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ABSTRACT

This practicum was designed to integrate the use of computers into the curriculum of a ninth-grade interdisciplinary science academy through staff development and a management plan dealing with division of time and space. Inservice training in the areas of computers and interdisciplinary planning were provided and a management plan for students and teachers formed the nucleus of the academy's plans for the year. Staff development activities over 15 days covered technology and interdisciplinary curriculum planning and used a series of templates for lesson planning and classroom management. Lesson planning forms and student study sheets were shared with other staff members. Analysis of the data revealed that teachers were satisfied with the amount of training they received in incorporating the use of computers into a series of interdisciplinary projects based on the Secretary's Commission on Achieving Necessary Skills (SCANS) competencies. In spite of setbacks having to do with network management and technical difficulties, teachers succeeded in integrating computers into their classes. Students reported that they found the use of study sheets useful in their academic classes, especially for group projects. (Contains 37 references.) (Author/SWC)

Integrating Computers into an Interdisciplinary Ninth Grade Science-Centered Academy

by
Marlene Murray
Cluster 66

A Practicum I Report presented to
the Ed.D Program in Child and Youth Studies
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

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APPROVAL PAGE

This practicum took place as described.

William Renuart

Verifier: Dr. William Renuart

Principal

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Miami Beach High School, Miami Beach, Florida

January 15, 1996

Date

This practicum report was submitted by Marlene Murray under the direction of the advisor listed below. It was submitted to the Ed.D. Program in Child and Youth Studies and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

Approved:

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Date of Final Approval of Report

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Abstract

Integrating Computers into an Interdisciplinary Ninth Grade Science Academy. Murray, Marlene R., 1996; Practicum Report, Nova Southeastern University, Ed.D. Program In Child and Youth Studies. Secondary/Restructuring/ Interdisciplinary/Academy/Computers/Staff Development/Science/SCANS

This practicum was designed to integrate the use of computers into the curriculum of a ninth grade interdisciplinary science academy through staff development and a management plan dealing with division of time and space. In service training in the areas of computers and interdisciplinary planning were provided and a management plan for students and teachers formed the nucleus of the academy's plans for the year.

The writer arranged for fifteen days of staff development in the area of technology and interdisciplinary curriculum planning and developed a series of templates for lesson planning and classroom management. Lesson planning forms and student study sheets were shared with other staff members.

Analysis of the data revealed that teachers were satisfied with the amount of training they received in order to incorporate the use of computers into a series of interdisciplinary projects based on SCANS competencies. In spite of setbacks having to do with network management and technical difficulties, teachers integrated the use of computers into their classes. Students reported that they found the use of study sheets useful in their academic classes, especially for group projects.

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Chapter 1: Introduction

Description of Community

The work setting is a large, multicultural, urban high school in the southeastern United States situated in the fourth largest school district in the country. The school system has six regional feeder patterns for 24 high schools. The writer's school, with a population of 2600 students in grades 9 through 12, has a staff of 150. The community ranges from lower to upper middle class with a diverse economic, occupational, cultural and educational background.

Students attend school half a mile from one of the fastest growing international arts communities in the world. In the past few years, there has been a proliferation of galleries, theaters, film and recording studios. The community attracts fashion photographers as well as film and television producers of American, European and Latin American shows. There is abundant opportunity for lucrative employment for students who become skilled in the arts.

Travel and Tourism has been the biggest industry in the community for the past 40 years. Many students work part time at hotels and restaurants. Those who are part of the school's Travel and Tourism Academy find promising careers in convention planning, hotel or restaurant management and travel.

Members of the community are actively involved in various programs within the school. It is affiliated with a large adult education program on site and several satellite programs in the community. The facility is in operation 12 months of the year from 7:30 A.M. through 10:30 P.M., including an after-school

and Saturday tutorial program through the parent outreach center of Bright Horizons.

Bright Horizons is a branch of the Full Service School which is a joint school and community program divided into the areas of health, education, and social service, created to meet the needs of the feeder pattern. Parents and members of the feeder pattern can come to the school for financial and family counseling, health-related problems, legal and social services. This link with the community serves to involve parents and others who want to participate in school programs and activities.

Writer's Work Setting

The writer's school has a multicultural population. Five years ago the entire minority population comprised approximately 40% of the student body. In 1994-95, the population grew to 59% Hispanic, 23% Black, 17% White Non-Hispanic, and 1% other, representing students from 69 countries. First generation immigrants make up 59% of the student body. The district lists 40% of the school's students as being "at risk." The school's mobility rate is 57.4%, (21% above the state average). Standardized test scores reflect the high mobility rate, being lower than county and state averages.

The school seeks to provide for the instructional needs of its diverse population. The gifted program is a separate department with classes for gifted students in language arts, mathematics, science and social studies. The special education department meets the needs of students with learning disabilities by providing core course instruction.

In an effort to personalize education for its students, the school is in the process of forming several schools-within-the-school called academies. An extensive English for Speakers of Other Languages (ESOL) academy has been formed for Limited English Proficient (LEP) students with abilities ranging from third grade level to high school honors classes. The Tech Prep program is a broad career-focused group of academies in health, business, child care, media, tourism and agriculture designed for the middle majority of students. An academy for at-risk students is based on a Josten computer program in language arts, social studies, mathematics, science and social studies that can lead to a regular or General Education Diploma.

The school is restructuring its curriculum through the use of technology. As members of the Southern Regional Education Board's High Schools That Work, Tech Prep and School-to-Work, the staff is building a technically enhanced curriculum that will prepare students to enter the next century's competitive work force.

A five-year technology plan calls for actively seeking grants to equip the school with hardware, software and teacher training in computer technology. In 1993, the school received a $180,000 technology grant. The money was spent to buy hardware and software to place four computers equipped with Josten's competency-based program in ninth and 10th grade English classes and in mathematics. A third of the money was spent on staff development in the area of technology and curriculum restructuring. Funding from a Cuban-Haitian grant in 1993 equipped the ESOL academy with computers and the Josten ESOL

computer program to assist students with English in order to enter the regular diploma courses.

Carl Perkins funding has added new computers in the business department. These computers are used to teach an introductory, interdisciplinary course in computers and career awareness; as well as various business courses for Tech Prep majors in office practice, international business, desktop publishing and computer technology.

Through Tech Prep, the science department has been equipped with two technology labs for a course in Principles of Technology and Pre-engineering.

A three-year Federal grant in 1994 funded a $102,000 interdisciplinary science program for ninth graders. Classes began in the fall of 1995 with four computers in the English and mathematics classes and computer labs in the introductory computer and careers classes. In 1996, four computers will be added to one of the science academy classes.

Other areas of the school have also been equipped for technology. In 1994, the Full Service School's Bright Horizons lab received a grant to fund a lab with ten computers serving students, their parents and members of the feeder pattern. In 1995, the Josten Learning Corporation funded the student at-risk academy with 90 computers.

The curriculum is being restructured so that teachers will become facilitators of broad-based learning instead of relying solely on textbooks. In order to provide the time for competency-based, authentic assessment, flexible scheduling has been adopted. Classes meet Monday, Tuesday and Friday for

one hour. Periods one, two and three meet on Wednesday; and periods four, five and six meet on Thursday for two hours. Teachers are encouraged to participate in staff development activities. In 1994-95, 97% of the faculty participated in workshops and activities oriented toward the use of technology to coordinate communication and to fundamentally transform the role of the teacher as the primary disseminator of information. Teachers are becoming guides and participants in a student-centered classroom.

Staff and students affected by this proposal included a team of ninth grade teachers, 210 students in grade 9, the assistant principal for curriculum (APC) and a team of technical support personnel.

The teachers involved in the proposal included a team of ten teachers in English, mathematics, social studies, science and computers. Two English and one mathematics teacher were in rooms with four networked computers equipped with the Josten Competency Based Learning System. Two business teachers taught introduction to keyboarding and careers in a computer lab equipped with twenty-five computers. Two biology teachers and two social studies teachers and one mathematics teachers of the team did not have classrooms equipped with computers. Training for members of the team included state, district and local conferences and workshops.

Students involved in the proposal were incoming ninth graders from a feeder pattern middle school who had not had access to computers in their core curriculum classrooms. One third of the students were in honors classes, and two thirds were in regular classes. Limited English Proficient (LEP) students

and special education students were not involved in this project during the first year.

In August, 1995, the team met for four days to plan an integrated, interdisciplinary project having to do with mathematics and science in a variety of careers. Modified block scheduling facilitated the interdisciplinary approach. Students' time was more flexible, and they were able to work on the same project during the course of their day's classes.

The Assistant Principal for Curriculum (APC) played an active role in restructuring the curriculum for technology. Seeking grants, reorganizing the curriculum into academies, scheduling faculty and students, and coordinating staff development for the ninth grade academy team were the APC's responsibilities.

The technical support personnel included the department chair of Bright Horizons, the media center personnel and the computer oversight team. The media personnel included one librarian, a TV studio production teacher and a TV technician who helped students with research and technical assistance in project production. The computer oversight team, consisting of volunteers from the faculty with knowledge of computers, helped teachers with technical computer problems and ways of integrating technology into the curriculum.

Writer's Role

The writer's position in the school was that of School-to-Work project specialist. In the proposal, the writer's role was that of project director for a Federal grant for the ninth grade interdisciplinary academy of science. As

assistant to the APC, duties included writing grants, designing the interdisciplinary curriculum and scheduling teachers and students involved in the ninth grade science academy. Coordinating staff development activities was another area of the writer's job. The writer made arrangements for members of the staff to participate in School-to-Work, Tech Prep and High Schools That Work conferences and computer workshops. The writer made sure that representatives from the faculty had the opportunity to attend restructuring workshops sponsored by the school district on topics such as flexible scheduling, interdisciplinary curriculum planning.

Serving as a liaison between members of the science academy and the school technology committee was another facet of the writer's responsibility. Teachers involved in the academy ranged from computer novices to computer experts who wanted to learn more about multimedia applications and telecommunications. The writer facilitated the operation of computer-assisted instruction (CAI) so that students have the opportunity to use computers for learning and the design of interdisciplinary, multimedia projects.

Chapter II: Study of the Problem

Problem Statement

Staff development in the school has addressed issues of restructuring such as computer training, hands-on methodology and authentic assessment, but not how to set up and manage computers in the classroom. In short, the problem was that computers in the classroom are new; and teachers did not know how to integrate them into what they teach.

Problem Description

Teachers in the ninth grade science academy are expected to use the Josten Competency Based Learning Program in mathematics and language arts. They have to master a complicated network management system, keep it in operation, and schedule students to use it. They had to change the way they have been teaching and essentially develop a whole new curriculum based on science and technology.

Presently, the school does not have an adequate management system for new technology. Although the school is looking for someone to oversee all aspects of technology and network maintenance, only one teacher has been released from three classes per day to be in charge of setting up and maintaining new systems. Twenty-eight computers to be networked for mathematics and language arts classes arrived in April of 1995, and are finally hooked up, but not all of the ninth grade students have logged in any computer time. Representatives from Josten were responsible for the initial set up of their system, but they are not on site when things go wrong.

The existing means of dealing with technology requires time volunteered by teachers with a knowledge of computers who serve on a technology committee. They do not, however, have time to help the ninth grade science academy teachers on a daily basis if network problems occur.

Teachers' personal familiarity with computers ranged from novice to proficient, but only the computer teachers in the science academy have had experience integrating computers into the curriculum for student use. Even the most up-to-date content area text books give only passing reference to the use of computers in the curriculum. The school has very little material for using computers in content area classrooms.

Teachers' classrooms will eventually be equipped with two to four computers, yet their teaching load is at least thirty five or more students. It is their job to make sure that all students in the class have equal access to the computers. In order to do that, they have to divide their students into groups that are not engaged in the same activities. Teachers have never had to organize their classes so that some students are using the computers while others are engaged in other activities. Traditional lesson planning formats are inadequate for managing several activities at once.

Problem Documentation

The School Improvement Plan (SIP) for 1995-96 identifies five school-wide problems that need to be addressed and suggests goals, methods and means of evaluating results (see Appendix A). Problems identified in the SIP parallel those of the writer's plan. Improving achievement in communications

and mathematics, increasing teachers' use of computers in the classroom, and improving performance of ninth grade students in science through increased use of technology were four of the five goals addressed in the 1995-96 school improvement plan.

Evidence that the problem exists was found by interviewing teachers regarding current practices. Only the language arts and computer teachers had had experience in interdisciplinary teaching during last year, and their curriculum was not focused on science. Teachers expressed concern that they did not know how to include other disciplines into their teaching and still accomplish the goals of their own subjects.

A preliminary survey of the ten teachers involved in the ninth grade science academy indicated that only four currently used computers in the classroom (see Appendix B). Five of the teachers used computers to some degree for lesson planning or grading. The four novices expressed a willingness to learn more about computers.

Interviews with teachers of the new ninth grade science academy indicated the need for time and assistance to develop a new technology-based integrated curriculum. Grant funds paid for a week of planning prior to the beginning of the 1995-96 school year. Teachers also had the opportunity to attend conferences and other staff development activities in their fields, but they were still faced with the management problems inherent in using computers in the classroom.

Further evidence that teachers needed a plan for computer management was found by examining the lesson plans of content area teachers which reflected a traditional, whole-group approach to teaching. Teachers relied heavily on a single textbook as the primary means of instruction. While most of the teachers had assigned group or individual projects to their classes, objective tests were the major means of assessment in mathematics, social studies and science. Content area teachers did not require written compositions on a regular basis. They had to devise ways of dividing class time and space so that some students were working at computers while others were engaged in different activities.

Another indication of the problem was that computers to be used by teachers and students in the 1995-96 science academy had not been networked or equipped with software and were used 0% of the time as interdisciplinary teaching tools. At the end of the 1994-95 school year, only 5 of the 28 computers purchased from the technology grant were being used at all.

Causative Analysis

Causes of the problem stemmed from the fact that technology has become available only recently to the school, and there is no precedent for its management. No teachers of core subjects had ever had the opportunity to integrate a computer network into the classroom. When they did, teachers did not have access to enough computers for every student in the class.

Whole-group teaching does not foster application of knowledge to real-world, interdisciplinary situations and problems. Teachers have had exposure to

student-centered methods, but eight of the ten teachers interviewed said they rarely organized more than one activity at a time during a class. They had not been given enough time to plan a whole new curriculum.

The new generation of learners is visually oriented. Textbooks are becoming impediments to learning. Supposing that teachers are willing to make major changes, there is no ready-made material for a new curriculum. State and district policies regarding textbook funding require that at least 50% of available funds be spent on state-adopted materials. The state has not adopted very much in the way of technology-based, interdisciplinary science material.

Management of technology is a district-wide problem. There is not a structure in place to supply schools with network and technical managers. The school is creating a position for a network manager, but even when one is hired, that person's priorities will be focused on the school as a whole. This has caused the science academy to find ways of keeping its system in operation with little outside help.

Relationship of the Problem to the Literature

A review of the literature on the use of computers in the classroom confirmed that the problems of this site are typical of any school that is restructuring for technology. Management of hardware and software requires the creation of new positions within the school system (District of Columbia Public Schools, 1982; Christensen, 1983). There is a management problem in keeping track of all the equipment, disks, and manuals, as well as getting the

whole class booted up at once, and dealing with equipment failures (Wiske, et al., 1988).

Ragsdale, (1983) suggests that there are two major problems in implementing technology into the classroom. The first is the necessity for a design of how the program will function when it has been fully implemented, including all equipment and other associated materials and procedures. The second is that there must be a strategy for proceeding to this ultimate objective, from the currently unorganized activity, in an effective management system.

Teacher training is a major factor in the successful implementation of technology in the classroom. (Chambers, Mullins, & Burrows,1994; Christensen, 1983). Overcoming anxiety about the use of computers in the classroom is the first step. (Becker, 1986; Vickers, 1988). Motivation to put in the amount of time and effort necessary to be proficient in the use of computers is also important. (Wiske, et al.,1988). Learning how to use computers and learning how to teach using them can take up to six years. (Becker, 1986; Vickers, 1988; Wiske, et.al., 1988).

Those who study restructuring efforts consistently single out time as essential to success. Teachers need time to practice computer skills related to basic word processing, databases and record keeping activities. (Leonard & LeCroy, 1988). Integrating technology into the curriculum will require time and training beyond basic knowledge of computers. (Ehrlich & Reynolds, 1994). "The schools that have made greatest progress are those that, early on, provided time for teachers to meet" (Sandholtz, 1992, p.314).

Transformation, the changing of assumptions and development of common goals and directions takes strategic planning time, not just add-on hours at random workshops (McCune, 1986). Yee & Kirst (1994) stress that without interdisciplinary planning time for teachers, commitment from the administration and structural adjustments in the school, most teachers will continue to depend on textbooks, and classes will be taught in much the same as they were before.

The curriculum will be altered by the introduction of computers into the classroom (Chambers, Mullins, & Burrows,1994). Textbooks as the exclusive teaching tool are becoming ineffective. They are difficult and boring to most students because multi-syllabic, incomprehensible terms must be learned in relation to concepts that are also unfamiliar and difficult (McNeil, 1987). Teachers and students spend precious class time acquiring elementary vocabulary; and learning usually remains in the lower level of thinking skills, focusing on basic comprehension. They never get to what the information has to do with the real world or skills that students will need in order to pursue a career (Zemelman, Daniels, & Hyde, 1993).

Marshal McLuan predicted that the medium is the message; and Neil Postman (1985) elaborates, "From painting to hieroglyphics to the alphabet to television-- each medium, like language itself, makes possible a unique mode of discourse by providing a new orientation for thought, for expression, for sensibility" (p.10). New models of instruction will require extensive commitments for professional development, since new roles for teachers as guides rather than

as authorities challenge existing classroom practices (Sheingold, & Tucker, 1990).

Lack of time and pressure to "cover the curriculum" make it difficult for teachers to incorporate technology into their classes. Whole-group teaching of unconnected subjects cannot accommodate application of knowledge to real-world situations, so teachers are at a loss to include this necessary component of learning into their plans. (Riedl, 1995). Lecturing should be replaced by small group activities and individualized instruction. (Wiske, et al.,1988). Dividing the class so that all students have equal access to a limited number of computers requires small group rather than large group instruction and management of independent study. (Bruder, Buchsbaum, Hill & Orlando, 1994).

Causes of the problem found in the literature relate to management of technology, curriculum and personnel. Attitudes about using technology keep teachers from incorporating technology into the classroom. (Vickers, 1988; Wiske, et al., 1988). Some teachers fear negative social and educational effects of the computer in the classroom, that students might turn into automatons (Becker, 1986). Some teachers experience anxiety if they feel that the students know more about computers than they do (Vickers, 1988). Other teachers feel that they might lose control or be in competition with computers. Something that some teachers do not want to admit is that computers break down barriers of communication, and those who do not want those barriers broken do not feel comfortable with computers. (Wiske, et.al., 1988). Some teachers have a basic

fear or distrust of machines, so in service training and talking with teachers who use computers do not do any good (Wiske et.al., 1988).

Another cause of the problem is that teachers do not have a system for managing computers (Bean, 1988; Wiske, et al.,1988). They had a whole set of problems to deal with before, and introducing the management of computers causes other problems (Ragsdale, 1983).

According to Becker (1993), teachers have been using technology mostly for rote purposes and not in support of real problem solving by students. Teachers who have not used problem solving assessment as a means of instruction in the past might find ways to treat the computer as an electronic babysitter (Becker, 1986). Teachers are also unwilling to give up text books that are incomprehensible and boring to most students because multi-syllabic, incomprehensible terms must be learned in relation to concepts that are also unfamiliar and difficult (McNeil, 1987).

Early literature on the subject of computers in the classroom mostly dealt with programming and computer literacy, while later materials focused on the computer as a tool of learning in all subject areas. (Chambers, Mullins, & Burrows,1994).

Computer classes can best help students if they are learning to use computers for a purpose relating to their other subjects. (Vickers, 1988; Wiske, et al., 1988). The research of Rutherford & Ahlgren (1988) supports the connection of an interdisciplinary science curriculum and technology. Science can be a connection to social issues. Students should study the connection of

science to such areas as agriculture, medicine, transportation, communications and other aspects of the world.

Roth's (1989) research indicates that changes in the science curriculum need to be focused on helping students think scientifically rather than on memorizing facts. A curriculum based on conceptual change and problem solving is proposed rather than the traditional teaching of facts from a large body of knowledge. Simulations enhance the curriculum of science. (Kozma, 1991). When graphing, the use various sensors such as temperature probes help students connect abstract concepts with the real world. In physics, students can use the computer to create models using pulleys, springs, etc. to perform experiments.

Computers in language arts facilitate the writing process. (Christensen, 1983; Lawrence,1994; Mageau, 1992; Vickers, 1988). The computer should be used as a tool for word processing and manipulation of data rather than just an add-on for drill and practice. (Doerr, 1979). Students are much more likely to edit and revise their work when they are able to use the cut and paste functions of the computer. Teams of students involved in group problem solving can share computers (Watson, 1992). Group term papers using computers have been found successful, especially for average students.

Teachers can make better use of time for helping students when teams are working independently. Different kinds of meaningful, independent study activities can occupy students not using the computer or interacting directly with

the teacher. Peer editing in small groups using the computer is powerful (Mageau, 1992).

Computers in other subjects are used in similar ways. In social studies, simulations help students understand complex economic systems (Vickers, 1988) and deal with social and moral issues (Kozma, 1991). In mathematics class, the computer puts learning into a real-world context in which students "do" mathematics (Eiser, L. 1994). CAD programs are being used in art and MIDI synthesizers in music (Vickers, 1988).

Chapter III: Anticipated Outcomes and Evaluation Instruments

Goals and Expectations

The goal of this practicum was to facilitate the use of computers as an interdisciplinary tool by teachers and students in the ninth grade science academy. The academy provides the opportunity for students who have not traditionally succeeded in science and mathematics (particularly women and minority students) to experience an interdisciplinary, problem-based core curriculum with attention to individual needs and learning styles. Students and teachers worked in a computer-based, simulated learning environment or "microworld" for integrating science, mathematics, social studies and English.

Staff development for this project promoted enjoyable, useful learning about technology in the classroom in cooperation with a faculty technology team. Teacher work stations were provided to encourage participation and training of staff in the use of a Local Area Network (LAN) for communication with staff, students and parents. Teachers began the construction of a shared database of teacher-made tests and curriculum materials.

Expected Outcomes

To facilitate the use of computers as an interdisciplinary tool by teachers and students in the ninth grade science academy, and from evidence found in the literature, the following outcomes were projected for this practicum:

1. Eight of the ten ninth grade teachers involved in the science academy will be using computers in their classrooms 50% of the time by the end of the implementation period. The baseline for this outcome is 0% since the network has not yet been connected.

2. Post-implementation surveys completed by the ten ninth grade science academy teachers (see Appendix C) will indicate that eight of ten teachers will express satisfaction with the amount of assistance that is provided for the development of technology-based, interdisciplinary curriculum.

3. Lesson plans of ten out of the twelve ninth grade science academy teachers will reflect the use of the writer's management plan for integrating computers into an interdisciplinary curriculum during eight of the twelve weeks of implementation.

4. Samples of student work from the classes of eight out of the ten teachers involved in the ninth grade science academy would reflect the use of computers as a tool in an interdisciplinary project.

5. A log of computer use during the implementation period will indicate that 80% of the 210 grade 9 science academy students log 10 total hours of computer time per week in their combined academy classes by the 10th week of implementation. Students using the Josten computer program in language arts and mathematics would be automatically monitored by the program's management system. Computer time for other purposes will be reported by the teachers on a log.

6. Post-implementation surveys concerning the effectiveness of the management of whole-group, small-group and individual activities as expressed by teachers and students will show an average gain of 30% in the level of satisfaction.

Measurement of Outcomes

The means of measuring the projected outcomes of this proposal were as follows:

1. In order to measure the amount of time teachers planned for computer use, the weekly lesson plans of those teachers who volunteered to participate were be analyzed according to time spent on large group, small group and individual activities. Time spent explaining computer activities and the amount of time allotted for student computer use were to be be measured since the object of the plan was to increase student use of computers. A chart representing weekly activities for each teacher was produced. By doing this, successful teaching was identified.

2. In order to measure post-implementation surveys concerning satisfaction with the amount of assistance provided for the development of technology-based, interdisciplinary curriculum, a chart with an analysis of the responses comparing pre- and post-implementation staff development was produced.

3. In order to measure use of the writer's management plan for integrating computers into the interdisciplinary curriculum, an analysis of each teacher's weekly plans was presented in the form of a chart in the practicum report. The analysis reflected time spent in large group, small group and individual instruction of both computer and non-computer related topics, as well as subject-specific and interdisciplinary activities in order to plan the future course of the academy..

4. Samples of student work were collected after the eighth and twelfth weeks of implementation. Measurement of samples was analyzed according to the types of computer activities that were involved in the samples. A chart of the analysis of what kinds of computer activities students used was presented in the practicum report.

5. The number of students and the amount of computer time for each teacher's students was to be measured weekly. This data would have been recorded for time spent using the Josten competency-based learning program and for other uses of the computers. Because of problems with hardware and network management personnel, the Josten system was not fully operational by the end of the implementation period.

6. Measurement of satisfaction with the writer's management plan was compiled in a chart of responses listed according to an item analysis of strengths and weaknesses of the plan as perceived by students and by teachers in order to plan future activities of the academy based on what works.

Chapter IV: Solution Strategy

Discussion and Evaluation of Solutions

Staff development in the school has addressed issues of restructuring such as computer training, hands-on methodology and authentic assessment, but not how to set up and manage computers in the classroom. In short, the problem was that computers in the classroom are new; and teachers did not know how to integrate them into what they teach.

Solutions selected to solve the problem of this practicum have been taken from a variety of sources since no single work involves managing a technology-based interdisciplinary science academy for ninth graders. Studies offered suggestions for solving various aspects of the problem, but no single work addressed development of curriculum, integration of computers in an interdisciplinary setting, problems of staff development, and classroom management of computers.

Solutions generated from a review of the literature were chosen based on their applicability to the writer's work setting and available resources. Current trends in multimedia technology indicate that constructivism, in which the learner rather than the teacher develops or constructs knowledge, is influencing the development of educational materials. Schools are beginning to use performance technology to teach skills that students need. (Brennan, 1991).

Replacement of the textbook as the primary learning tool

The writer's management plan uses a variety of teaching tools. With the rapid advance of technology, textbooks will become obsolete as multimedia applications become popular. Software programs are beginning to replace

traditional textbooks as the primary means of information (Greenfield,1994). Two good examples of better ways to learn come from Eiser's reviews of Electronic Laboratory (1992a), a new virtual laboratory for science exploration in the classroom and The Living Textbook (1992b). Instead of relying solely on text-heavy books, an electronic laboratory can accelerate traditional lab work and even become the foundation of an entire science curriculum. Teachers can illustrate lectures with quick video clips and 3D animation, while students themselves can explore exciting interactive multimedia courseware individually or in small groups.

Using a program such as The Living Textbook or the Encarta encyclopedia, students can view such phenomena as lemming behavior or watch an animated sequence depicting Lucy, the fossil hominid unearthed in East Africa. They can also watch animated sequences on wound healing, antibody formation and cat dissection. Technology is important as a tool of inquiry, a means to improve investigation and communication, and a way of making connections between science and technology. (Donovan & Sneider, 1994; Kling & Iacono1990). Teachers involved in the ninth grade science academy had an opportunity to select software during the course of implementation.

Student-centered classrooms to promote higher order thinking skills.

Student management forms used during small group and individual activities reflect critical and creative thinking skills. Discussion of methods for using computers to promote higher order thinking skills was found in the

literature. The use of computers is changing the very nature of the curriculum. The advantages of the computer in education include: (a) opportunities for relevant education, (b) training of students for jobs of the future, (c) a powerful new teaching force surpassing anything as yet achieved in education, (d) instantaneous feedback, (e) creative daily individualized instructional programs (Doerr,1979).

Activities of the plan were designed to encourage writing in the content areas. Process writing has been transformed by the computer. To some degree, the computer itself will shape the way we teach writing in the future (Christensen, 1983). More time can be spent on researching ideas and organizing text as revision becomes highly efficient and more rewarding. The mechanical aspects of editing can be handled by the computer, leaving the teacher free to discuss the more complex and creative aspects of writing (Vickers, 1988).

Development of interdisciplinary science curriculum.

Several authors stressed interdisciplinary integration of curriculum. Research indicates that if a computer-based interdisciplinary curriculum is given a chance to develop, democratic education for all students is possible (Apple & Beane,1995). Classes and opportunities once available to elite, college-bound students are now being extended to all students through the use of technology.

Spector (1992) advocates teaching science/ technology/society interaction through an interdisciplinary approach. The curriculum should be organized around (a) real world issues, (b) themes, (c) different learning styles,

(d) different levels of cognitive development, (e) an understanding of different perspectives in order to construct meaning based on new paradigm assumptions. The science/technology connection is vital for restructuring the curriculum of the entire school.

Staff development

Staff development activities of the practicum plan were based on suggestions from the research. Researchers who discussed the issue of staff development for using technology in the classroom agree that the teacher is the key to the ultimate success of computers in the classroom (Christensen; Wallace, LeMahieu & Bickel,1990). If teachers are to integrate technology into their teaching, to learn new skills and to take on difficult challenges, their professional judgement must be respected. Administrators need to listen to them and provide them with the time and opportunities to learn, to experiment and to share their experiences (Leonard & LeCroy,1988; Wiske, et al., 1985).

The secret of good training is paying teachers for their time or giving them credit toward certification (Wiske, et al., 1985). Teachers involved in the plan received compensation for extra planning days, and they were included in the process of curriculum development.

Vickers' (1988) experience with staff development proved that introductory short courses with support groups of subject area teachers and development of shared curriculum materials worked best. In Norway, success of teacher development at the school level depended on (a) the attitude of the principal, (b) the extent to which teachers are able to sustain practice after initial

training, (c) the degree of mutual support among teachers, (d) the availability of written material giving advice on effective software applications, (e) one-on-one coaching.

Vickers (1988) believes that teachers should have access to formal courses, informal workshops, self-teaching and mutual support, both within schools and between them. They should have access to a computer in the faculty room that allows simple applications such as grading or writing notes to parents, and preparing teaching materials. This helps teachers to see the computer's capabilities and hopefully stimulates a desire to see how computers can be used in the classroom.

Wiske et al., (1988) say that teachers will overcome their fear of computers if they learn on a "need to know" basis by sitting down with someone who can show teachers how to create a document they need. This way they learn when they are ready and can absorb information at their own pace. People need stretches of uninterrupted time to work. It is good if they can borrow a computer to take home to practice. Teachers involved in the practicum plan who wanted to use computers were given Dell multimedia teacher work stations, technical assistance and opportunities for staff development.

Classroom management.

Several suggestions for classroom management of hardware and software are found in the literature. Vickers (1988) says that technical assistance, troubleshooting and inservice support all need to be provided by one

staff member who has to time to handle these tasks. There also should be a computer-coordinator to handle staff development and resource management.

According to Watson (1992), classroom management is made much easier by computers. Teachers can access all student files. Students cannot access each other's files, but there are files common to all students (a class library). Teachers can send messages to all students who miss classes. Teachers can look at student files to see what has been mastered and what kinds of mistakes are being made by the class as a whole. Assignments can be handed in electronically. Students can send the work to the teacher, maintaining the original files. Teachers can make or suggest modifications that can then be incorporated into a revision.

West (1989) states that computers make possible certain aspects of management that teachers could not have kept track of without computers. It is possible to assess and diagnosis student needs, provide prescriptive learning activities and perform record keeping tasks related to state testing programs. Ragsdale (1983) suggests that changes for the teacher will include less management and routine lessons. There will be more time for teaching, more individualized instruction, as well as individualized drill and practice. How much teachers are involved in the production of educational software is also a critical part of the definition of their role in the modern classroom.

According Vickers (1988), computers promote group work as a learning mode, and they cause students to take some responsibility for teaching other students. Having two or three students work at a computer promotes technical

Chapter 5: Results

Results

The problem was that teachers in the 9th grade science academy had to adopt new interdisciplinary teaching methods with an emphasis on SCANS competencies, as well as using computers as a teaching tool in the classroom. They needed staff development and time to organize and a system that would help to manage time, large and small group activities, independent activities as well as changes in the traditional curriculum.

The goal was to provide teachers with the assistance they needed in order to organize and manage technology in an academy setting. To facilitate the use of computers as an interdisciplinary tool by teachers and students in the ninth grade science academy the following outcomes were projected for this practicum:

1. Eight of the ten ninth grade teachers involved in the science academy will be using computers in their classrooms 50% of the time by the end of the implementation period. The baseline for this outcome is 0% since the network has not yet been connected.

This outcome was not achieved. Only five of the ten teachers had computers in their rooms by the end of the implementation period. Table reflects the use of the 63 computers available for students in the science academy. Three of the teachers who did not have computers in their rooms gave outside work that required the use of computers. During the first three weeks of implementation, computer activities in classes of the eight teachers

Riedl advocates the use of learning stations so that technology becomes a natural tool. Students can learn to collaborate, cooperate and develop communication skills. Multimedia work stations use a combination of interdisciplinary and real-life experiences. Students practice self-management and develop responsibility for their own learning by completing tasks individually and in small groups while the teacher is engaged with other members of the class.

There is a change from "telling" students to "asking," an atmosphere of spontaneity in which no single person dominates. Riedl uses questioning techniques to stimulate learning. Her method of assessment minimizes paperwork and stimulates students to assess themselves.

Report of Action Taken.

The writer developed a management system for maximizing the use of four or less computers in classes of 30 or more students in order to promote higher order thinking skills and integration of core subjects. The management system included resources and strategies for integrating computers into the curriculum and technical support for the teachers and students involved in the academy.

A plan for integrating computers into the classroom included support material for dividing classes into groups engaged in meaningful, higher order activities. Suggestions for group and individual activities were presented to teachers during the first week of implementation in order to create a loose-leaf

notebook of plans, lesson and activity templates and assessment tools. Teachers were encouraged to add material as the year progressed.

All forms given to the teachers were available on disks. Interdisciplinary planning is easier if teachers, on their own computers, have access to assignments given by their colleagues in other subjects. A shared database can be created by exchanging disks of curriculum material.

All staff development activities were practical in nature. Hands-on teacher training worked on a need-to-know basis, so that by the end of a training session there was material that the teacher could actually use. The writer facilitated staff development activities as needed for teachers in the science academy. Planning periods for the academy teachers could not all be scheduled at the same time, as had been originally hoped, so the writer acted as a facilitator for disseminating information, and the teachers met on an informal basis between formal monthly meetings (see Appendix E).

The plan for classroom management of computers needed to have a visual component that is generic in form. The writer made suggestions, and the academy team developed a series of templates for activities that are clear and easy for teachers and students to use. There were lesson plan forms for teachers, as well as activity management forms for students which are presented in the practicum report (see Appendix F). Since teachers of five different subjects were coordinating their efforts, using the same lesson plan format was useful for common planning. Graphic forms helped students manage their time

and complete assignments according to a rubric that let them take control of their own learning.

Computer activities included: (a) use of information software such as Compton's Electronic Encyclopedia, Encarta Encyclopedia (b) Word- perfect 6.1 and Microsoft Works 6.0 word processing software, © electronic grade books, (d) multimedia technology in the content areas. "Broadcast News" stations (Riedl, 1995) included the use of video camcorders that allow students to synthesize assignments in the form of three-minute news broadcasts.

Unexpected outcomes included delays having to do with the computer technology. In late September, there was a fire in the school that burned down the administration building and damaged the computer network in the media center. Asbestos was discovered in the media center as a result of the fire and it has been closed for abatement since October. The Josten computer network was not fully operational until November. Training the language arts and mathematics teachers to use the Josten Learning System is still in progress. There were also delays in equipping the science rooms with computers. The position of the new network engineer was terminated in the middle of the implementation period. A teacher was taken from three classes per day and has been assigned to install computers and manage the network, but progress has been slowed. Computers in the language arts and mathematics rooms have been used as stand-alones equipped with word processing programs, Bookworks, Encarta Encyclopedia and other software programs such as PageMaker and Printshop Deluxe.

Chapter 5: Results

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who assigned computer work comprised an average of 4.75 hours, or 17% of the total time. During the last three weeks of implementation, the average number of hours spent using computers increased to an average of 7.5 hours, showing a gain of 33% of total class and homework time used in computer related activities. Table 1 below shows how computers were used by eight of the ten teachers in the academy. Teachers who did not have computers in their classes assigned work to be done in the two computer labs or at home.

Table 1

Computer-Related Assignments of Science Academy Students

Language Arts Projects	*Computer Skills*
1. Life lines	Word processing, use of electronic encyclopedia, graphics
2. Compositions (including prewriting, editing and peer reviews)	Word processing
3. Book reviews	Word processing
4. Poetry	Word processing, thesaurus and dictionary, graphics
Social Studies Projects	*Computer Skills*
1. Current events homework (completed in computer labs or at home)	Word processing
2. World history newspaper (assigned as homework and completed in computer labs)	Word processing, Electronic encyclopedia, graphics

(table continues)

3. Reports (assigned as homework and completed in computer labs or at home)	Word processing, Electronic encyclopedia, graphics
Mathematics Projects	*Computer Skills*
1. Reports on famous mathematicians	Word processing, Electronic encyclopedia
2. Book reports	Word processing, graphics
Science Projects	*Computer Skills*
1. Lab reports (assigned as homework and completed in computer labs or at home)	Word processing, mathematical calculation, tables, charts
Computers/Careers Projects	*Computer Skills*
1. Keyboarding activities	Word processing
2. Database project	Database
3. Career project	Word processing, graphics, spreadsheet (charts)

2. Post-implementation surveys completed by the ten ninth grade science academy teachers (see Appendix C) will indicate that eight of the ten teachers will express satisfaction with the amount of assistance provided for the development of technology-based, interdisciplinary curriculum.

This outcome was achieved. Figure 1 shows a comparison of the teachers' responses before and after the practicum implementation regarding the amount of staff development and computer training they received. Responses of the ten teachers on the postimplementation survey indicated that four were very satisfied with the amount of staff development provided and six indicated that they were completely satisfied with the training they have received

this year. Teachers spent four days planning at the end of August before school began. They had the opportunity to participate in two and a half days of Josten training and one day each of Word processing, Teacher Tools, Desktop Publishing, Make and Take (news letters and other graphic applications), as well as two county and state computer conferences. They could also participate in four interdisciplinary workshops developing interdisciplinary curriculum sponsored by School-to-Work and Tech Prep.

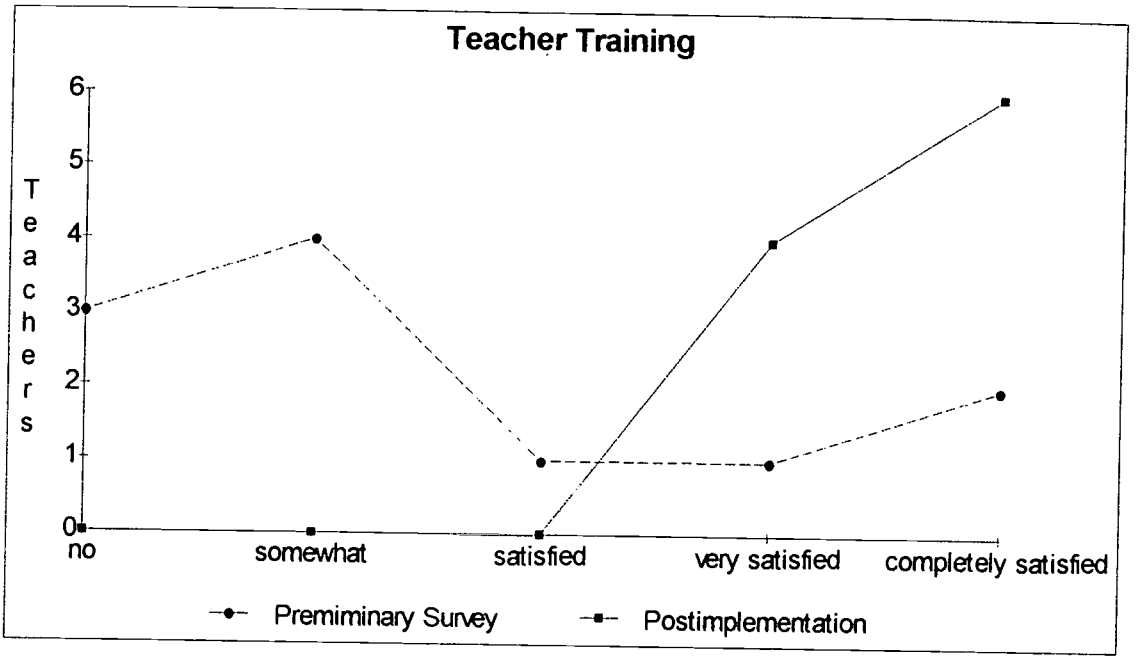

Figure 1. Comparison of Science Academy Teachers' Satisfaction with Staff Development as a Result of the Practicum

3. Lesson plans of eight of the ten ninth grade science academy teachers will reflect the use of the writer's management plan for integrating computers into an interdisciplinary curriculum during eight of the twelve weeks of implementation.

This outcome was achieved. The management plan consisted of ways to break up time into large group, small group, individual and computer assignments. Another aspect of the plan was the use of study sheets to keep students on task during the various activities (see Appendix F). Appendix G shows a breakdown of class time into individual activities, small groups, large groups, and computer related assignments.

Figures 2 and 3 below show student responses to the usefulness of study sheets that were used to manage the various kinds of activities in their academy classes. Students were asked to mark the classes and kinds of activities in which study sheets were beneficial. There was a positive gain in students' perceptions of the use of study sheets in all five subjects as well as small group work. Also, there was a 14% gain from 39% to 53% in the number of students who could see a connection between science and their other subjects.

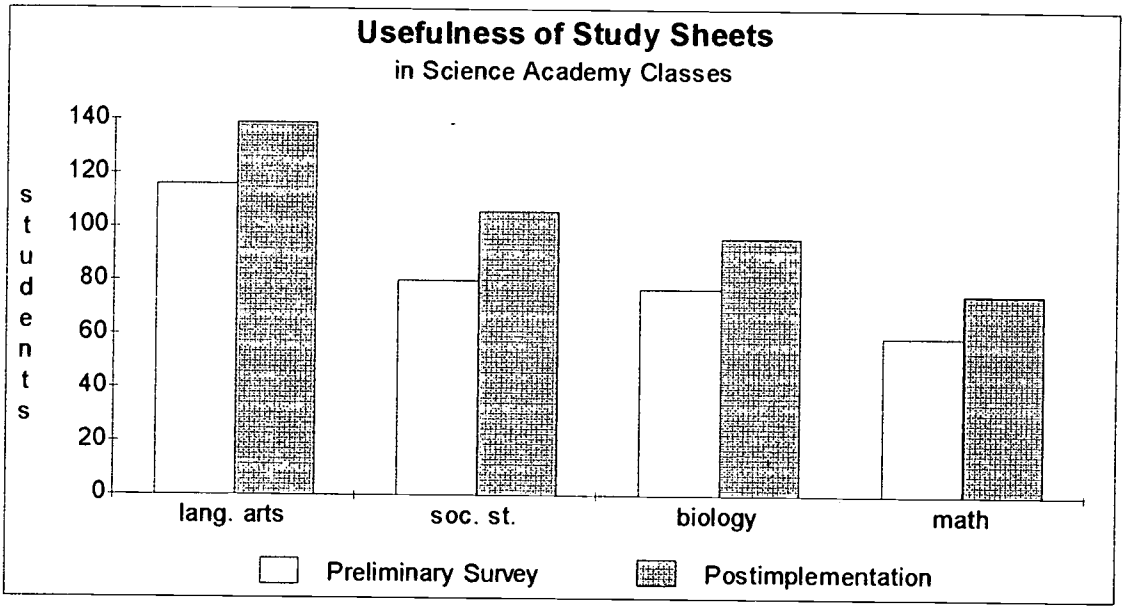

Figure 2. Analysis of Student Responses Concerning the Usefulness of Study Sheets in Academy Classes.

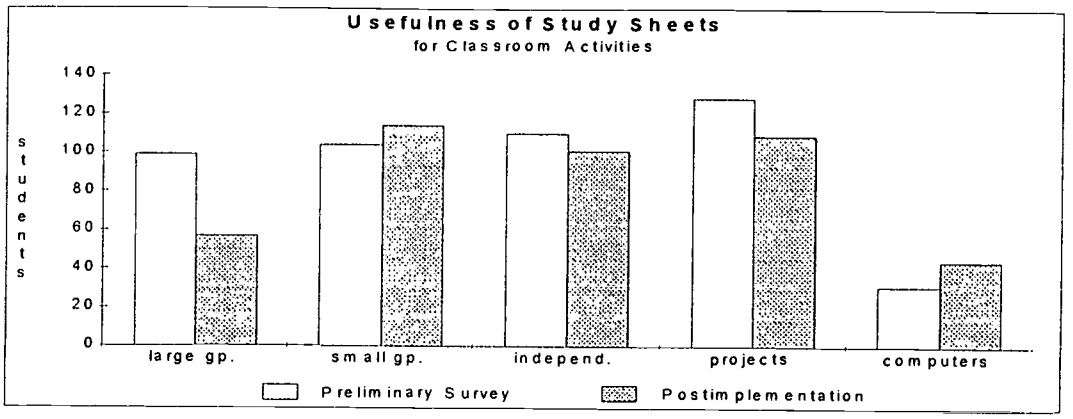

Figure 3. Analysis of Student Responses Concerning the Usefulness of Study Sheets in Various Class Activities.

4. Samples of student work from the classes of eight of the ten teachers involved in the ninth grade science academy will reflect the use of computers as a tool in an interdisciplinary project.

This outcome was achieved. All ten of the teachers in the academy have participated in at least one interdisciplinary project. The table below lists projects started and/or completed during the implementation period. The name of the project is followed by the subjects involved in each. Teachers who did not have computers in their rooms encouraged their students to do computer work at home or in one of the computer labs for extra credit. In the postimplementation student survey, 141 students listed one of the interdisciplinary projects as their best assignment. The World History Times project was the favorite of 45 students.

Table 2

Interdisciplinary Projects of the Science Academy Classes.

Interdisciplinary Projects	lang. arts	math	soc. st.	bio-logy	comp-uters	art
Flatland	X	X			X	X
"World History Times" newspaper	X		X		X	X
Personal Lifeline	X	X	X		X	X
Port of Miami Career Project	X	X	X	X	X	
Famous Mathematicians	X	X			X	
Career Portfolio	X	X		X	X	
Book Reports	X			X	X	
Poetry	X				X	X
Biology Lab Reports	X	X		X	X	X

5. A log of computer use during the implementation period will indicate that 80% of the 210 grade 9 science academy students log 10 total hours of computer time per week in their combined academy classes by the 10th week of implementation.

This outcome was not achieved. Students were able to use computers in the classroom for an average of only six hours per week (see Appendix G). The Josten system was not in place by the end of the implementation period.

6. Post-implementation surveys concerning the effectiveness of the management of whole-group, small-group and individual activities as expressed by teachers and students will show an average gain of 30% in the level of satisfaction.

This outcome was achieved. Results of the various aspects of the management plan indicated that both teachers and students benefited during the

implementation period. Figure 4 below shows changes in student perceptions as to the best way to learn. Students could make more than one choice, so the table is represented in percents for the purpose of comparison. The highest gains were in the areas of group projects and computer assignments.

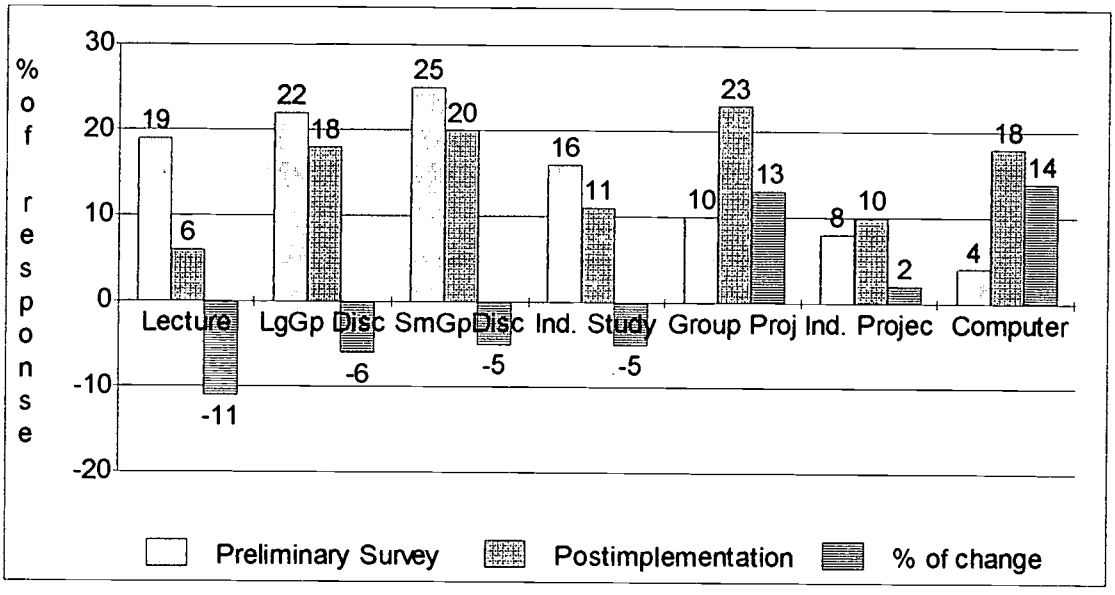

Figure 4. The Percent of Change during Practicum Project in Students' Perceptions of the best way to learn.

Figure 5 represents an analysis of the teachers' pre- and post-implementation surveys with regard to the management plan. Aspects of the division of time and space, information represented on the lesson plan forms concerning kinds of activities, interdisciplinary activities, and multiple class activities are addressed. Appendix F contains the lesson plan form that teachers used as well as other forms for classroom management.

Analysis of Teacher Participation in the Management Plan				
Aspects of the Plan	Number of teacher Responses		Strength	Weakness
Division of space reflected in lesson plans	6 yes 4 no			Classes overcrowded
Division of time reflected in lesson plans	10 yes 0 no		Helped especially on block days	
Use of SCANS competencies	8 yes 2 no		Emphasis on applied methods	
Use of written forms/ rubrics	8 yes 2 no		8 of 10 teachers use written forms/rubrics for class management	
Interdisciplinary Activities	8 yes 2 no		8 of 10 teachers cooperated with at least one other teacher on assignments	
	Average class time: weeks 1-3	Average class time: weeks 8-10		
Large Group Activities	5.25 hours	3 hours	Decrease from 33% to 20% of class time	
Small Group Activities	2.87 hours	4.7 hours	Increase from 19% to 31% of class time	
Individual Activities	2.5 hours	10.75	Increase from 16% to 71%	
Computer Activities	4.75 (including homework)	7.5 (including homework)	increase from 17% to 50% of class time/homework	Only 5 of 10 teachers have computers available for student use
Multiple Activities per Class	3 teachers	6 teachers	increase of 50% of 8 teachers during the implementation	

Figure 5. Analysis of Responses from Teacher Surveys of the Management Plan.

Discussion

During the practicum implementation, emphasis was placed on staff development and organization of the ninth grade science academy. Teachers spent four days of planning and outlined a year long interdisciplinary career project (see appendix H). The writer's practicum management plan was presented and teachers adapted it to their styles of teaching.

The writer scheduled a total of nine days of computer training and conferences for the academy teachers, as well as six days of interdisciplinary curriculum planning. Eight of the ten teachers in the academy participated in at least two of these activities. The school is also taking part in an interdisciplinary project to study the Port of Miami. In spite of the amount of training provided, which was funded through grants at a cost of over $14,000, teachers still do not feel confident enough to utilize available resources.

Teachers involved in this practicum are experiencing the growing pains of restructuring that were found in the literature. While all of them express a willingness to change, they were not able to do so in three months. They need more coaching and hands on experience with the Josten Learning System before they feel confident enough to present it to their students.

Time spent using the Josten program will cause teachers to use textbooks less. The mathematics teachers have been most reluctant to give up their books. Interdisciplinary workshops have helped them to realize the importance of applied methods, but there is not a lot of curriculum material available in the school. Change involves a lot of extra work.

The world history teachers have expressed a willingness to approach their subject based on themes rather than chronological order; but again, a great deal of extra work is involved in making the change.

The science teachers are very enthusiastic about using multimedia in their classrooms because computer simulations can replace some of the lab work. In fact, due to overcrowded classes, students will be able to have experiences that would have been impossible without computers. One of the science teachers will soon have four computers in his room, and he has been previewing software.

The two language arts teachers face a dilemma. The traditional literature-based classroom can accommodate the teaching of writing using computers, but putting emphasis on SCANS competencies and interdisciplinary learning means that certain aspects of the traditional curriculum have to go. These teachers have had to make major decisions about what to teach and what to leave out. The management plan's lesson plan form has been a big help in focusing attention on all aspects of the curriculum.

Having computers used as stand-alones in the classroom takes away pressure to "teach" students about computers. In fact, the teachers are actually learning from their students in a nonthreatening environment while students work on projects. The students who know more about computer applications help others as they take turns using the computers to complete class projects.

Teachers who do not have computers in their rooms encourage students to use other computer labs during lunch or after school if they do not have

computers at home. Seventy nine of the 210 students in the academy indicated that they do have computers. The quality of work done on computers is far superior to handwritten assignments and most students reported that their best work involved projects done on computers (see appendix C).

Students play a big part in the restructuring process. Their enthusiasm for group projects that had relevance to them, such as the World History Times newspaper project, encouraged teachers to let go of control of knowledge and allowed their students to discover information on their own. Also, teachers who were somewhat reluctant to use computers are being caught up in the possibilities that their students want to explore.

Recommendations

1. The success of an academy within a school has to be supported by the district as well as by grassroots efforts of the teachers. School districts that want to resturcture their schools for technology need to be prepared to reallocate funds in order to provide schools with adequate network management and curriculum materials other than state adopted textbooks. Flexible scheduling is important for interdisciplinary curriculum based on applied methods. The traditional Carnegie Unit, which measures "seat time" rather than SCANS competencies, is a hindrance to restructuring. Changing the structure at the district level can make or break the efforts of individual schools.

2. Finding new methods of providing time for staff development is essential to the success of restructuring for technology. Releasing teachers

from class is costly, and too many days out of class can disrupt the academic program. Further research on creative staff development is needed.

Dissemination

The Union representative who is a member of the 9th grade team shared the academy lesson plan form with other union representatives from all over the county. The science academy plan was very well received.

The head of Tech Prep in the county who likes the practicum concept has asked the writer to participate with a team of other writers who will be paid to develop interdisciplinary curriculum intended to extend Tech Prep to all 26 high schools in the county.

As the school becomes equipped with more computers, the writer plans to use what works best from the practicum experience to assist other teachers at the school to incorporate the use of computers in their classrooms. Then by the end of the year, after the science academy produces their magazine and career fair, the writer will submit an article about the school's experiences.

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APPENDIX A

SCHOOL IMPROVEMENT PLAN

EXECUTIVE SUMMARY

Provide a brief summary of the goals and objectives addressed within this plan for 1994-95.

After analyzing and evaluating pertinent data, the school advisory council of Miami Beach Senior High School has identified as school priorities five areas of emphasis for the 1995-96 school year.

- Student performance in communications will improve, as measured by the following indicators: (a) Increase the median percentile on the combined ninth and 11th grade Stanford Achievement Test in reading by 5 percentile points; (b) Increase the percentage of students passing the 11th grade High School Competency Test in communications by 10%.

- Student performance in mathematics will improve, as measured by the following indicators: (a) Increase the median percentile on the combined ninth and 11th grade Stanford Achievement Test in mathematics by 5 percentile points; (b) Increase the percentage of students passing the 11th grade High School Competency Test in mathematics by 10%.

- As a result of an extensive staff development program, the use of technology will increase as evidenced by a survey of technology use in the classroom.

- As a result of additional services provided to ninth graders, the school climate will be improved as evidenced by a reduction of 20% in the number of second time referrals to S.C.S.I.

- Student performance in ninth grade science will be improved as a result of increased opportunities to engage in hands-on, real-life problem solving instructional activities by the increased use of technology in the classroom as measured by (a) a survey of the number of these activities, (b) the number of students participating in science fairs and (c) the number of students who pass science with a C or above.

Some strategies that will be employed in order to achieve these objectives include: a 10th grade "required elective" for students with a "C" or "D" average in mathematics or English; tutoring and/or Saturday school to improve students' skills in mathematics and English and science; computer training for faculty who will be using technology funded by various grants; and special activities for ninth graders who need help adjusting to high school.

APPENDIX B

PRELIMINARY SURVEY OF COMPUTER USE

BY TEACHERS AND STUDENTS

Preliminary Survey of Computer Use by Teachers

1. Have you had any experience using computers?

1	2	3	4	5
none	novice	some experience		expert

2. What kind of computer training have you had?_____

3. What kind of training did you find most effective? _____

4. Are you satisfied with the amount of computer training you have had?

1	2	3	4	5
no	somewhat satisfied		very satisfied	

5. Do you have a computer at home? If so, what kind?_____

6. Indicate the amount of experience you had with any of the following kinds of programs:

a. Word processing_____

1	2	3	4	5
none	novice	some experience		expert

b. Database_____

1	2	3	4	5
none	novice	some experience		expert

c. Spreadsheet_____

1	2	3	4	5
none	novice	some experience		expert

d. Graphics_____

1	2	3	4	5
none	novice	some experience		expert

e. Telecommunications_____

1	2	3	4	5
none	novice	some experience		expert

f. Fax_____

1	2	3	4	5
none	novice	some experience		expert

7. Do you use computers for school work? If so, how?_____

8. Do you give any assignments to students that require the use of computers? If so, what kind?_____

9. Do you collaborate with any other teachers when giving assignments? If so, do any of the assignments require students to use computers?_____

PRELIMINARY STUDENT SURVEY

1. I learn best by:
   ___Lecture
   ___Discussion in large groups
   ___Discussion in small groups
   ___Independent study
   ___Use of Josten competency-based program
   ___Group projects
   ___Independent projects
   ___Computer assignments (other than Josten)

3. Study sheets have helped me with assignments in:
   ___ yes ___ no English
   ___ yes ___ no Social Studies
   ___ yes ___ no Science
   ___ yes ___no Mathematics
   ___ yes ___no Computers

4. Study sheets helped me in doing:
   ___yes ___no small group assignments
   ___yes ___no large group assignments
   ___yes ___no independent study
   ___yes ___no projects

5. ___yes ___no I see a connection between what I am studying in science and my other subjects.

6. _____ is the subject that seems to have the greatest connection with science.
   ___ mathematics
   ___ language arts
   ___ social studies
   ___ computer class
   ___ health/physical education

7. _____ is the subject that seems to have the least connection with science.
   ___ mathematics
   ___ language arts
   ___ social studies
   ___ computer class
   ___ health/physical education

8. ___ yes ___ no My courses are taught the same way as last year.

9. Have you had any experience using computers?

1	2	3	4	5
none	beginner	some experience		expert

11. ___ yes ___ no Do you have a computer at home?

12. Indicate the amount of experience you have had with any of the following kinds of computer programs:

a. word processing

1	2	3	4	5
none	beginner	some experience		expert

b. database

1	2	3	4	5
none	beginner	some experience		expert

c. spreadsheet

1	2	3	4	5
none	beginner	some experience		expert

d. graphics

1	2	3	4	5
none	beginner	some experience		expert

e. telecommunications

1	2	3	4	5
none	beginner	some experience		expert

f. fax

1	2	3	4	5
none	beginner	some experience		expert

13. Do you use computers for school work? If so, how?

___ no
___ homework
___ research
___ reports
___ mathematics
___ compositions
___ typing
___ projects

14. How can computers help you the most to learn?

Responses:

(7) working with ideas, not just grammar and spelling
(6) learning how to learn/problem solving

(25) being faster/more organized
(7) being neater/producing more professional work
(11) learning without books
(9) easier to understand
(4) saving information
(5) having fun
(52) learning skills for the future
(20) learning computer programs and applications
(26) getting information from the Internet
(15) using an electronic encyclopedia
(8) producing graphics
(1) becoming a hacker
(15) typing
(32) projects
(2) meeting people
(12) homework
(10) research
(21) reports
(5) mathematics
(16) compositions
(3) using the dictionary

APPENDIX C

POSTIMPLEMENTATION SURVEYS:

TEACHER AND STUDENT EVALUATIONS

Postimplementation Teacher Surveys

Technology and Staff Development

1. Have you received the opportunity for computer training during 1995-96?
   1 none 2 very little support 3 some support 4 5 a lot of support

2. If you have participated in computer training, what has been the most effective for you?
   - ___ word processing
   - ___ learning the basics
   - ___ graphics
   - ___ teacher tools
   - ___ Josten training
   - ___ Technology conferences

3. What kind of teacher training would help you the most at this point?
   - ___ spreadsheets
   - ___ grade book applications and practice
   - ___ reinforcement of the basics
   - ___ troubleshooting
   - ___ Internet training
   - ___ MS DOS commands
   - ___ learning about new software
   - ___ other_____

Curriculum Development

4. Was the week of curriculum planning before school productive?
   ___ yes ___ no ___ did not attend

5. Do you use written forms or rubrics to keep students on task?
   ___ yes ___ no

6. Please briefly describe any projects or block lessons your students have done that are interdisciplinary in nature._____

7. Please briefly describe any projects or block lessons your students have done which required the use of computers._____

8. Do your lesson plans reflect:
   a.___ yes ___ no division of space
   a.___ yes ___ no division of time
   a.___ yes ___ no SCANS competencies

9. To what degree have your methods of teaching changed this year?

1	2	3	4	5
none	Changed a little	Changed somewhat		Changed a lot

Your students' reaction to this year's curriculum

a. Are they able to work in small groups to accomplish assignments?

1	2	3	4	5
poorly		require supervision		work very well

b. Do they work independently and hand in the work assigned?

1	2	3	4	5
poorly		require supervision		work very well

c. What is the effect of computers on their work?

1	2	3	4	5
none	basic word processing		lesson content and word processing	

d. What kind of assignment works best?_____

e. What kind of assignment was least effective in producing desired outcomes?

_____

5. Please check the methods you have used to integrate other core subjects into your teaching:

___ lecture ___ discussion in large groups ___ discussion in small groups
____ independent study __ use of Josten programs __ group projects
____ independent projects

Postimplementation Student Evaluation Survey

1. Choose the two best ways you learn (mark them "yes"). Then mark the worst way you learn as "no".

Method of instruction	Best way to learn	Worst way to learn
Lecture	_____	_____
Large group discussion	_____	_____
Small group discussion	_____	_____
Independent Study	_____	_____
Group Projects	_____	_____
Independent Projects	_____	_____
Computer Assignments	_____	_____

2. Check the following subjects in which study sheets have helped you this year.
   - __ English
   - __ Social Studies
   - __ Science
   - __ Mathematics
   - __ Computers

3. Check the kinds of assignments where study sheets have helped you this year.
   - __ small group assignments
   - __ large group assignments
   - __ independent study
   - __ projects

4. __ yes __ no I see a connection between what I am studying in science and my other subjects.

5. _____ is the subject that seems to have the greatest connection with science.
   - __ mathematics
   - __ language arts
   - __ social studies
   - __ computers
   - __ other_____

6. _____ is the subject that seems to have the least connection with science.

7. Briefly describe the best assignment you have done this year.

   _____

APPENDIX D

SUMMARY OF THE SCANS REPORT

Summary of the Secretary's Commission on Achieving Necessary Skills (SCANS) Report
Workplace Know-how The report consists of five competencies and a three-part foundation of skills and personal qualities needed by students for future job performance in any profession.
Workplace Competencies Effective Workers Can Productively Use: Resources: Students know how to allocate time, money, materials, space, and staff. Interpersonal skills: They can work in teams, teach others, serve customers, lead, negotiate, and work well with people from culturally diverse backgrounds. Information: They can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information. Systems: They understand social, organizational and technological systems; they can monitor and correct performance, and they can design and improve systems. Technology: They can select equipment and tools, apply technology to specific tasks, maintain and troubleshoot equipment.
Foundation Skills: In order to be competent workers in the high-performance workplace, students need: Basic Skills: Reading, writing, arithmetic and mathematics, speaking and listening. Thinking Skills: The ability to learn, to reason, to think creatively, to make decisions, and to solve problems. Personal Qualities: Individual responsibility, self-esteem and self-management, sociability, and integrity.

APPENDIX E

SCIENCE ACADEMY MEETING MEMO

9th Grade Science Academy Update

Lunch Meeting

Please plan to meet in Room 120 on Friday for lunch. Pizza will be served. We need to coordinate our activities.

Telecommunications Conference in Fort Lauderdale

There is a giant conference on December 1-2 (Friday and Saturday) that we can go to. It is like the one that got us into technology in the winter of 1993. As conferences go, it's one of the BEST. The grant will pay for any of you who want to go. You will receive the conference brochure at the meeting.

Careers: Miami

We need to get started with our group project. If you didn't get a copy of the project that was created in August, they will be available at the meeting. We also created the "Career Contest" and we need to decide which classes will do it (and whether you want to modify the original plan.

Group Organization Aids and Activities

Please be prepared to share the kinds of group activities you have done so far with your classes. I will be happy to reproduce anything you want to share with the team. Suggestions have been made that students might keep a group journal. Also, for classroom management, if you would like a big dry erase "white board" in your room to keep track of group activities, let me know at the meeting.

Josten Update

The networks in the 400 wing and the new wing are finally operational.

Math teachers are being trained on the 27th and 28th. There will be a half day of curriculum training for both math and English teachers on October 6. (Probably English in the morning and math in the afternoon). The English teachers will probably have management training for two days during the week of the 9th-12th. I should know by Friday.

Educational Resources Computer Training

The following teachers from the 9th grade team signed up for training so far: Marc, Diana, Noel, Carole, Rey, Chris, Ann and Joan. The sessions will include "Basic Word processing" on October 17; "Teacher Tools" using Microsoft Works on October 18 & 19; "Desktop Publishing" using Printshop and PageMaker on November 10; and "Make & Take" using Printshop on November 21.

Subs will be provided.

Preliminary Technology Student Survey

Please ask students to complete the enclosed survey. We want to identify students who can act as team leaders for helping the teachers when the Josten system is ready to be used. Also, if you would like to have a student aide who is an advanced computer student to help you with booting up the computers, troubleshooting, etc., (so that you will be able to deal with students who are not using the computers) let me know which periods.

APPENDIX F

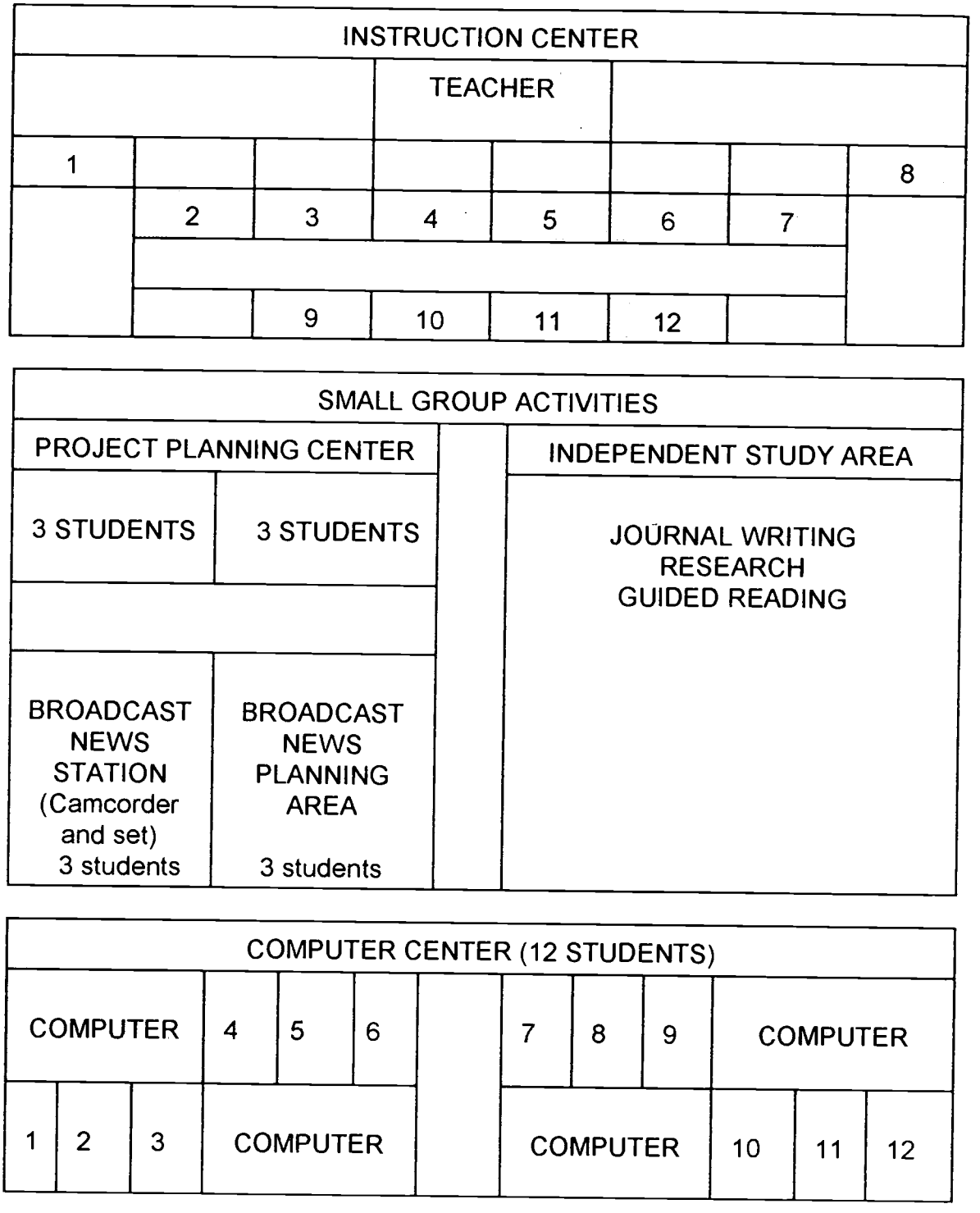
MANAGEMENT PLAN:

PARTIAL CONTENTS OF TEACHER PLAN BOOK

TEACHER PLAN BOOK

Table of Contents

I. FLOOR PLAN FOR ACTIVITY-CENTERED CLASSROOM



II. TIME MANAGEMENT: TWO-HOUR BLOCK DAYS

1. JOSTEN COMPUTER LESSON

20 MINUTES

WHOLE-GROUP: Explanation of lesson concept; Overview of activities and assessment procedure

30 MINUTES EACH (12 students per group)

COMPUTER LESSON (JOSTEN)	OR	GUIDED INDEPENDENT READING	OR	TEACHER GUIDED STUDY SKILL

2. BUILDING A KNOWLEDGE BASE

20 MINUTES

WHOLE GROUP INSTRUCTION: How to.....

30 MINUTES EACH: (12 students per group)

PLANNING GROUP PROJECTS	OR	SORTING DATA: 1. like and unlike data 2. changing form of data (words to numbers, numbers to words) 3. creating graphs, pictures, charts, maps	OR	COMPUTER ACTIVITIES

3. PROJECTS

15 MINUTES

WHOLE-GROUP: Explanation of project; Overview of activities and assessment procedure

30 MINUTES (12 students per group)

COMPUTER ACTIVITIES	OR	LIBRARY: 4 STUDENTS TEACHER WORKS WITH 8 STUDENTS	OR	INDEPENDENT READING/WRITING

III. TIME MANAGEMENT: ONE-HOUR DAYS

1. LEARNING NEW CONCEPTS

15 MINUTES

WHOLE GROUP INSTRUCTION: Explanation of concept or computer skill

40 MINUTES

Fast learners help others who are fairly confident	Teacher helps those who need extra help with the concept or computer skill

2. REINFORCEMENT OF CONCEPTS

10 MINUTES

TEACHER EXPLAINS THE DAY'S ACTIVITIES

15 MINUTES EACH

Teacher reinforces concept with small group	Small groups work together on projects or at the computers	or	Students work on independent assignments

3. PUTTING IT ALL TOGETHER

10 MINUTES

TEACHER EXPLAINS THE DAY'S ACTIVITIES

20 MINUTES EACH

Small groups work together on projects	or	Students work at the computers
Teacher circulates, monitoring each group		

III. Lesson Plan Form

Block Day Lesson Plan Week of_____ Teacher_____		
Weekly objective:		
Academic objectives: **Interdisciplinary objectives:**	**SCANS Foundation Skills** __Basic Skills __Reasoning __Personal Qualities __Problem Solving __Knowing how to learn __Decision Making __Responsibility __Self-esteem __Social Skills	**SCANS Competencies** __Manages Time __Resources __Interpersonal Skills __Information Processing __Systems __Technology
Materials: __Textbook __Handout __Dictionary __Magazine __Lab Equipment __Computer __Multimedia __ Workbook __Newspaper __Overhead/AV __Speaker __LCD __Software __Other_____		
Large Group Activity:__Film/video__Instruction__Discussion__Presentation of Projects__Demonstration__Pre-lab prep__Other_____		
Small Group Activity: __Discussion __Lab Work __Computers __Planning project __Problem Solving __Writing __Simulation __Other_____		
Individual Activity: __Guided Reading __Research __Writing __Problem solving __Map work __Other_____		
Assessment: __Teacher observation __Peer evaluation __Presentation __Test __Written Assignment __Quiz Other_____ _____ _____		
Weekly Planning Notes		
MONDAY		
TUESDAY		
WEDNESDAY		
THURSDAY		
FRIDAY		

Note. The form for teachers is expanded and put in landscape format.

IV. STUDENT MANAGEMENT FORMS

Reflection Sheet for Small Group Activities

Period_____ **Signature**_____

Rate yourself on the scale and describe how you did a good job in each area:

I contribute ideas.

always sometimes never

I encourage other team members to contribute ideas.

always sometimes never

I praise and support my team.

always sometimes never

I am a responsible team member.

always sometimes never

Complete the following statements:

I am proud of myself when

One group skill that I need and want to work on is

I think my team does a good job of

I depend on my team for

Put It All Together

The following work sheet helps students understand what they have read. It includes all the major reading skills. It can be used with textbooks, manuscripts, letters, memos, reports, newspaper articles, textbooks, stories, essays and biographies.

GET THE FACTS	
State three facts from the reading passage: 1._____ _____ 2._____ _____ 3._____ _____	Answer the following questions about the reading passage: **Who?**_____ **What?**_____ **When?**_____ **Where?**_____ **Why ?**_____ **How?**_____ **Which?**_____
WHAT DO YOU THINK?	
Write three opinions stated in the passage: 1._____ _____ 2._____ _____ 3._____ _____	Write Your opinion about the ideas in the passage:
GET IT ALL TOGETHER	
List the sequence of events (or ideas): 1. 2. 3. 4 5.	Write a one sentence summary of the whole passage:

SIX LEVELS OF THINKING ABOUT WHAT YOU READ

Unit (or semester) Review Test

1. Review the material you will be tested on, asking yourself questions you need to know in order to understand the material.

2. Read the following question stems. The labels show you the kinds of questions that can be asked. **Make up a twenty question test** with at least two questions from each category. (Some categories will have more than two questions). Put your name at the end of the test.

3. **Make an answer key** with your name on it.

4. The teacher will collect the tests and answer sheets and give you someone else's test to take.

5. Take the test and then check your answers, using the answer key that matches the name at the bottom of the test.

Knowledge:	Who, what, when, where, how _____?
	Describe_____.
Comprehension:	In your own words, retell_____
	What is the main idea of_____
Application:	How is_____an example of _____?
	How is _____related to _____?
	Why is _____significant?
Analysis	What are the features of_____?
	Why_____?
	Classify _____according to_____.
	What can you conclude from_____?
	What evidence can you present for_____?
	How does_____compare/contrast to_____?
Synthesis:	What would you predict from_____?
	What ideas can you add to_____?
	What will happen if_____?
	What solutions would you suggest for_____?
Evaluation:	What is your opinion of_____?
	What is the most important_____?
	What criteria would you use to assess_____?

APPENDIX G

BREAKDOWN OF ACTIVITIES IN ACADEMY CLASSES

Teach.	Activities	Wk. 3	Wk. 4	Wk. 5	Wk. 6	Wk. 7	Wk. 8	Wk. 9	Wk. 10	total hours
Eng 1	individ.activity small groups large groups explain/computer student use	2 hr 0 3 0 0	2 hr 0 3 0 0	1hr 2 2 ½ 3	4 hr 0 1 0 0	4 hr 0 1 1 2	1hr 2 2 ½ 3	4 hr 2 1 ½ 4	3 hr 2 0 0 3	26hr 5 12 2 13
Eng 2	individ.activity small groups large groups explain/computer student use	1hr 2 2 ½ 3	2hr 2 1 0 3	1hr 2 2 ½ 3	4 hr 2 1 ½ 4	4 hr 2 ½ ½ 4	2hr 1 1 0 0	3hr 3 ½ 1 4	4 hr 2 1 ½ 4	21hr 16 9 3 ½ 25
Soc. Stud. 1	individ. activity small groups large groups explain/computer student use	2hr 3 1 0 0	1hr 2 2 0 0	2hr 2 1 0 0	3hr 2 1 ½ 3hw	1hr 2 2 0 0	3 hr 2 0 ½ 2hw	0hr 2 3 0 0	2hr 3 1 0 0	14hr 18 11 1 5hw
Soc. Stud. 2	individ.activity small groups large groups explain/computer student use	2hr 3 1 0 0	1hr 0 4 0 0	1hr 0 4 0 0	1hr 0 4 0 0	3hr 0 2 0 0	2hr 3 1 0 0	1hr 0 4 0 0	3hr 2 ½ 0 0	14hr 8 20 ½ 0 0
Math 1	individ. activity small groups large groups explain/computer student use	2hr 0 3 0 0	1hr 0 4 0 0	3hr 0 2 0 0	2hr 3 1 0 0	1hr 2 2 0 0	3 hr 0 2 0 3	2hr 3 1 ½ 2	3hr 0 2½ ½ 2	17 8 17½ 1 7
Sci. 1	individ. activity small groups large groups explain/computer student use	1hr 0 4 0 0	1hr 2 2 0 0	1hr 2 2 0 0	2hr 3 1 0 0	1hr 2 1 0 0	1hr 2 2 0 0	2hr 3 1 0 0	3 hr 2 0 ½ 3hw	12 16 13 ½ 3hw
com-puter 1	individ. activity small groups large groups explain/computer student use	0hr 0 0 4 1	1hr 0 0 1 3	1hr 0 1 1 2	0hr 0 0 1 4	1hr 1 1 0 4	0hr 1 0 1 4	0hr 0 0 1 4	1hr 1 0 0 3	4hr 3 2 9 25
com-puter 2	individ. activity small groups large groups explain/computer student use	0hr 0 0 3 2	0hr 0 0 2 3	1hr 1 0 1 2	0hr 1 0 1 4	0hr 0 0 1 4	1hr 1 0 0 3	0hr 1 0 1 4	1hr 0 0 0 4	3hr 4 0 9 26

APPENDIX H

CAREER UNIT

Careers Unit

Phase 1: Careers Exploration (12 weeks)

Overview of careers

1. Learning Styles — Counselors/Social Studies
2. Career Assessment Battery — English classes
3. "Math, Who Needs It?" — Mathematics classes
4. Speakers — Computers/Science

Assessment:

1. Students write a report about themselves, summarizing the results of the CAB and learning styles inventory as to which jobs they are best suited for and present the information to the class.
2. Students will begin career portfolio.

Career Project (3-5 careers)

Students will research 3-5 careers and present a report including at least one graph, one map and a bibliography.

ENGLISH	1. Research on Careers 2. Writing 3. Essays and literature relating to careers
WORLD HISTORY	1. Trace the history of careers 2. Maps
MATH & SCIENCE	1. Collection and interpretation of data 2. Analysis of statistics 3. Measurement, metric conversions, graphing, tools of math and science
COMPUTERS	1. Project will be formatted and completed in computer class 2. Guest speakers and taping

Phase 2: Career Economics: A personal Evaluation (12 weeks)

ENGLISH	Write letters, book reviews, bibliographies
MATH	Budget, financial planning and projections
WORLD HISTORY	Historical background, factors impacting change, interviewing

SCIENCE Science-related fields

COMPUTERS Part of the project must be produced on the computer.

Assessment: A portfolio including phase 1 and 2 components

Phase 3: Presentation (6 weeks)

Career Fair

Math, science & computers	Projects dealing with science, math and technology careers

Magazine

English, history & computers	Highlights of students' best work in all subjects (from portfolios)

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