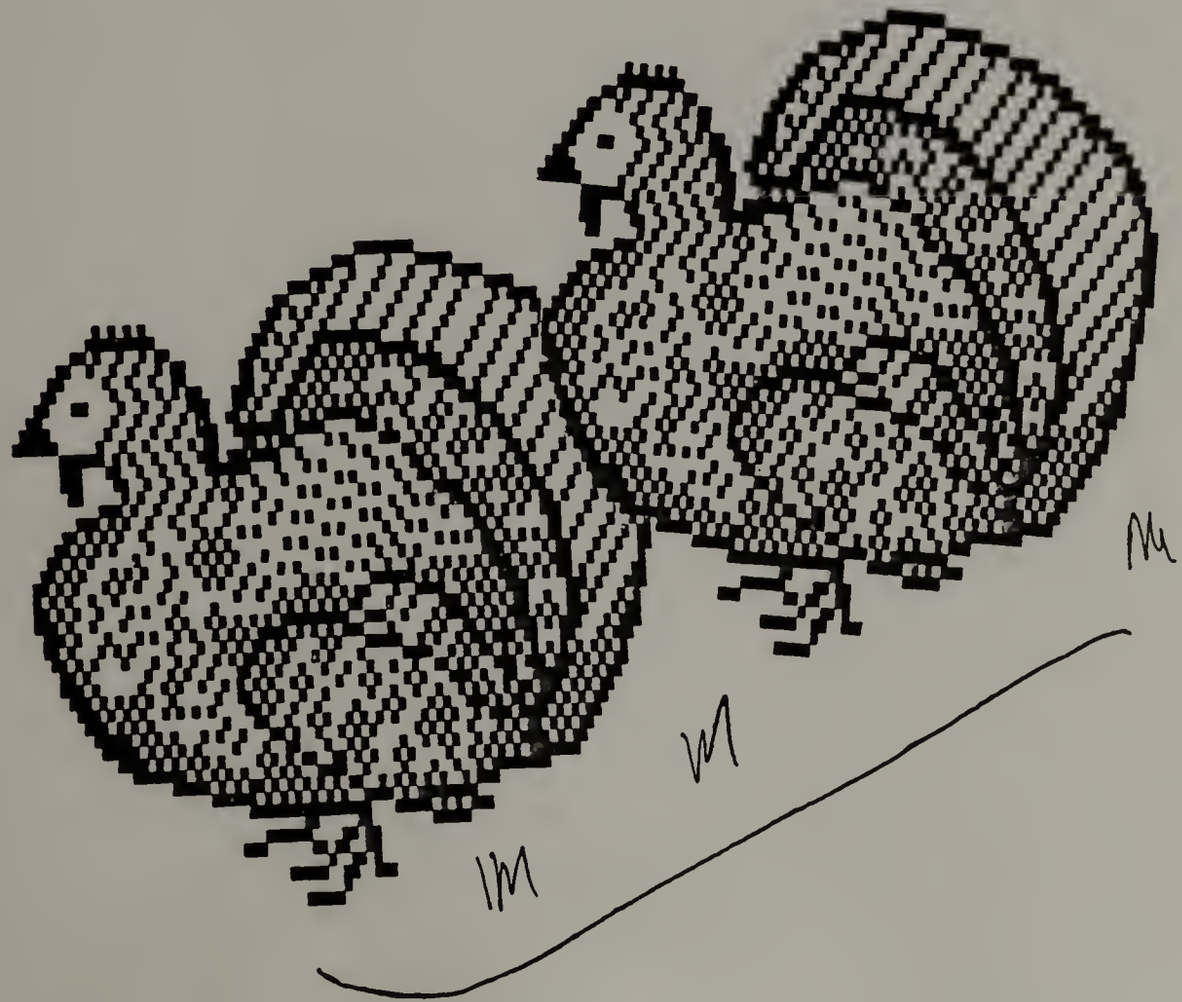
WORD	MEANING	PAGE	CODE
EAST	A DIRECTION WORD. FACING NORTH, EAST WILL BE ON ONE'S RIGHT, WEST ON THE LEFT.	292	G
ELEVATION	DISTANCE OR HEIGHT ABOVE SEA LEVEL.	68	G
EQUATOR	IMAGINARY LINE ON THE EARTH THAT IS HALFWAY BETWEEN THE NORTH POLE AND SOUTH POLE.	292	G
ESTIMATE	TO JUDGE OR FIGURE OUT SOMETHING, SUCH AS DISTANCE OR LOCATION ON A MAP OR GLOBE.	292	G
FALLS	A STEEP DESCENT OF WATER.	292	G
GARNET	A BRITTLE, USUALLY RED MINERAL USED TO GRIND AND POLISH THINGS.	61	G,E
GENEALOGY	A RECORD OF BIRTHS, DEATHS AND MARRIAGES IN A FAMILY.	30	S
GEOGRAPHY	STUDY OF THE EARTH AND HOW PEOPLE USE IT.	20	G
GLOBE	A MODEL OF THE EARTH.	34	G
GOODS	THINGS THAT ARE MADE, ESPECIALLY THINGS THAT ARE TO BE SOLD.	292	E
GOVERNMENT	A GROUP OF MEN AND WOMEN WHO MAKE LAWS AND CARRY THEM OUT.	292	P
GRAPH	A SPECIAL KIND OF DRAWING THAT USES PICTURES, BARS AND LINES TO GIVE FACTS AND COMPARE THINGS.	292	G
GRID	A SYSTEM OF CROSSING LINES OR BOXES.	42	G

History of Thanksgiving

In the United States and Canada, a day is set aside each year as Thanksgiving Day. In the month of November, we celebrate Thanksgiving. On Thanksgiving Day, a group of people get together such as a family. We have a big feast on Thanksgiving Day. Thanksgiving Day is a time for joy, a time for gratefulness, and a time for love!

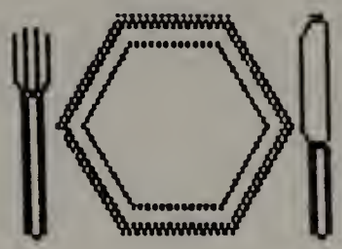
Mrs. and Mr. Turkey

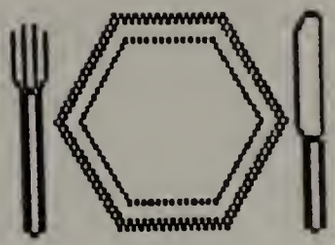
Once upon a time, there lived some turkeys who were married. These turkeys were no ordinary turkeys. They could talk and do all things like humans. These turkeys had 1ØØ little children and it was very hard to take care of them, but they managed because some of them were old enough to help. Mrs. Turkey had to go out one day and she told Mr. Turkey to watch the babies or do anything. All he liked to do was to watch T.V. and drink beer. He got in trouble and never could watch T.V. again. From then on, whenever he had to watch the baby turkeys, he did a better job.



THANKSGIVING

Thanksgiving is one of the favorite times of the year to me. I love Thanksgiving because I get to eat alot of food. That's why I love Thanksgiving. This year I hope to go to Boston to see my cousin and I hope to see the John Hancock again. Then we can get some pizza and soda and come back home to Long Island. I am looking forward to Thanksgiving.





The Dumb Turkey

One day there was a very dumb turkey. He always made mistakes and messed up anything he touched. No one wanted to be near him because he was very clumsy. Everyone hated him so much, they were going to chop his head off and eat him for Thanksgiving dinner. But the turkey knew the time would come when they would try to chop his head off so when they tried to stuff him with food, he would not eat at all. Finally, they gave up because he was so skinny he had no meat on his body. And he lived happily ever after.

References

Burns, M., & Galen, J. (1985). Activity book for the Bank Street Writer. New York: Scholastic.

Crouch, B. (1984). Notebook filer data base program [Computer program]. Lexington, MA: D. C. Heath.

Kusmiak, G., Riggs, G., & Smith, F. E. (1984). Bank street writer [Computer program]. San Rafael, CA: Broderbund.

LeVine, G. (Ed.). (1985). Computeach LOGO Strand K-6. (Available from East Ramapo Central School District, Spring Valley, NY)

Miller, S., & Thorkildsen, R. (1983). Getting started with LOGO. Allen, TX: Developmental Learning Materials.

New York State Commissioner's Office. (1985). New York Commissioner's Regulation Report. (Part 100). Albany, NY: Department of Education.

New York yesterday and today. (1985). Morristown, NJ: Silver Burdett.

Phi Delta Kappa. (1980). Why do some urban schools succeed? The Phi Delta Kappa study of exceptional urban elementary schools. Bloomington, IN: Phi Delta Kappa.

Radio Shack (1979). Scripsit word processing system training program [Computer program]. Fort Worth, TX: Tandy.

C H A P T E R V

EFFECTS, CONCLUSIONS, RECOMMENDATIONS AND IMPLICATIONS

Introduction

This chapter addresses the promise, the people and the process uncovered in this study beginning with an account of the FOCUS Project effects on student learning followed by responses to the research questions posed in Chapter I. Those questions were:

Subsidiary Questions

What do students need in order to use computers effectively to enhance their learning?

What do teachers need in order to use computers effectively in the service of instruction?

Are there things that connect the various groups within the school and if so, what are they?

How do the administrators, teachers and paraprofessionals communicate to build a consensus of mission and to attain agreement on a plan of action?

Main Question

What are the planning procedures and processes that enable administrators, teachers and students to come to some shared resolution of their varied perceptions on computer utilization?

The Promise

Student Learning

One aspect of the study rationale was based on the belief that motivation of students could be stimulated by an environment enriched by more active learning experiences, and that this increased motivation would be associated with success levels for elementary students. Consequently, the study investigated ways in which computers could be utilized to enhance affective development, specifically to stimulate motivation to result in more active learning, leading ultimately to greater cognitive gains for students.

The methods sought to utilize the microcomputer as the medium for engaging students in activities and processes which would promote active learning within a heuristic atmosphere. Evaluation of those activities and processes hinged on achieving the objectives for all students, regardless of characteristics usually considered to be

traditional predictors of academic success or failure and irrespective of student subclassification. Therefore, the final evaluation involved conducting surveys to gather the perceptions and findings of teachers conducting the school-based projects regarding the observable effects of the project activities on students. The object of the evaluation was to determine the degree to which the teachers found the activities useful for students in answer to the research question, "What do students need in order to use computers effectively to enhance their learning?".

Effects of School-Based Projects

The following tables present findings regarding the observable effects of the school-based computer projects on student learning in three curriculum areas, namely writing, mathematics and reading for social studies. The findings were based on the results of three surveys conducted with four staff members from the Centennial Avenue School, six from the Theodore Roosevelt School and four from the Washington Rose School (see Appendixes C, D and E for instruments).

Writing

The three teachers and the teacher assistant who conducted the "Write" Focus Project were asked to rate a list of eleven effects as low , medium or high based on

their experience with using the Bank Street Writer in the instruction of writing and their observations of approximately 68 fifth grade students using the word processor (see table 1). The list of effects were drawn from the work of Kane (1983), Daiute (1983) and Loheyde (1984) relevant to the impact and benefits of writing with computer. The responses were tallied for each of the eleven items. Ratings representing the average response based on the numerical assignment of 3 for high, 2 for medium and 1 for low are listed in descending order.

Table 1

Effects of the Writing Project

Mean Rating	Effects
3.0	Stimulated motivation as a result of seeing text in print.
3.0	Increased pride in work
2.8	Easily accommodated revision stages
2.8	Allowed students to focus more on ideas than on recopying
2.8	Helped overcome problems with physical act of writing

2.8	Eased teacher's job; evaluation not colored by the need to decipher student's work
2.5	Motivated students to learn new strategies as a result of ease of revision
2.5	Increased involvement with text improved writing
2.3	Speed of use allowed students to use earlier drafts to explore new ideas
2.3	More attention given to organizational matters
2.3	Peer conferencing facilitated

LOGO

The three teachers, two coordinators and the teacher assistant involved in the "Getting Started With LOGO" project were asked to rate a list of effects as low, medium or high based on their involvement with LOGO and their observations of approximately 61 third grade students using LOGO (see table 2). The effects were borrowed from a research tool used in the St. Paul Public Schools to assess the impact of a LOGO project in an urban setting (Dog, 1985). The responses of six staff member were tallied for each of the 21 items. Average ratings for each survey item appear in table 2.

Table 2

Effects of the LOGO Project

Mean Rating	Effects
3.Ø	Sharing, teaching, consulting
3.Ø	Decrease in boredom
2.7	Motivation
2.7	Enthusiasm, excitement about learning
2.7	Cooperation, participation
2.7	Pleasure in work
2.7	Decrease in isolation, shyness, passivity
2.7	Creativity, resourcefulness
2.7	Level of achievement
2.7	Concentration, memory
2.7	Frequency of interaction with peers
2.7	Playfulness, curiosity
2.5	Systematic problem solving
2.5	Logic, structured thinking
2.5	Self-confidence
2.5	Attention to detail
2.5	Use of quantitative relationships
2.3	Likableness, sense of acceptance, belonging

2.Ø	Rate of learning
1.7	Altruism, prosocial behavior
1.7	Spelling and writing

Social Studies

The three teachers and teacher assistant conducting Project "Notebook" were asked to rate a list of 13 effects as low, medium or high based on their experience with the Notebook Filer Data Base Program (1984) and their observations of approximately 73 fourth grade students using the data base to organize and manage information in social studies (see table 3). With the exception of two items, the effects were borrowed from the same research tool used to assess the LOGO project. Average ratings for each effect appear in table 3.

Table 3

Effects of the Social Studies Project

Mean Rating	Effects
3.Ø	Motivation
3.Ø	Enthusiasm, excitement about learning

3.Ø	Frequency of interaction with peers
2.8	Pleasure in work
2.5	Sharing, teaching, consulting
2.5	Self-confidence
2.5	Attention to detail
2.3	Cooperation, participation
2.3	Concentration, memory
2.Ø	Logic, structured thinking, planning
2.Ø	Fostered skill in gathering data
2.Ø	Fostered skill in manipulating data
2.Ø	Spelling and writing

Additional Supportive Information

The surveys used for the writing and social studies projects included a concluding section which allowed teachers to make open comments about the project, the process or the product. To the same end, teachers involved in the LOGO project collaborated on a summative report which they submitted to the Project Researcher in January of 1986.

Teacher comments regarding the writing project indicated that: (a) the overall outcome was favorable; (b) word processing was beneficial to students who were deficient in writing skills, those having difficulty with

the physical act of writing, and those who did not respond well to the traditional "red pen" correction method; and (c) students appeared to enjoy working with the Bank Street Writer, were highly motivated and looked forward to the time they would attend the computer room.

Comments regarding the LOGO project indicated that the program fostered development in several ways. First, using LOGO helped students develop directionality and other mathematical concepts, especially in the area of geometry by demonstrating spatial relationships. Second, LOGO engaged students in logical thinking by encouraging them to break down problems into smaller parts and then combine them to create a final solution. Third, teachers believed that LOGO could foster abstract thinking and the ability to conceptualize. Fourth, teachers commented that students were highly motivated and excited about using LOGO in the computer room. During the course of time spent there, students combined creativity, experimentation and procedural thinking which teachers considered beneficial to the learning process. Teachers noted that students who were not usually productive in the classroom setting became motivated, excited and thought productive while using LOGO.

Teachers conducting the reading in social studies project indicated that students continued to demonstrate an eagerness to learn. Further, teachers felt strongly that the data base project served to sustain students' enthusiam

and excitement about learning. The teachers attributed this to their perception that students remain enchanted with computers.

Response to Research Question

"What do students need in order to use computers effectively to enhance their learning?"

Students need empowering activities dedicated to proactive learning, advanced through approaches which are "discovery" oriented, with routine practice to reinforce learning over a substantial period of time. To this end, activities should foster affective development by drawing on the natural creativity and imagination of the student. At the same time, the activities should reflect a sensitivity to individual differences and should be prescribed based on prevailing learning styles and varying dispositions to the learning modalities, i.e. visual, auditory, tactile and kinesthetic. It is important for students to engage in computer applications that demonstrate tangible results which students feel are in direct response to their efforts.

Conclusions and Recommendations

Specific recommendations have been incorporated to represent practical determinations reached in consequence of this study and are intended for educators interested in

designing computer programs for elementary students. The recommendations maintain a focus on computer uses which capitalize on the full potential of the computer and its capacity to stimulate motivation. Moreover, they place learners in active rather than passive roles in relationship to computers and strive to enable students to apply computer technology to various subjects in the learning process. The recommendations are based on experiences and insights gained through the implementation of projects with elementary students, the materials developed, and the observations and suggestions of the FOCUS participants, including the Project Researcher. Specifically, the suggestions address word processing, LOGO and data base applications.

Specific recommendations for initiating word processing programs with elementary students are as follows:

1. Attempting to instruct whole classes with a limited number of computers will require teachers to explore alternatives and make adjustments accordingly, taking into account the teaching and learning styles of the students and the activity being conducted at any given time. The pairing of students on one machine does not present as much a problem while students are learning the mechanics of the word processor as when they reach the text entry point.

2. It is crucial that teachers and students be provided with a substantial block of time in which to learn the operations and mechanics of any given word processing

program before teachers begin to instruct or students begin to write. For example, students can be scheduled for hands-on activity every day for at least forty minute periods each day over an extended period of time. However, the time frame must be determined by the individuals within the setting and should be flexible enough to allow for modification based on formative assessment results.

3. For elementary students using word processing for the first time, all operations need not be covered before students start writing with the word processor. Initial writings will usually consist of single paragraphs so that more advanced editing functions, such as moving, finding or replacing text are not required. Text correction can more easily be accomplished in the write mode, for example, using the delete key to delete characters. The sooner students engage in writing with the word processor, the more meaningful the mechanics become.

4. Instruction in word processing functions should allow for individualization to accommodate differences in learning paces. Some students will be ready to use some things sooner than others, such as the save and retrieve features of the word processor.

5. Designing activities which culminate in collaborative projects where groups combine their writings on a common theme (a) helps to sustain student interest, (b) provides students with a sense of accomplishment in product,

and (c) communicates to the students that their work has worth. Themes for projects can be generated from student interests or can serve as opportunities for teachers to integrate topics from various curriculum areas.

6. The aesthetic development of students can be fostered, and creativity can be stimulated at the text printing stage by combining graphics programs, such as the Print Shop and Print Shop Graphics Library with the word processing program, enabling students to illustrate their text.

Specific recommendations for introducing LOGO at the primary levels are as follows:

1. For elementary students using LOGO for the first time, it is strongly recommended that teachers develop readiness for LOGO within the classroom setting prior to having students use LOGO on the computer. Initially, this would consist of teacher explanations of expectations for students, the purpose of each lesson and keyboard introduction and practice. Similarly, conducting prerequisite classroom activities strengthens the foundation for student learning when students begin to use LOGO on the computer. For example, activities might include plotting procedures on graph paper to simulate eventual screen outputs, using a variety of tactile materials and manipulative activities in the course of instruction, and engaging students in kinesthetic activities to imitate

forward and backward movements as well as right and left turns in varying degrees.

2. In instructing students in the procedural nature of LOGO, teachers should build gradually, beginning by introducing one command at a time in the immediate mode, then moving to several commands in one line, leading students finally to the procedure writing level.

3. LOGO is an ideal medium for integrating associated mathematics concepts and illustrates the salience of the "teachable moment." For example, introducing the LOGO primitives for RIGHT and LEFT turns is an opportune time for integrating instruction on angles and degrees.

4. When introducing students to procedure writing, beginning with shapes allow teachers to draw from and build on students' previous learning.

5. Teachers can emphasize the active nature of LOGO by advancing the notion to students that <u>they</u> are in control in that they are "teaching" the computer rather than the computer "teaching" them. To the same end, students should be encouraged to alter LOGO assignments to their liking and to explore and experiment in LOGO without reservation.

6. Pairing students on computers for LOGO activities can be advantageous because it facilitates sharing, consulting and cooperation and encourages students to collaborate in a discovery process to raise questions and to explore solutions.

Specific recommendations for implementing data base applications with elementary students are as follows:

1. Ample time should be planned for students to gather and record data on the entry forms prior to entering the data into the data base.

2. Follow-up training is recommended to reinforce the operations for correcting errors and removing records when students begin to enter data.

3. Visual aids are helpful for reinforcing steps in procedures. For example, charts can be posted in the computer room to outline the steps for editing, saving and removing records.

4. Teachers can create files on topics of interest, curriculum topics or data from personal projects. Students can create dictionaries with data base programs by choosing vocabulary words subjects they are studying. Files can also be created to store and organize students' notes.

5. Collecting information for files presents an opportunity for teachers to introduce basic reference materials and to integrate research skills. Once students become familiar with reference sources and the data base software they can use the computer in preparing research reports.

6. Beyond using data base files for supplementing textbook information, the advantage of using the computer is that students can learn how to use library materials at

their own pace. By meshing the writing capabilities of word processing with the capabilities of the data base program, students can efficiently approach the production of research papers.

The People

Staff Learning

A major part of the activities undertaken in this study entailed working with teachers to bring about more effective utilization of computers in the service of instruction. The Project Researcher reasoned that there would be a group of staff members who would subscribe to the project as a result of being actively involved. The collaborative efforts of people in key positions and other staff members agreeing to the project promised that change could occur to bring about more favorable conditions in which staff development could flourish.

The need was based on the fact that most teachers had no computer courses as part of their preservice training. Moreover, the rapidly increasing technological advances have inhibited teachers from learning things that may become obsolete in the near future.

The study aimed to utilize computers effectively by implementing ongoing provisions to involve teachers in the

whole technological thrust. Staff development represented a viable means to that end. Because the content in computer education is usually focused on mastery issues, educators tend to lose sight of process concerns. The staff development activities were designed with the belief that effective inservice depends on applying principles of good staff development rather than thinking about the "best" model for teacher education in computer literacy (Corwin, 1983, p. 6).

Response to Research Question

"What do teachers need in order to use computers effectively in the service of instruction?"

Barth (1980) suggested that those who want to change schools by changing teachers would do better to address the conditions under which they work (p. 146). Teachers burdened with daily issues of students and changing patterns of behavior seek practical solutions to the real problems they face. Teachers are more likely to embrace innovations when programs are sensitive to their concerns and responsive to their needs. Although teachers may resist learning something that will soon change, they will commit to learning when their needs are addressed and they are actively involved.

It is critical that teachers be involved in the planning and decision-making phases of a program, as well as the selection of program objectives, content and activities. Teachers need evidence of a concrete action plan. Teachers need to know that their input is valuable to that plan and that the feedback they receive accurately reflects their progress. Response from teachers is positive within a climate of mutual trust where they feel respected and valued.

Teachers need opportunities to practice and apply what they learn. Guided practice should precede independent practice. Hands-on experiences must be provided on a relatively consistant basis and teacher training must be individualized to accommodate different learning styles and paces.

Finally, teachers need a forum for communicating with one another. Release time must be provided so that teachers can attend meetings where they can share successes as well as problems. Additionally, meetings provide opportunities for sharing update reports on the plan with participants. Having teachers gather at other schools within the district broadens perspectives, invites fresh dialogue and suggests new ideas.

Conclusions and Recommendations

Designers of staff development programs should

maintain a greater emphasis on process than on content. Creating a synergy necessarily involves participants in the planning and decision-making stages of that process. Based on experiences and insights gained through the staff development activities conducted in this study, the conclusions reached support the views of Rodriquez and Johnstone (1986) who wrote:

> If schools are to increase student achievement, they must stop ignoring the primary source of student learning: teachers . . . . Furthermore, if teachers are to become partners (rather than adversaries) in efforts to create improved learning conditions in our schools, they must be involved in planning, decision-making and goal setting (p. 94).

Although the conclusions support research findings that stress the importance of specificity or focus in training programs (Phi Delta Kappa, 1980), it is equally if not more important to gain the willingness of the individuals to embark on a journey into the unknown.

The Process

Group Connections, Common Mission and Goal Agreement

The process undertaken in this study was guided by principles drawn from literature on school change. As pointed out in the literature review, a major problem in affecting change was that no one group controls enough of

the fabric of education, each group having only a single strand of thread in the whole fabric (Allen & Woodbury, 1970). Change was viewed as a complex process involving the interaction of all groups, taking into account past history, present realities and future goals. Therefore, the critical part of the process involved working with the various groups within the schools. Specifically, it entailed engaging groups in extended dialogue aimed at establishing a sense of common mission and goal agreement in order to build consensus.

Response to Research Questions

"Are there things that connect the various groups within the school and if so, what are they?"

and

"How do the administrators, teachers and paraprofessionals communicate to build a consensus of mission and to attain agreement on a plan of action?"

Given the fact that the individuals in these groups come to the setting from diverse backgrounds with varying needs, and that they operate with different personal and professional priorities, there are, in reality, few connectors across group lines. It is the process itself and the dialogue that takes place when individuals interact in

that process which serve to connect these groups. Those interactions originate communication toward building consensus of mission and gaining agreement on a plan of action.

Conclusions and Recommendations

The following statements are offered in evidence of the steps believed to have contributed to attaining consensus as the process unfolded:

1. Initial dialogue focused on sharing perceptions of the present conditions, identifying problem areas and establishing a general direction for the plan.

2. Dialogue with people in leadership positions, i.e. Superintendent and Principals, served to build support and generate enthusiam for conducting activities aimed at improvement. Their opinions were gathered regarding staff development needs. Principals recommended staff members from their school to serve as participants in the planning and training sessions.

3. Dialogue with FOCUS participants clarified their role in terms of purpose and involved discussions on philosophical and theoretical issues related to computer utilization. Sharing ideas and articulating the group's sense of a sound philosophy of computing served to establish a foundation for the practices to come.

4. Consensus building was fostered through team

building exercises such as having participants set an ideal by brainstorming ideas in small groups for general discussion followed by activities in which teachers analyzed and prioritized needs assessment data. That juxtapositioning of reality to the ideal helped establish a framework for movement.

5. Activities which involved participants in analyzing resistance to change by identifying the forces they viewed as helpful or harmful and those they felt they had the power to influence, served as a springboard for planning concrete steps toward action.

6. During the course of the FOCUS workshops, the Workshop Facilitator informed teachers as to the status of all aspects of the plan and involved them in presentations and planning for their individual schools.

7. Engaging teachers in concrete activities and hands-on experience with the computer served a two-fold purpose. First, it broadened understanding of the subject and improved competencies. Second, it influenced thinking, thereby aiding the process.

Perceptions On Computer Utilization

Students, paraprofessionals, teachers and administrators came to the setting with various perceptions on computer utilization. Students tended to view the

computer as something magical and were basically enchanted as a result of the inundation of video and computer games in the public market place and media.

Because paraprofessionals managed the computer room, loading the computers with prescribed C. A. I. programs, usually of the drill and practice variety, this group had the most experience and direct contact with the equipment. However, the limitations posed by the equipment at the onset of the project did not permit exposure to the more powerful computer applications which would have fostered their actualization of the computer's full potential. This was also true for the teachers. Additionally, only a few teachers had received inservice consisting of about 20 hours of training in BASIC. However, little sense had been conveyed of how that training connected to the existing curriculum or their role in the service of instruction. Generally, teachers felt that they were unprepared to make decisions about computer use with their students.

While the aforementioned groups tended to underestimate the full potential of computers, partly in response to the existing conditions, administrators tended to view the computer as being more powerful in and of itself than was the case. In general, this group saw the use of computers primarily as a way to provide remediation through C. A. I. applications.

Response to Research Question

"What are the planning procedures and processes that enable administrators, teachers, paraprofessionals and students to come to some shared resolution of their varied perceptions on computer utilization?"

In answer to the question posed, the following is offered in summary of the sequential planning procedures adopted in this study which contributed to achieving resolution:

1. Establishing a Planning Committee Key individuals were identified and included as participants in a planning group which reflected cross-section representation. This group established the purpose, uncovered and set the issues. In addition to their own beliefs, they examined the impact of computers on the educational process, the range of computer uses in the past, present and future as well as how computers can be applied to various disciplines.

2. Assessment This procedure examined where the group stood in relation to where they wanted to go. In this phase, the group analyzed the driving and restraining forces in play, identified key people as well as those who might be in opposition, and considered how those individuals might be involved in the planning process.

3. Worksessions Worksessions were conducted composed of a mix of content knowledge and skill, planning methodology and team building activities. Teachers reviewed the major educational strengths of computers and the functions computers can serve through different types of software programs. A variety of hands-on activities were conducted with both guided and independent practice.

4. Developing a Plan Plan development took into account past history, present conditions and future ideals. The master plan combined the individual school-based plans which were intended to serve as projects from which the other schools could adapt. One or more staff members from each school served as liaisons to the Project Director and shared the responsibility with the Principal for implementing the project, monitoring the steps taken toward achieving the objectives and modulating time frames. The components of each school plan included a definition of the task, individuals responsible for each step, what they would do and when they would do it. Expected outcomes were also included as a component of each plan. The final plans for each school were incorporated where possible into the comprehensive district plan for school improvement.

5. Testing the Plan Once the plans were developed, they were tested from bottom-up and from top-down. Revisions were invited from key people not directly involved in designing the plan, people who were concerned about the

issue before it became a plan and people who the group had determined may be in oppostion to the plan. Ultimately, backing for the plan had to be obtained from the final decision maker.

6. Implementing the Plan The planning group for each school assumed the responsibility for overseeing the plan, assuring that activities moved forward and reporting on the status to the project director. In this phase, the Project Director monitored the steps as they were conducted in each school, provided ongoing support, acquired necessary resources and distributed materials when needed. The role of Project Director involved negotiating and striking common chords between various groups, adjusting time frames and seeing that plans flowed as smoothly as possible.

Conclusions and Recommendations

Based on experiences and insights gained from the planning procedures engaged in this study, the following conclusions are supported:

1. In establishing a planning committee, the broader the group, the greater support.

2. Staff development needs must be determined by staffs in individual schools.

3. Constructive interaction among and between administrators, teachers, paraprofessionals and students can foster mutual adaptions toward accomplishing goals.

4. Preliminary workshop activities which involve teachers in examining and setting the issues are important for establishing a framework for understanding.

5. Hands-on experience and practice over a period of time is crucial for reinforcing learning.

6. Support for proposed change can be broadened by incorporating the objectives of an action plan into a district school improvement plan which addresses the needs of individual schools.

7. Individuals at each site should be named for overseeing the school plan with the Project Director assuming responsibility for coordinating and monitoring all phases of the plan and reporting progress.

8. There must be on-site support for school improvement projects.

9. The final decision maker must agree to the need for the plan and endorse the plan once it is developed.

10. Successful implementation of a plan depends on whether or not it incorporates enough flexibility to improvise when unexpected events occur.

11. There is an underlying feeling of powerlessness among teachers, except in a narrow range of management issues over which some teachers seek to compensate. Thus, it is the sense of professional growth and school improvement as evidence of teacher power to affect their environment that is crucial.

Future Implications

Based on the results of activities conducted in the three elementary schools in this study, future staff development efforts should continue to introduce a new computer application in each school annually. This would involve introducing a different application for a different group of teachers. Because different settings dictate different time frames, at any point in time there could be projects in three stages. In the first stage the facilitator would learn the application with some other staff members. The second stage would involve planned workshops with teachers, and the third, implementation with students.

Where teacher turnover and changes in grade level assignments occur, workshops should be conducted every fall with the new teachers that come into each building. These workshops would be offered as introductory workshops to new teachers and would be open to other teachers as refresher sessions. Conducting workshops for new teachers would not only provide training on current computer applications but would also enable program designers to realize the new talent.

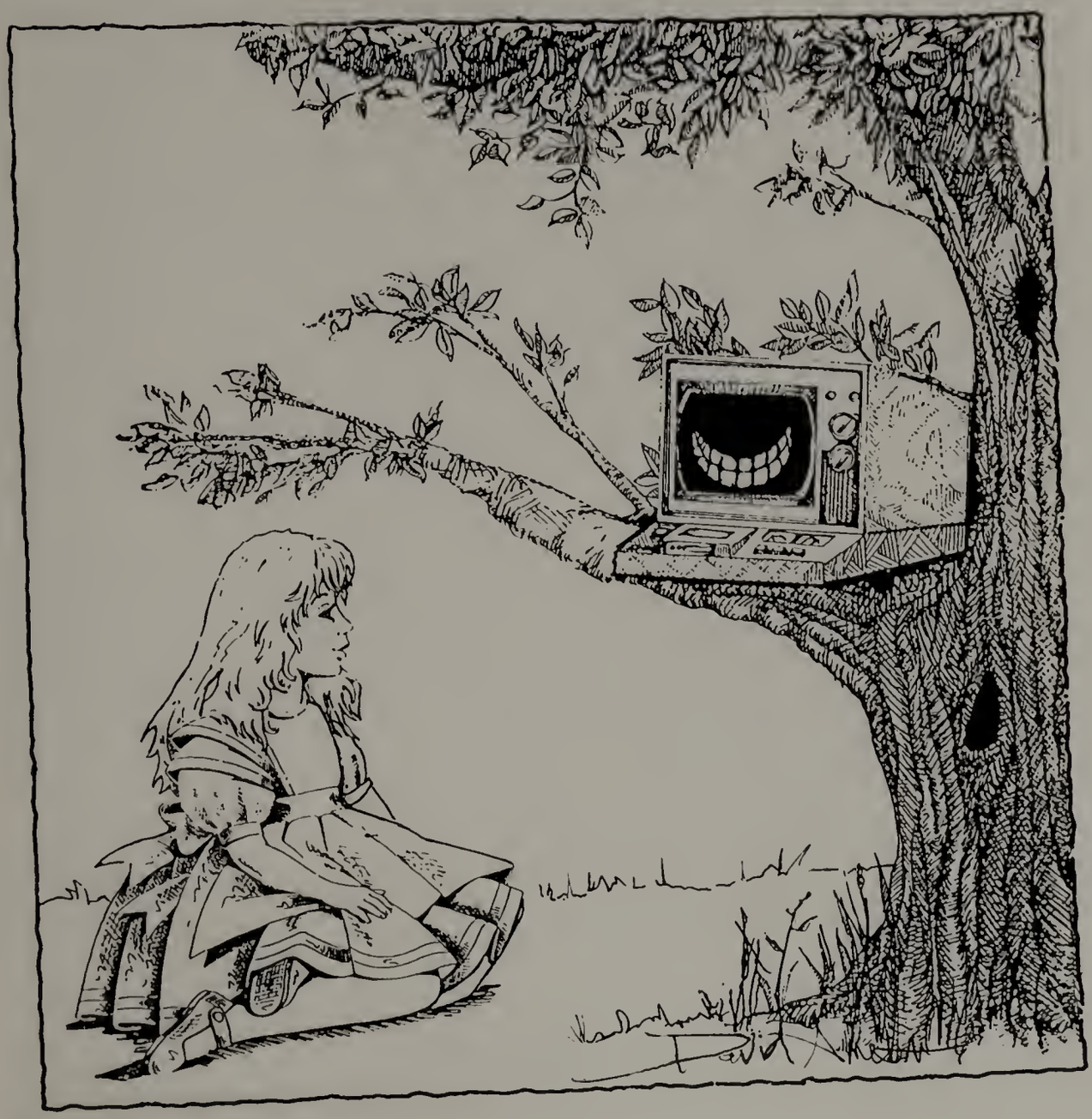
The software applications utilized in this study and other advanced software packages currently on the market

require a large block of time to learn. Based on the nature of the software and the technology that is available, one can expect that it will require at least one hour for every dollar the software cost for teachers to become adept at using and teaching the program. Consequently, the major emphasis in terms of cost and time will be in staff development rather than in the purchasing of hardware and software.

New programs should continue to be introduced in each school based on an assessment of needs and discussions with the principal and interested teachers. Assessment may be conducted with a formal instrument or at school faculty meetings by offering staff several different options for the next year with a majority vote and principal's support determining which projects would be planned.

As generally unpredictable as the future may be, particularly for computers, any number of outcomes are conceivable. The obstacles educators encounter while charting the voyage and journeying the path are ponderous. While those obstacles, predictable and unpredictable, will inevitably present themselves, the treasures will be found in the willingness of adults to successfully enter the child's world of discovery--a wonderland--where the impossible becomes possible, the unreal, real and where the heights of adventure are limited only by the depths of imagination.

Alice said, rubbing her eyes, and addressing the kitten, respectfully, yet with some severity. "You woke me out of oh! such a nice dream! And you've been with me all through the Looking-Glass world. Did you know it dear?" . . . On this occassion the kitten only purred: and it was impossible to guess whether it meant "yes" or "no".



Epilogue

Still she haunts me, phantomwise
Alice moving under skies
Never seen by waking eyes.

Children yet, the tale to hear,
Eager eye and willing ear,
Lovingly shall nestle near.

In a wonderland they lie,
Dreaming as the days go by,
Dreaming as the summers die:

Ever drifting down the stream--
Lingering in golden gleam--
Life, what is it but a dream.

(From Lewis Carroll's Through The Looking-Glass)

References

Allen, D. W., & Woodbury, J. C. (1970). Levers for Change. (Typescript photocopy, School of Education, University of Massachusetts Amherst)

Barth, R. S. (1980). Run school run. Cambridge: Harvard University Press.

Carroll, L. (1871). Through the looking-glass. London: MacMillan.

Corwin, R. (1983). Looking for a model of computer literacy training. Journal of Staff Development: Staff Development for Computer Literacy, 4(2), 6-13.

Crouch, B. (1984). Notebook filer data base program [Computer program]. Lexington, MA: D. C. Heath.

Daiute, C. A. (1983). The computer as stylus and audience. College Composition and Communication, 34, 134-145.

Dog, P. F. (1985). Exciting effects of Logo in an urban public school system. Educational Leadership, 43(1), 45-47.

Kane, J. H. (1983). Computers for composing. (Bethesda, MD: ERIC Document Reproduction Service No. ED 230 978)

Loheyde, K. M. J. (1984). Computer use in the teaching of composition: Considerations for teachers of writing. Computers in the Schools, 1(2), 81-86.

Phi Delta Kappa. (1980). Why do some urban schools succeed? The Phi Delta Kappa study of exceptional urban elementary schools. Bloomington, IN: Phi Delta Kappa.

Rodriguez, S., & Johnstone, K. (1986). Staff development through a collegial support group model. ASCD Yearbook, Staff Development/Organization, 87-99.

APPENDIXES

APPENDIX A

ROOSEVELT PUBLIC SCHOOLS
COMPUTER EDUCATION
NEEDS ASSESSMENT
FOR PRINCIPALS

ROOSEVELT PUBLIC SCHOOLS
MEMORANDUM

To: Principal
School
From: Assistant Superintendent for
Curriculum and Instruction
Date: June 14, 1984
Subject: Computer Education Program

At the June 14 official meeting of the Roosevelt Board of Education, the Superintendent recommended and the Board approved Ruth Rubin as District Director of Computer Education. Ms. Rubin will assume this responsibility on August 20, 1984.

In order to provide Ms. Rubin with the status of the Computer Program in your school, I am requesting that you return this form to me by Wednesday, June 27.

I. Identify three problem areas in your school's present Computer Education Program.

1. _____

2. _____

3. _____

II. Define three goals you wish to achieve in your school's Computer Education Program for the 1984-1985 school year.

1. _____

2. _____

3. _____

III. Provide comments for areas you feel should be addressed immediately in the district' Computer Education Program.

_____

_____

_____

_____

APPENDIX B-1

ROOSEVELT PUBLIC SCHOOLS
Roosevelt, New York

FOCUS COMMITTEE MEETING/WORKSHOP
Theodore Roosevelt School

FEEDBACK ASSESSMENT

October 12, 1984

1. The session as a whole was:

   a. not useful

   b. minimally useful

   c. somewhat useful

   d. very useful

   e. extremely useful

2. I particularly found useful:

   a. Disussion of Computer Utilization Issues

   b. Utopian Thinking Exercises

   c. Needs Assessment Data Sorting

   d. Hands-on with the Computer

   e. Talking with people from other schools

   f. Talking with people in other roles

   g. Other _____

3. In a future session I would like to explore_____

_____

_____

_____

APPENDIX B-2

ROOSEVELT PUBLIC SCHOOLS
Roosevelt, New York

FOCUS COMMITTEE MEETING/WORKSHOP
Centennial Avenue School

FEEDBACK ASSESSMENT

October 26, 1984

1. The session as a whole was:

   a. not useful

   b. minimally useful

   c. somewhat useful

   d. very useful

   e. extremely useful

2. Which of the following from the material covered today should be incoporated into the curriculum for students?

   a. What a computer program consists of

   b. The binary number system

   c. The computer's memory components

   d. Input/Output/CPU

   e. Statement in BASIC (PRINT, INPUT, LET, LIST, NEW and END)

   f. Screen format using comma and semicolon

3. In a future session I would like to explore_____

_____

_____

_____

APPENDIX B-3

ROOSEVELT PUBLIC SCHOOLS
Roosevelt, New York

FOCUS COMMITTEE MEETING/WORKSHOP
Washington Rose School

FEEDBACK ASSESSMENT

November 30, 1984

1. The session as a whole was:

   a. not useful

   b. minimally useful

   c. somewhat useful

   d. very useful

   e. extremely useful

2. Which of the following from the material covered today do you feel should be incorporated into the curriculum for students?

   a. Cursor key functions

   b. Statements in BASIC (GOTO, IF...THEN, REM, strings)

   c. Graphics

3. I particularly found useful:

   a. Cursor key functions

   b. Statements in BASIC

   c. Graphics

   d. Force-Field Analysis

   e. Reviewing material

4. In a future session I would like to explore_____

_____

APPENDIX B-4

ROOSEVELT PUBLIC SCHOOL
Roosevelt, New York

FOCUS COMMITTEE MEETING/WORKSHOP
Theodore Roosevelt School

FEEDBACK ASSESSMENT

February 8, 1985

1. The session as a whole was:

   a. not useful

   b. minimally useful

   c. somewhat useful

   d. very useful

   e. extremely useful

2. I particularly found useful:

   a. Word Processing Techniques

   b. Discussion on Computer Education Plans

   c. Discussion of Hardware Plans

   d. Discussion of Software Plans

   e. Literature on Word Processing

   f. Other _____

3. In future sessions I would like to explore_____

_____

_____

_____

APPENDIX B-5

ROOSEVELT PUBLIC SCHOOLS
Roosevelt, New York

FOCUS COMMITTEE MEETING/WORKSHOP
Centennial Avenue School

FEEDBACK ASSESSMENT

March 1, 1985

I would like your frank assessment of the activities today in order to improve the FOCUS activities and in order to report accurately how this process can be useful.

1. The session as a whole was:

   a. not useful

   b. minimally useful

   c. somewhat useful

   d. very useful

   e. extremely useful

2. I particularly found useful_____

_____

3. In future sessions I would like to explore_____

_____

_____

_____

APPENDIX B-6

ROOSEVELT PUBLIC SCHOOLS
Roosevelt, New York

FOCUS COMMITTEE MEETING/WORKSHOP
Theodore Roosevelt School

FEEDBACK ASSESSMENT

March 15, 1985

I would like your frank assessment of the activities today in order to improve the FOCUS activities and in order to report accurately how this process can be useful.

1. The session as a whole was:

   a. not useful

   b. minimally useful

   c. somewhat useful

   d. very useful

   e. extremely useful

2. I particularly found useful:

   a. Word Processing Review

   b. Working With A Document

   c. School Reporting

   e. Other_____

3. In future sessions I would like to explore_____

_____

4. Open comments:_____

_____

_____

APPENDIX B-7

ROOSEVELT PUBLIC SCHOOLS
Roosevelt, New York

FOCUS COMMITTEE MEETING/WORKSHOP
Theodore Roosevelt School

FEEDBACK ASSESSMENT

June 10, 1985

I would like your frank assessment of the activities today in order to improve the FOCUS activities and in order to report accurately how this process can be useful.

1. The session as a whole was:
   a. not useful
   b. minimally useful
   c. somewhat useful
   d. very useful
   e. extremely useful
2. I particularly found useful:
   a. Discussion on "Why Teach LOGO?"
   b. Exercises with LOGO procedures
   c. Examination of curriculum materials (Computeach)
   d. Other_____
3. If future sessions were to be planned for next school year, I would like to explore_____

_____

4. Open comments:_____

APPENDIX C
SURVEY ON EFFECTS OF WRITING PROJECT

ROOSEVELT PUBLIC SCHOOLS
Roosevelt, New York 11575

To: Grade 5 Centennial Avenue School Teachers
From: Ruth Rubin
Date: December 16, 1985
Re: The "Write" Focus

You have been instrumental in the implementation of the "Write" Focus Project piloted in your school this year. I would like to elicit your assessment and opinions regarding the usefulness of using word processing, specifically the Bank Street Writer as a tool for writing. Based on your experience please rate to what degree you have observed these effects while students were using the word processor:

	Low	Medium	High
1. Revision stages were easily accommodated by the computer.	_____	_____	_____
2. Students were motivated to learn new strategies as a result of ease of revision.	_____	_____	_____
3. Speed of use allowed students to use earlier drafts to explore ideas.	_____	_____	_____
4. Freedom from recopying by hand allowed the writer to focus more on ideas.	_____	_____	_____
5. More attention was given to organizational matters.	_____	_____	_____
6. Helped overcome problems students face in revising, such as the slow and painful act of writing.	_____	_____	_____
7. Eased teachers' job because evaluation decisions were not colored by having to decipher students' work.	_____	_____	_____
8. Response of students to their own work in print was a good motivator.	_____	_____	_____

9. Students had increased pride in the production of their work. _____ _____ _____

10. Peer conferencing was facilitated. _____ _____ _____

11. Increased involement with text may itself have improved writing. _____ _____ _____

Please make any other comments you may have about the process, the project or the product.

_____

_____

_____

_____

_____

_____

APPENDIX D
SURVEY ON EFFECT OF OF LOGO PROJECT

ROOSEVELT PUBLIC SCHOOLS
Roosevelt, New York 11575

To: Theodore Roosevelt LOGO Team
From: Ruth Rubin
Date: December 4, 1985
Re: Assessment of LOGO Pilot Project

As of this date the pilot project "Getting Started With LOGO" has been operational in your school at Grade 3 for a little over ten weeks. Would you please indicate below to what degree you have observed these effects while students were engaged in LOGO activities.

Please rate by placing a check under:

	Low	Medium	High
Enthusiasm, excitement about learning	____	____	____
Sharing, teaching, consulting	____	____	____
Frequency of interaction with peers	____	____	____
Logic, structured thinking, planning	____	____	____
Likableness, sense of acceptance, belonging	____	____	____
Self-confidence	____	____	____
Cooperation, participation	____	____	____
Pleasure in work	____	____	____
Systematic problem solving	____	____	____
Creativity, resourcefulness	____	____	____
Spelling, writing	____	____	____
Concentration, memory	____	____	____
Motivation	____	____	____
Attention to detail	____	____	____
Use of quantitative relations, math	____	____	____
Decrease in boredom	____	____	____
Altruism, prosocial behavior	____	____	____

Level of achievement	____	____	____
Rate of learning	____	____	____
Decrease in isolation, shyness, passivity	____	____	____
Playfulness, curiosity	____	____	____

(Effects were borrowed from a research tool used in the St. Paul Public Schools to assess the impact of a LOGO project on their students. Taken from Educational Leadership, Exciting Effects of Logo in an Urban Public School System, Pete Fire Dog, September 1985.)

APPENDIX E
SURVEY ON EFFECTS OF DATA BASE PROJECT

ROOSEVELT PUBLIC SCHOOLS
Roosevelt, New York 11575

To: Grade 4 Teachers, Washington Rose School
From: Ruth Rubin
Date: January 15, 1986
Re: Project "Notebook"
Social Studies and Computer Date Bases

You have been instrumental in the implementation of the social studies computer project with data bases, Project "Notebook", in your school this year. I would like to elicit your assessment and opinions regarding the usefulness of using a data base, specifically the D. C. Heath "Notebook Filer" as a tool for organizing and managing information in social studies.

Based on your experience please rate to what degree you have observed on effect on the following while students were using the data base program.

Please rate by placing a check under:	Low	Medium	High
Sharing, teaching, consulting	____	____	____
Frequency of interaction with peers	____	____	____
Logic, structured thinking, planning	____	____	____
Self-confidence	____	____	____
Cooperation, participation	____	____	____
Pleasure in work	____	____	____
Spelling, writing	____	____	____
Concentration, memory	____	____	____
Fostered skill in gathering data	____	____	____
Fostered skill in manipulating data	____	____	____
Motivation	____	____	____
Attention to detail	____	____	____
Enthusiasm, excitement about learning	____	____	____

Please make any additional comments regarding the project.

SELECTED BIBLIOGRAPHY

Allen, D. W., & Woodbury, J. C. (1970). Levers for Change. (Typescript photocopy, School of Education, University of Massachusetts Amherst)

Bakon, C., Neilson, A., & McKenzie, J. (1983). Computer fear. Educational Leadership, 41(1), 27.

Bank Street College Project in Science and Mathematics (1985). Voyage of the Mimi. New York: Bank Street College of Education.

Barth, R. S. (1980). Run school run. Cambridge: Harvard University Press.

Becker, H. J. (1983, September). How schools use microcomputers. Classroom Computers, 40-44.

Bloom, B. S., & Broder, L. (1950). Problem-solving process of college students. Chicago: University of Chicago Press.

Bloom, B. S. (1976). Human characteristics and school learning. New York: McGraw Hill.

Blumberg, A. (1980). Supervision & teachers: A private cold war. Berkeley, CA: McCutchan.

Bork, A. (1986, April). Computers in the future of our schools. School Administrator, pp.23-24.

Bronfenbrenner, U. (1979). The ecology of human development: Experiments by nature and design. Cambridge: Harvard University Press.

Bruner, J. S. (1960). The process of education. Cambridge: Harvard University Press.

Bunker, R. M., & Hruska, M. (1982). School based staff development: Definitions, documents, & directions (Worcester Public School Staff Development Project). Amherst: University of Massachusetts, School of Education.

Burns, M., & Galen, J. (1985). Activity book for the Bank Street Writer. New York: Scholatic.

Carpenter, T. P., Corbitt, M. K., Kepner, H., Lindquist, M. M., & Reys, R. E. (1980). Problem solving in mathematics: National assessment results. Educational Leadership, 37(7), 562-563.

Carroll, L. (1985). Alice's adventures in wonderland. London: MacMillan.

Carroll, L. (1871). Through the looking-glass. London: MacMillan.

Cogan, M. L. (1973). Clinical supervision. Boston: Houghton Mifflin.

Collier, R. M. (1983). The word processor and revision strategies. College Composition and Communication, 34, 149-155.

Comer, J. P. (1980). School power: Implications of an intervention project. New York: Free Press.

Corwin, R. (1983). Looking for a model of computer literacy training. Journal of Staff Development. 4(2), 6-13.

Crouch, B. (1984). Notebook filer data base program [Computer program]. Lexington, MA: D. C. Heath.

Daiute, C. A. (1983). The computer as stylus and audience. College Composition and Communication, 34, 134-145.

Dog, P. F. (1985). Exciting effects of logo in an urban public school system. Educational Leadership, 43(1), 45-47.

Elliott, P. C. (1974). Elementary mathematics teacher training via A Programming Language. (Doctoral dissertation, University of Massachusetts, 1973). Dissertation Abstract International, 35, 297A.

Eisner, E. W. (1984, March). Can educational research inform educational practice? Phi Delta Kappan, pp. 447-452.

Gentry, A. A., Jones, B. L., Peelle, C. C., Phillips, M., Woodbury, J. C., & Woodbury, R. L. (1972). Urban education: The hope factor. Philadelphia: Saunders.

Goodlad, J. (1984). A place called school. New York: McGraw Hill.

Grammer, V. C., & Goldenberg, E. P. (1984). The Terrapin Logo language [Computer program manual]. Boston: Terrapin.

Gray, J. L., & Storke, F. A. (1984). Organizational behavior concepts and applications (3rd ed.). New York: Charles E. Merrill.

Harris, B. M. (1980). Improving staff performances through inservice education. Boston: Allyn & Bacon.

Hechinger, F. M. (1984, April 3). Scholar harshly criticizes educational research. New York Times, p. 45.

Huse, E. (1980). Organizational development and change. St. Paul, MN: West.

Jones, B. L. (1972). Change and institutional racism. In B. L. Jones (Ed.), Urban education: The hope factor (pp. 83-124). Philadelphia: Saunders.

Jones, B. L. (Ed.) (1983, January). A Report on Roosevelt Public Schools: Strengths and Potential Improvements. (Available from the School of Education, University of Massachusetts Amherst)

Kane, J. H. (1983). Computers for composing. (Bethesda, MD: ERIC Document Reproduction Service No. ED 230 978)

Kulik, J. A. (1983). Synthesis of research on computer based instruction. Educational Leadership, 41(1), 19-21.

Kusmiak, G., Riggs, G., Smith, F. E. (1984). Bank street writer [Computer program]. San Rafael, CA: Broderbund.

Leacock, E. B. (1961). Teaching and learning in city schools. New York: Basic Books.

Levine, G. (Ed.). (1985). Computeach LOGO strand K-6. (Available from East Ramapo Central School District, Spring Valley, NY)

Lewin, K. (1947). Frontiers in group dynamics. Human Relations, 1, 5-42.

Lipkin, J. (1983). Equity in computer education. Educational Leadership, 41(1), 26.

Lipsky, M. (1980). Street level bureaucracy: Dilemmas of the individual in public services. New York: Basic Books.

Loheyde, K. M. J. (1984). Computer use in the teaching of composition: Considerations for teachers of writing. Computers in the Schools, 1(2), 81-86.

Maddux, C. D. (1984). The educational promise of logo. Computers in the Schools, 1(1), 79-89.

Malcom X. (1966). The autobiography of Malcom X. New York: Grove Press.

Massachusetts Institute of Technology (1981). Terrapin Logo [Computer program]. Boston: Massachusetts Institute of Technology.

McLauglin, M. W., & Marsh, D. D. (1978). Staff development and school change. Teachers College Record, 80(1), 69-94.

Miller, S., & Thorkildsen, R. (1983). Getting started with LOGO. Allen, TX: Developmental Learning Materials.

Murphy, R. K. (1984). School Use of Microcomputers and its Impact on Minorities: A Paralysis of Analysis.

Nash, R., & Durcharme, E. R. (1983). Where there is no vision, the people perish: A nation at risk. Journal of Teacher Education, 34(4), 38-46.

New York State Commissioner's Office. (1985). New York Commissioner's Regulation Report. (Part 100). Albany, NY: Department of Education.

New York yesterday and today. (1985). Morristown, NJ: Silver Burdett.

Nova, (Public Broadcasting Station). (1983, October). Talking turtle [Science broadcast]. New York.

Papert, S. (1980) Mindstorms. New York: Basic Books.

Phi Delta Kappa. (1980). Why do some urban schools succeed? The Phi Delta Kappa study of exceptional urban elementary schools. Bloomington, IN: Phi Delta Kappa.

Practical Applications of Research. (1982). A Newsletter of Phi Delta Kappa's Center on Evaluation, Development, and Research.

Radio Shack (1979). Scripsit word processing system training program. [Computer program]. Fort Worth, TX: Tandy Corporation.

Robinson, G. E. (1985). Effective schools research: A guide to school improvement. Concerns in Education (February Report). Arlington, VA: Educational Research Service.

Rodriguez, S., & Johnstone, K. (1986). Staff development through a collegial support group model. ASCD Yearbook, Staff Development/Organization, 87-99.

Rutter, M., Maughan, B., Mortimore, P., Ouston, J., & Smith, A. (1979). Fifteen thousand hours. Cambridge: Harvard University Press.

Sarason, S. B. (1972). The creation of settings and the future societies. San Francisco: Jossey Bass.

Sarason, S. B. (1982). The culture of school and the problem of change. (2nd ed.). Boston: Allyn & Bacon.

Watts, D. (1982). Education for citizenship in a computer-based society. In Computer Literacy (p. 59). New York: Academic Press.

Whimbey, A. (1980). Students can learn to be better problem solvers. Educational Leadership, 37(7), 560-565.

Wilson, M. A. B. (1983). Teachers, microcomputers and inservice. Journal of Staff Development: Staff Development for Computer Literacy, 4(2), 80-92.

Wilson, W. J. (1980). The declining significance of race. Chicago: University of Chicago Press.

Wood, F. H., Thompson, S. R., & Russell, F. (1981). Designing effective staff development programs. In Staff Development/Organization Development (pp. 59-89). Alexandria, VA: Association for Supervision and Curriculum Development.

Zigarmi, P., & Corwin, R. B. (Eds.). (1983). Journal of Staff Development: Staff Development for Computer Literacy, 4(2), 3-4.