1-1-1998

Development of an interdisciplinary program in an elementary setting : a case study of integrating curriculum topics with the arts.

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DEVELOPMENT OF AN INTERDISCIPLINARY PROGRAM IN AN ELEMENTARY SETTING A CASE STUDY OF INTEGRATING CURRICULUM TOPICS WITH THE ARTS

A Dissertation Presented

by

LAURIE J. DEROSA

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

DOCTOR OF EDUCATION

May 1998

School of Education

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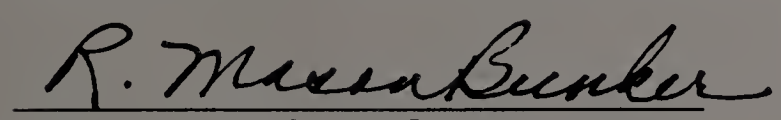

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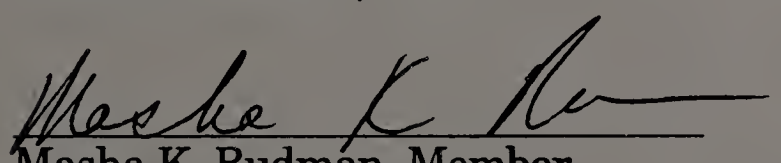

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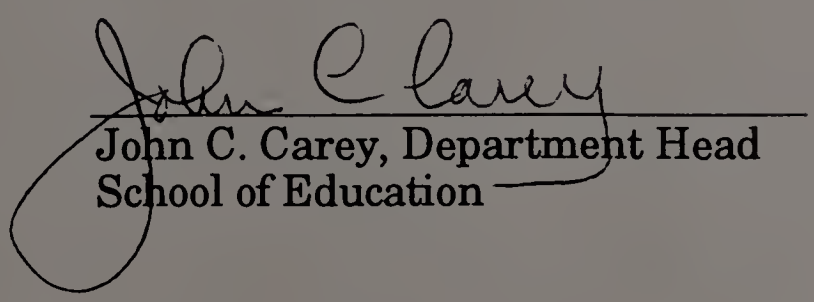

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ACKNOWLEDGEMENTS

I would like to express my gratitude and thanks . . .

- to Mason, who patiently guided me through the process and helped me build confidence to embark on this journey.

- to my committee members, Masha and Martha, who offered constructive criticism throughout the process. I am especially grateful for Masha's Friday night doctoral seminars because they reassured me that I was not alone and allowed me to share ideas which helped me to clarify my thoughts.

- to my husband, Bob, who unselfishly allowed me uninterrupted time and supported me throughout my graduate experiences.

- to my friends, Sue and Karen, who listened and supported me.

- to my parents, whose values taught me to be the best that I could be. "When given lemons, make lemonade." Also to my sisters, whose support gave me strength and comfort when I needed it.

- to my colleagues, Judy and John, who offered their support and expertise during the writing process.

- to all the teachers in my school, especially Francine, Joyce, Marcia, and Lance, who allowed me into their classrooms and were willing to take a risk and try something new.

- to Fred, who indirectly gave me uninterrupted time to conduct this inquiry.

- and finally, to our glorious environment, whose sunshine and rain cleansed my soul and offered me many moments of wonderment. I am especially grateful for the hummingbirds dancing in front of my office windows and for the deer who appeared during my nature walks. Lastly, I am grateful for my gardens, whose beauty and connection with the earth kept me grounded.

ABSTRACT

DEVELOPMENT OF AN INTERDISCIPLINARY PROGRAM
IN AN ELEMENTARY SETTING
A CASE STUDY OF INTEGRATING CURRICULUM TOPICS
WITH THE ARTS

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This qualitative case study focuses on the development of an interdisciplinary program in a Massachusetts urban elementary school over a fourteen month period as it moved from a teacher-directed approach to a student-directed one. An underlying assumption in this study is that integration of the arts supports learning. The interdisciplinary approach employs collaboration of teachers from different disciplines. The researcher in this study is also the art specialist. This study is a teacher's story viewed through a researcher's lens. One question which intrigued this researcher is: Who should choose the interdisciplinary connections, topics, and related arts projects - teachers or students?

The naturalistic methodology of qualitative research utilized in this study included data collected through a researcher's journal, participant observer field notes, formal and informal interviews, researcher-made survey questionnaires, videotapes, and student projects. The study examined three focuses: different approach styles, effect of collaborating teachers' role on the learning environment, and factors affecting students' choices when deciding topics and interdisciplinary connections for projects.

One conclusion drawn from data revealed that the development of the program was unique to each collaborating team. Although seven approach styles unfolded, the same style used with some teams developed differently. Factors included prior experiences, comfort level, constant reflection and feedback. Concerns inhibiting development included time to plan and scheduling limitations. The effect of the collaborating teachers' role on the learning environment disclosed both interpersonal and intrapersonal characteristics. Collaborating teachers experienced leader, assistant, co-leader, and facilitator roles. Teachers were flexible and adaptable in each role although, at times, the roles felt uncomfortable. The program's development influenced personal teaching strategies and styles, and fostered companionship among members. One concern to emerge was the learning environment itself. It appeared that the location (classroom or art room) effected the choices and effort students put into their projects.

Another conclusion drawn from this study is that students should have a voice in the process of learning. Grade four students favored choices in the decision making process and experiences which involved movement or manipulation of materials. These conclusions support elements of brain-based learning and learning through the arts.

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CHAPTER I

RATIONALE AND STATEMENT OF THE PROBLEM

Introduction

The process of learning has always intrigued researchers. Two questions that have interested me as a researcher are: how do educators provide students with opportunities that build individual strengths; and do learning opportunities match students' interests? These questions raise issues concerning the ways in which teachers make choices as they go about the process of creating optimal learning environments. One type of learning environment, referred to as an interdisciplinary approach, employs collaboration of teachers from different disciplines. Heidi Jacobs, a professor of teacher education and editor of *Interdisciplinary Curriculum : Design and Implementation* (1989) defined the term, interdisciplinary, as:

> "A knowledge view and curriculum approach that consciously applies methodology and language from more than one discipline to examine a central theme, issue, problem, topic, or experience." (p.8)

The approach can be short-term (a one time unit of study) or long-term (a sequence of events over time). Research focused on the development process in a long-term approach may provide a deeper understanding of interdisciplinary learning.

This qualitative case study focuses on the development of an interdisciplinary program in a Massachusetts urban elementary school over a fourteen month period. In this study, I examined the growth of an interdisciplinary program as it moved through three developmental phases from a teacher directed approach to a student directed one. Phase One and Two describe different styles of implementation created in the first year of the program. In the program's development, two collaborating teachers moved

through three approaches: teacher directed, teacher-student directed, and student directed. Phase Three, a three month program, examines the student directed approach in a single classroom focusing on factors influencing student choices.

A profile of a grade four team (a classroom teacher, her students and an art specialist) unifies the three phases of this program and provides a narrower focus to examine the beliefs and motivations of the participants (teachers and students) when making interdisciplinary connections. The researcher in this study is also the art specialist. The aim of this study is to develop a deeper understanding of the contribution and limitations of this learning approach.

Background

The interdisciplinary program in this school setting initiated on March 2, 1995. The principal and vice principal asked me to meet with them. They informed me that a preschool would be added to our school within a four week period and my art room was needed for that class. The art program was to become "Art on a Cart" and travel from classroom to classroom. I knew from personal experience and knowledge of other art colleagues' experiences that the loss of an art room is common whenever space is needed in schools. It was at this time I began to question how I could turn this inopportune situation into an opportunity. My graduate studies at the University of Massachusetts encouraged the application of theories into practice. Those experiences expanded my knowledge and perceptions of the broader general school curriculum and instilled in me a vision for change. In March 1995, I proposed my vision to the administration and teachers. My proposal called for an alternate week art program freeing me to work collaboratively every other week with teachers who wanted to explore an interdisciplinary approach to learning. Weekly art classes for each classroom in the school changed to

biweekly classes. This rescheduling still gave all students art time but also left eighteen time slots for interdisciplinary sessions. Each combination of a teacher's class with the art specialist created a different team in the program.

As the program evolved and in my role as a teacher-researcher, I began to wonder who should choose the curriculum topics and interdisciplinary connections, teachers or students? This question led one grade four team to attempt three learning approaches:

1. Teacher directed
   Teachers choose the curriculum areas, topics, and a related arts projects

2. Teacher-student directed
   Teachers choose the curriculum areas and topics and their students choose a related arts project

3. Student directed
   Students choose the curriculum areas, topics, and arts projects

The roles of the teachers differed in each of these approaches. When the program began, the teachers directed the learning experiences and through the program's development, the roles changed to facilitators' roles. A review of the literature portrayed interdisciplinary studies that combined disciplines from a teacher's point of view and revealed a lack of any studies that focused on students choosing their own interdisciplinary connections. Phase Three of this study focuses on students making their own interdisciplinary connections. A potential significance of this study is viewing the interdisciplinary learning experience from a student's perspective.

Statement of the Problem

The purpose of this case study is to describe the development of an interdisciplinary program in a particular setting over a fourteen month period. Focus questions helped guide the inquiry and data collection:

1. How did the interdisciplinary program develop over a fourteen month period? What were the various styles of implementing interdisciplinary learning that developed in this setting?

2. What is the effect of the collaborating teachers' role on the learning environment in an interdisciplinary approach?

3. What factors affect students' choices when deciding topics and interdisciplinary connections for projects?

The purpose of the first question is to describe the styles of interdisciplinary learning attempted in this school setting. The focus was to examine how the different styles related to other interdisciplinary experiences gleaned from the literature by comparing and contrasting characteristics. How do the concerns and beliefs of the participants in this setting compare with the literature?

The second question focuses on the role of the teacher the learning environment. Where did the learning experiences take place? Who made the interdisciplinary decisions? The purpose of the second focus question is to describe how the teachers' roles changed and effected those decisions.

The third question concentrates on the student directed approach attempted by a grade four team. During the program's third phase, one grade four team allowed students to decide the curriculum area, topic, and related arts project. What factors affected student's choices? These grade four students experienced all three approaches. Which approach did the students favor and why?

Rationale

Have you ever been so interested in a topic that before you realized it, hours had passed? What is more important, how easily the information was learned and recalled when you began to share your "new-found information" with others? If learning can be so enjoyable, then why are some students unsuccessful in their learning experiences? Are the opportunities schools provide uninteresting to the learner? Do teachers establish learning environments that provide opportunities for all types of learners? Are the learning experiences brain-compatible? Recent research in multiple intelligences (Gardner, 1985), learning styles (McCarthy, 1980; Dunn and Dunn, 1992) and brain-based learning (Hart, 1983; Caine and Caine, 1994, 1997; Dryden and Vos, 1995; Hannaford, 1995; Dennison and Dennison, 1989; and Buzan and Dixon, 1978) has increased educators' interest to restructure the learning process by integrating learning experiences. The research reports the multiple means humans have for seeking, processing, and expressing knowledge. Too often, across the general curriculum, only verbal expressions have been acceptable as a tangible expression of knowledge. The program in this study provided an opportunity for students to express knowledge visually through the arts.

Brain-Based Learning

The most recent research to support an interdisciplinary approach is the theory of brain-based learning. Geoffrey and Renate Caine (1994), educational researchers and authors on brain-based learning, stated several reasons supporting interdisciplinary teaching:

1. The brain searches for common patterns and connections.

2. Every experience contains within it the seeds of many, and possibly all, disciplines.

3. One of the keys to understanding is what is technically called redundancy. (p.128)

The "keys to understanding" are multiple opportunities for students to obtain and express knowledge. "If the same message can be packaged in several ways, the receiver has a much better chance of grasping what is happening" (Caine and Caine, 1994, 128). Eliot Eisner (1994), a professor of art education and leading proponent of an arts integrated curriculum concurred: "Education programs that aim to help children gain an understanding of the world need to recognize that understanding is secured and experienced in different ways" (p.147-148). Eisner asserted that different knowledge systems are utilized to "acquire, store, and retrieve understanding" (p.148). I believe that teachers who utilize various teaching styles and methods create optimal learning environments. Such environments represent one means to improving the learning process.

The collaboration of teachers in an interdisciplinary approach may help to create a learning environment which allows students opportunities to experience curriculum topics in multiple ways. An interdisciplinary curriculum also provides patterns and connections for more complex reasoning thus enhancing student learning (Caine and Caine, 1994; Grady, 1994). Eric Jensen (1995), a well-known writer and keynote conference presenter, defined brain-based learning as "a dynamic interdisciplinary system wide approach based on the way current research in neuroscience suggests our brain naturally learns best" (NH Conference, Sept. 28, 1995). The brain-based learning approach affects five areas in the process of learning: instructional strategies, environment, curriculum, assessment, and organizational structures (Jensen,

1995). The rationale for using theories of brain-based learning is that it is embedded in all that we do as educators when creating learning environments for different types of learners.

Arts in Education

The interdisciplinary approach in this study includes the arts. Numerous research and reports build a case for integrating the arts in education (McLaughlin, 1990; Welsh and Greene, et al., 1995; Weigand, 1985; Brigham, 1978; Weinstock, 1981; Oddleifson,1992a; Graillert, 1991). In the 1970's, a report, *Coming to Our Senses,* sponsored by the National Endowment for the Arts (NEA) stated: "The arts provide unique ways of knowing about the world and should be central to learning for this reason alone" (Rockefeller, ed., 1977, 6). I define "integrating the arts" as learning activities that combine a topic from the broader school curriculum with the processes of art media and methods. I believe the difference between integrating the arts and an interdisciplinary approach involves the expertise of teachers. Classroom teachers can integrate an art experience into their curriculum, but it is an art teacher who provides expertise in choosing and facilitating the arts media and methods. The art teacher also is skilled in using and fostering creative abilities. Developing an interdisciplinary curriculum challenges the creativity of teachers as well as the students (Kronish and Abelmann, 1989, 20). Collaboration of teachers in an interdisciplinary approach brings expertise from various disciplines together with various levels of creative abilities.

I have been an art specialist for the past eighteen years. I have always noticed the expression of enjoyment on students' faces when they are in the process of creating. Not only does the experience give students joy, but also the process results in a tangible expression of knowledge. The interdisciplinary program described in this study combined the arts processes and media with

the broader general curriculum content. I believe this is a natural blend increasing students' interest in learning and understanding. This program combined the expertise of collaborating teachers to facilitate learning by viewing curriculum topics from multiple perspectives. In addition, I believe if students' interests influence curriculum content and arts projects, the result might develop within students a desire to learn because the experience is more meaningful. This case study provides the opportunity to explore these beliefs and to examine their meaning.

Therefore, the rationale for including brain-based learning theories and the arts in education is to demonstrate a teaching strategy, which may foster development of individual interests. In Phase Three of this study, I attempted to restructure the learning environment to be more brain-compatible. By examining the changing teachers' roles, this study may help other educators to take a risk and join a collaborative teaching approach supporting the multiple means students have for obtaining and expressing knowledge.

Methodology

The naturalistic approach in qualitative studies chosen for this study provides detailed descriptions. This approach gathers data as it naturally occurs in the setting by observing participants who are engaged in natural behavior (Bogdan and Biklen, 1992, 3). Through analysis, the researcher constructs meaning from the data to create multiple views of reality (Marshall and Rossman, 1989; Bogdan and Biklen, 1992).

The case study design in this dissertation provides a detailed examination of an elementary setting where interdisciplinary learning took place and describes the events as they happened. The collection and analysis of data allow a narrower focus of the study to be examined. This "funnel" representation of qualitative data gathering, as described by Bogdan and

Biklen (1992), education professors and researchers, fits this case study because the development of this program was an ongoing event. Each phase informed the next level of development.

The participant observation methodology is important to this study because it allows the researcher to become involved in the process. As researcher, I was immersed fully in the setting as a participant. Immersion allows the researcher to act naturally in his or her role and experience reality as a participant before meaning is attached to those observations (Marshall and Rossman, 1989, 79). Although Bogdan and Biklen (1992) warn against choosing familiar research sites (pp.60-61), I believe, as a researcher in this study, my relationship with the chosen site had several advantages. My professional connection and relationship with the research site have developed during eight years of employment within this school system. This eliminated the time needed for a researcher to get acquainted with the site. I was comfortable in the environment and had an in-depth knowledge of the school from a teacher's perspective. An unfamiliar person entering the classroom setting often is viewed as a limitation in research studies (Bogdan and Biklen, 1992, 88-90). Because I was the art specialist in this setting, my research role was not obtrusive nor was I viewed by the participants as an outsider looking in. I believe my familiarity with this setting did not affect participants' behavior. For the past eight years, I have tried to build a positive rapport with colleagues and students, establish cooperation, and build trusting relationships.

Qualitative methodology is useful for this study because it is grounded in the role of the narrative. Witherell and Noddings, qualitative researchers, explained the importance of story and narrative in educators' work in their book, *Stories Lives Tell* (1991). They defended the narrative model structure because it gives meaningfulness and understanding to everyday life (p.3). This model serves teachers seeking to understand learners. This dissertation study presents a teacher's story viewed through a researcher's lens. Eighteen years

of teaching art have honed my skills as a teacher. My graduate experiences have prepared me with qualitative research skills for this study. Thus, I was in a unique position to combine these roles to obtain meaning and gain insight into the interdisciplinary approach in this setting.

Educational research requires the collaboration of the researcher's role and teacher' role (Eisenhart and Borko, 1993; Marshall and Rossman, 1989; Hubbard and Power, 1993). The collaboration brings the expertise of the teacher together with the expertise of the researcher to address practical educational problems. Educational research is complex because it requires ongoing deliberation and decision-making. As classroom activities evolve, the design and procedures are modified (Eisenhart and Borko, 1993, 11). Collaborating teachers and students in this setting participated in discussion during and after each interdisciplinary unit to review parts of the process. The collaborating teachers also informally and continually discussed the process and reflections during and after program sessions.

Examples of successful collaborative researcher/practitioner studies include The Teacher Lore Project at the University of Illinois at Chicago. This ongoing research effort initiated by William Schubert, a professor of education specializing in curriculum theory and history, involved teachers and researchers. According to Schubert, teacher lore is "the study of the knowledge, ideas, perspectives, and understandings of teachers." (in Witherell and Noddings, eds., 1991, 207) Schubert's research, which is embedded in Deweyan philosophy, reflects teachers learning from experiences and those experiences giving meaning and direction in their environment (p.214). In other words, teachers continuously blend theory and practice. Schubert believed teachers' "*daily inquiry* needs to be seen as a viable form of research, for it potentially makes available insights and understandings." (p.211) His research valued teachers sharing their experiences to influence others.

Teacher stories "enhance the interpretation, assessment, and subsequent action" of research issues (p.211).

Another researcher, Susan Florio-Ruane (in Witherell and Nodding, eds., 1991), agreed with the concept of researcher/practitioner collaboration. She recognized the need for teachers to be directly involved in the interpretation of data for the research to be useful. Florio-Ruane created the Written Literacy Forum by combining researchers with practitioners in conversation about their research study. She created this forum after sharing the results of a research case study with the teachers involved in that study. She noticed her research did not "grasp" the teachers and for research to be of value, the teachers needed to "grasp it" (p.237). In this setting, I involved teachers by continually discussing concerns and issues throughout the fourteen month program development. These conversations took place informally during program sessions and formally during interviews.

My experiences as a teacher and as a researcher, along with the collaboration of classroom teachers and students, influenced how the interdisciplinary learning approach developed in this school setting. I chose the collaborative effort because it "gives credibility to teachers themselves as creators of knowledge and theory that can illuminate an understanding of curriculum, teaching, and the educative process." (Schubert, in Witherell and Noddings, eds., 1991, 214) In the chapters that follow, I will describe in detail the specific methodologies used, present collected data and analysis of those data, draw conclusions, and propose areas for further research.

Outline of the Dissertation

Chapter I : Rationale and Statement of the Problem

In the introduction chapter, interdisciplinary learning is placed into context in this particular elementary setting followed by the statement of the problem, rationale, methodology, and brief summary of the study.

Chapter II : Review of the Literature

The review of the literature provides a historical context for the interdisciplinary learning approach; a historical context for establishing a brain-compatible learning environment; and definition of a teacher's role in the learning environment.

Chapter III : Methodology and Procedures

This case study utilizes the naturalistic methodology of qualitative research and describes the site, participants, methodology of data collected, and analysis procedures.

Chapter IV : Data Presentation and Analysis

Data are presented chronologically through three phases with brief excerpts to identify patterns and themes that respond to the research questions. Analysis of the data include juxtaposing characteristics of this program's approach against characteristics gleaned from the literature review. Multiple data sources provide triangulation of themes and patterns.

Chapter V : Conclusions and Recommendations

Conclusions drawn from this study and implications of the results for other educators are presented along with recommendations for further research.

CHAPTER II

REVIEW OF THE LITERATURE

The review of the literature provides the theoretical foundation for this study. The inquiry questions of this study (p.4) provided a focus for the review. Part One views the interdisciplinary learning approach in a historical framework. Part Two places the theory of brain-based learning into a historical perspective and defines brain-based learning elements and characteristics of a brain-compatible learning environment. Part Three views the role of the teacher in the learning environment citing advantages and disadvantages of three approaches: teacher directed, student directed and teacher-student directed.

Part One: Interdisciplinary Learning

A Historical Perspective

In order to develop a comprehensive knowledge of the interdisciplinary approach, Part One describes theories, trends, and patterns of the interdisciplinary learning approach which developed over this past century. Interdisciplinary program characteristics defined are used as a basis of comparison with the program in this study.

Interdisciplinary programs can involve two or more disciplines which may or may not include art. I narrowed the focus of the review to programs which included the arts. The interdisciplinary approach also reaches all levels of education from Pre-K through college. I further narrowed the focus to the Pre-K through elementary level. Therefore, this literature review investigates the theories, trends, and patterns which incorporates the arts in an interdisciplinary approach in elementary programs.

Definition of Terms

For this study, term definitions used are:

School Curriculum: "The curriculum of a school, or a course, or a classroom can be conceived of as a series of planned events that are intended to have educational consequences for one or more students." (Eisner, 1994, 31)

Discipline: Defined by Piaget (1972), a discipline is "a specific body of teachable knowledge with its own background of education, training, procedures, methods, and content areas." (qtd. in Jacobs, 1989, 7).

Interdisciplinary Curriculum: "A knowledge view and curriculum approach that consciously applies methodology and language from more than one discipline to examine a central theme, issue, problem, topic or experience." (Jacobs, 1989, 8)

Background

The interdisciplinary learning approach has a history that begins in the 1920's when a project-based approach incorporated a variety of disciplines and themes in schools (McMurray, 1920, v). The underlying belief reflected the "need to organize knowledge into complete wholes or projects" (McMurray, 1920, v). The approach also needed to be child-centered and related to real life experiences (McMurray, 1920, 46-47).

John Dewey's philosophy of experiential learning for children fostered this same belief and has been an influential force over this past century. Dewey (1934) believed life was not compartmentalized but was an integrated whole. His philosophy supports an interdisciplinary approach because he advocated the use of the arts in education.

During the 1970's, on a national level, the federal government promoted the interdisciplinary approach by funding programs. Those which involved the arts included: IMPACT, a five year school program integrating the arts into the regular curriculum; Learning to Read through the Arts (LTRTA); and Reading

Improvement through Art (RITA). Program goals reflected improving reading skills as well as artistic development and self-esteem (Schiff, 1977, 9). Evaluations of these programs revealed improvements in test scores and attendance among its participants. Despite positive outcomes, development of such programs dissolved when the federal funding ended. One program, which has continued for twenty years, is the LTRTA program in New York. Current research by the Office of Educational Research, New York City Board of Education (in Welsh and Green, et al., 1995, 21-23), showed consistent and impressive academic improvement. Multiple data sources including: pre and post tests, interviews, observations, student and teacher surveys, standardized test scores and holistic writing samples, showed evidence of the program's success.

In 1983, a report by the National Commission on Excellence in Education, *A Nation at Risk,* raised issues about the quality of education. This report helped to shape the current education reform initiative, *Goals 2000: Educate America Act of 1994.* When the government released this document, the first draft did not include the arts. However, arts advocates submitted an amended version that included the arts. For the first time in the history of education, the arts became a core curriculum subject taking its place beside "reading, writing, and arithmetic".

The National Art Education Association (NAEA) responded to the 1994 education reform initiatives by developing a national voluntary set of arts' goals. NAEA published K-12 standards in the *National Standards for Arts Education: Dance, Music, Theatre, Visual Arts: What Every Young American Should Know and be able to do in the Arts* (1994). Interdisciplinary learning is encouraged in their report, but more importantly, they argued that the arts should first be taught as a discipline in its own right.

> Arts education benefits the *student* because it cultivates the whole child, gradually building many kinds of literacy while developing intuition, reasoning, imagination, and dexterity into

> unique forms of expression and communication. This process requires not merely an active mind but a trained one. An education in the arts benefits *society* because students of the arts gain powerful tools for understanding human experiences, both past and present. They learn to respect the often very different ways others have of thinking, working, and expressing themselves. They learn to make decisions in situations where there are no standard answers. By studying the arts, students stimulate their natural creativity and learn to develop it to meet the needs of a complex and competitive society. And, as study and competence in the arts reinforce one another, the joy of learning becomes real, tangible, and powerful. (NAEA, 1994, 132)

The statement, art for art's sake, encompasses NAEA's belief that the subject of art should be studied by itself to provide a firm foundation for integration and correlation to other subjects. The belief that art should be studied as a separate discipline is one argument which hinders development of interdisciplinary programs.

As a researcher I have noticed the present efforts of national reform and school improvement is towards standardization. Standardization means the same knowledge and school experiences for all students. Although it is important that our students are skilled in basic competency, I have found little evidence of national curriculum guides that emphasize developing a curriculum which places emphasis on the unique interests of each student.

Theories Supporting Interdisciplinary Programs

Theories, which support interdisciplinary programs, include brain-based learning, multiple intelligences, and individual learning types and styles. The brain-based learning theory has a base with research conducted in the 1950's by Dr. Roger Sperry at the California Institute of Technology. His right and left brain research received a Nobel prize in 1981. His theory seemed to show each half of the brain as having different characteristics and abilities. The left

side processes are linear, logical, analytical, numerical, and sequential. The left side performs the verbal (language) and mathematical tasks. The right side processes are global (sees things as wholes instead of parts), intuitive, musical, imaginative, and creative. The right side performs the visual tasks including pictures, patterns, and rhythm. Sperry once believed that each side of the brain processed information differently and independently of each other. Further research has indicated both sides of the brain are always interacting. A more detailed description of brain-based learning is described in Part Two of this review (p.36-55).

Other research which supports the interdisciplinary approach includes individual learning types and styles. Researchers such as David Kolb, Bernice McCarthy, Roger and Rita Dunn, have explored the different ways people learn and identified diagnostic indicators to distinguish individual styles. The main theme to emerge from their research is that people have a variety of ways of thinking. Two main modes include the verbal and nonverbal. Today, our educational system tends to favor the verbal aspect in assessments and neglects the nonverbal processes.

The individual learning style research has also defined at least three types of learners: the visual learner, the auditory learner, and the kinesthetic learner. The visual learner primarily "sees" pictures in their brain and constructs "images" of learning. The auditory learner "hears" words and sounds in their brain. The kinesthetic learner "feels" learning and must move or manipulate materials to process information. In addition, some learners are combinations of the three types. For example, the V.K. learner is visual and kinesthetic. The A.K. learner is auditory and kinesthetic. Observing body language and listening to student's descriptions help teachers to identify the types. To facilitate learning, a variety of teaching strategies is needed to match the individual learning types and styles (Caine and Caine, 1994, 120).

The interdisciplinary approach supports different learning styles, and types because integrative activities help to present information in multiple contexts.

Another major theory supporting the interdisciplinary approach includes the research of Howard Gardner, psychologist and professor at Harvard University. His Multiple Intelligence (MI) Theory (1985) defined each individual as having multiple means of perceiving information. Gardner defined an intelligence as an ability "to solve problems or to fashion a product, to make something that is valued in at least one culture" (Gardner, 1990, 16). He first defined seven types of intelligences: mathematical, verbal, musical, bodily, spatial, intrapersonal, and interpersonal. More recent work by Gardner (1997) suggests the possibility of at least one additional intelligence, a naturalist intelligence (ability to see patterns in the living world) and possibly an existential intelligence (the human tendency to ask very basic questions about life). Gardner's intelligence theory is supported by brain research by giving evidence that each intelligence can be localized in an area of the brain.

Gardner's MI theory supports students representing knowledge in different ways using their own unique blend of intelligences. Gardner believes that most people have the capacity to develop all the intelligences to a fairly high performance level. Even though each individual may be described as having a tendency or strength in one area, every individual also has the ability to utilize "pluralized" intelligences, which are subcomponents to each intelligence and combination of different types (Lazear, 1991). His theory is useful to educators by advocating varying teaching styles to match students' strengths.

Interdisciplinary Program Trends

Brain-Based Learning theories, the Multiple Intelligence theory, individual learning types and styles have contributed to the development of a

variety of educational trends, patterns, and programs. The next section describes program trends, including learning through the arts, thematic, and integrated programs, and characteristic patterns of the interdisciplinary approach.

Learning Through the Arts

A comprehensive search of the literature revealed many interdisciplinary programs which included the arts. John McLaughlin (1990), Arts and Education Consultant and past Arts Education Director for the American Council for the Arts, prepared a monograph of more than one hundred research articles and studies building a case for integrating the arts in education. McLaughlin recognized the research over the past two decades reflected improving the "way the arts are taught in school and the importance of the arts to the cognitive development of the child." (p.9) If the arts contribute to the cognitive development of the child, then development of interdisciplinary programs should be a critical component in every school's curriculum development.

During this decade, the NEA and the U. S. Department of Education have funded National Arts Education Research Centers at the New York University and the University of Illinois. These research centers mark the first substantial investment in arts education in twenty years. In 1994, a report by the NEA, *Arts Education Research Agenda for the Future*, stated the need for research in three major areas: curriculum and instruction, assessment and evaluation, and teacher education and preparation.

Welsh and Greene (et al., 1995), senior research analysts for the National Endowment for the Arts, complied a book which reported arts in the curriculum research. Their compendium reviewed forty-nine research studies

including both qualitative and quantitative methods. As in McLaughlin's book, this compendium serves as a resource guide in locating specific research topics.

The Center for Arts in the Basic Curriculum (CABC) has published numerous reports describing schools around the country that implement art in education curriculums. Their research claimed schools devoting twenty-five percent or more of the school day to the arts produce youngsters with academic superior abilities (Oddleifson, 1992b, 48). CABC asserted "that arts integrated schools are the most promising way to improve American education." (Oddliefson, 1994, 447). In an examination of schools that made the arts primary in the curriculum, CABC reported:

> Test scores rise, student's passion for learning awakens, self esteem is enhanced, disciplinary actions are reduced, suspension drop/out rates lower, teachers are reenergized, high attendance is maintained, parental involvement is improved, and the quality of personal performance increases fostering mutual respect.
>
> (Oddleifson, 1995a, 3)

The Waldorf School, a private organization founded by Ruldolf Steiner in 1919 was developed specifically to include the arts as basic to the curriculum. The school's philosophy was to educate the whole child - head, heart, and hands. Waldorf schools can be found in thirty-two countries around the world. In addition to the arts as being fundamental to their curriculum, teachers relate all learning experiences to student's lives (Barnes, 1991, 52).

Another school, The International NETWORK of Performing and Visual Arts Schools, has developed a philosophy based on infusing the arts into the general curriculum. The organization has 112 models for education in Canada and the United States. Models include a range of instruction strategies from PreK to adults. Their students become actively involved in their education as the curriculum is arts based and interdisciplinary (NETWORK, 1993).

Other schools around the country have boasted the positive characteristics of including the arts in the general curriculum. The Ashley River School in South Carolina infused the arts throughout the curriculum as well as kept the discipline separate in its own right. The Key School in Indianapolis has a reputation for successfully integrating the arts in the general curriculum and utilizing Gardner's Multiple Intelligence Theory. The SPECTRA+ program in Fairfield, Ohio, a four year model arts education, has instruction in the arts for one hour daily along with an artist in residence program. A three year pilot program in Augusta, Georgia developed a sequential curriculum based approach which placed the arts into all academic areas in the regular classroom. The common feature of these schools reflect a belief that combining disciplines with the arts has helped students in the learning process.

A dissertation research study by Karen Brooks (1991) focused on the initiation and development of an arts in education program in New York City. The two year case study used interviewing as a method of collecting data. Community artists integrated art experiences into the regular curriculum during the school year 1987-1988. Brooks' study focused on the process of designing the program and the process of implementation. Her analysis revealed the majority of teachers did not perceive a difference in student's work. Yet, the teachers felt the program was a way for students to "become stars through the arts" (pp. 206-207). They unanimously stated that the children loved the program, especially the special education students. The arts activities provided opportunities for those students "to shine" (p.207).

Brooks also concluded that the interpersonal skills of the principal played an important role in the implementation of the program. Teachers were not involved in the decision making process throughout the planning and implementation phases. The principal did not encourage his staff to share their ideas with him or ask them how to facilitate certain activities which

involved their students. Teachers perceived the program to be a "top down" approach. The teachers suggested that teamwork and continual planning would help the implementation phase.

Brooks' study provided a comparison to this study in the processes of program development. The difference between our studies was the source of the arts component. In her study, the arts came from outside sources. In this study, the arts were provided within the context of collaboration with the art teacher, the classroom teachers, and students.

The previous examples included programs which integrated the arts into the general curriculum. A narrower focus isolates combination of disciplines. A literature search revealed numerous studies and research involving one or more disciplines with art. One of the most prolific discipline combinations located in the literature search involved literacy and art. Literacy is defined as the concept of reading and writing. I chose two studies to review that closely connected to the program in this setting.

A dissertation study by Karen Ernst (1994a) reported combining literacy and art successfully. Her personal transition from teaching eighth grade English to teaching elementary art developed into research. She implemented a program using writing to help students express meaning in pictures. Her study combined visual and verbal thinking with expression through journal writing. Students in her elementary classes wrote in their journals before art projects were started, while the projects were ongoing, and after the project was completed. Writing helped students to define meaning in their artwork and allowed them to make connections with previous knowledge.

Beth Olshansky (1994) at the University of New Hampshire conducted research which also combined literacy and art. Her research is referred to as "Image-Making within the Writing Process". Olshansky's research supported evidence that children's writing topics became varied and imaginative when utilizing a collage process for story illustrations. The collage process involves

the creation of various types of papers to be cut and pasted into visual images. Her research revealed the topics of students' writings moved from personal narratives to fiction (p.355). The Image Making process is important to this study because it was used during Phase One and Phase Two.

Thematic

A major trend, which incorporates an interdisciplinary approach, involves the development of thematic units. The aim of thematic units is to expand thinking and help students make connections to their lives (Caine and Caine, 1994; Eisner, 1994; Kronish, 1989; Krogh, 1990; Lipson, et al., 1993). Thematic units bond disciplines. Units can incorporate two or more disciplines and, at times, can involve a whole school participatory approach. Various disciplines collaborate with each other by sharing common information and integrating knowledge and skills. The process helps the curriculum become less fragmented (Walmsley, 1994).

Mansfield's (1989) research study reported theme-based units as providing a framework to build an integrated approach. Mansfield's five week study, "Life of Egypt", involved 9-12 year old students from a Canadian elementary school. His study revealed a positive student's perception of a thematic approach. He noticed that the students displayed independence and autonomy when completing their projects. At the end of the unit, the students commented that learning was less fragmented and more holistic (p.139).

Research by Krogh (1990) not only included the thematic approach but also embraced an emergent model. The teacher and the students created curriculum as it progressed. The process involved students and teachers continuously undergoing reflection and change. Students helped to generate curriculum topics through their interests. Krogh's approach embraced a technique called curriculum webbing. Curriculum webbing places a theme

focus in the center, then different discipline project ideas radiate or branch out from that center.

Integrated

The integrated curriculum is another interdisciplinary approach based on developing theme units. "Integration connects subject areas in ways that reflect the real world." (Drake, 1993, 2) Susan Drake in her book, *Planning Integrated Curriculum : The Call to Adventure* (1993) described integration as the process of "dissolving the boundaries" (p.27-28). Disciplines assist educators in ordering knowledge in a meaningful way and impose a structure to help make sense of our world. Dissolving the boundaries through integration restructures the curriculum to how we perceive the real world (p.28).

The "Reggio Emelia Integrated Approach" developed in Italy during the middle part of this century utilizes an art integrated curriculum. At the Reggio Emelia School, learning activities have been child centered and emergent and the children help to generate ideas, topics, and theories. Emphasis has been placed on the children's symbolic drawings to create more meaning in their learning (Schiller, 1995, 46). However, the term "art" has not used and instead replaced by the term, "project work". Once students have expressed ideas in one medium, they often express the same idea in a different medium helping to generate meaning within each student.

The whole school (including the custodian and cook) function as a team in the process of learning. There is constant collaboration of experiences by the staff. Students explore one topic at a time and develop theories, for example, how rain is formed and shadows are made. Teachers are free to use whatever time is necessary for students to explore ideas in depth and learn skills as needed.

The children's artwork enhances the environment and commercial visuals are not used. The school is designed around an art studio (atelier). In that location, small groups go to "think out" problems visually with the assistance of an art teacher (atelierista). At the Reggio Emelia School, the learning environment is important and is often referred to as the "third teacher" (there are two teachers for each group of twenty-five students). The layout of the building, the decor, and the visual decorations are important to their philosophy of learning (Topal, 1997).

An interview with Reggio Emelia's Atelierista (art teacher), Lella Gandini, revealed her artistic training to be of vital importance to the Reggio Emelia program as she visited each teacher every day (Vecchi, 1993). Gandini recognized that art training was different from classroom teacher training and her art expertise brought a different background to the learning experience. Her role as a "constant consultant" helped teachers to see visual possibilities that may not have been apparent to them (Vecchi, 1993, 125).

In the fall of 1988, Marks Meadow Elementary School in Amherst, MA implemented an approach based on Reggio Emelia's program: "The City in the Rain". The Amherst unit developed a snow theme based on New England weather. In the reflection of its process, Forman (et al., 1993) cited the issue of planning to be critical. Most teachers involved in the program spent many hours planning, which was not scheduled during their regular school day.

The Integrated Thematic Instruction (ITI), developed by Susan Kovalik, presented another approach to integrate a thematic curriculum. The ITI approach, a comprehensive model which incorporates current brain research and meaningful curriculum, was designed in four stages:

Stage One: Selecting a slice of real life
Stage Two: Identifying key points
Stage Three: Developing inquiries
Stage Four: Creating a year long theme
(Ross and Olsen, 1995, IV-1)

Key points are defined as the concepts, significant knowledge, and skills which develop useful mental patterns for making meaning of the world (Ross and Olsen, 1995, VIII-4). Inquiries are defined as the action part of learning and are based on real-world issues using authentic assessment or performance-based assessment which ask two basic questions: "What do students understand, and what can they do with it?" (Ross and Olsen, 1995, VIII-3). The final stage of creating a year-long theme was designed as a pattern-enhancing activity to help "glue" everything studied during the year (Ross and Olsen, 1995, VII-1).

The John Elliot School in Needham, Massachusetts has developed an arts integrated curriculum and I had an opportunity to visit this school in 1994. As I walked in the hallways viewing bulletin boards, and looked at curriculum displays within the classrooms, and talked with classroom teachers, my first impressions revealed a positive reflection of an art-based curriculum. Miriam Kronish, the principal, has been an active participant within classrooms and has been an integral component in creative school-wide performances. Informal conversations I had with teachers revealed the extent to which Kronish seemed to value the arts. This school's adoption of an arts integrated curriculum and implementation of a social skill and self management curriculum, have contributed to climbing test scores in the standardized MEAP (Michigan Education Assessment Program) exams. These exams test areas in reading, science, social studies and math. The MEAP scores have indicated that this school has become one of the top scoring schools in Massachusetts.

Sybil Marshall (1963) in her book, *An Experiment in Education,* described integrating the arts with her classroom teaching strategies. Her curriculum valued the importance of practicing art herself as well as using art for understanding other subjects. She stated: "The essential thing was to grasp every idea that would make learning more *active* and therefore more

interesting and more easily assimilated" (p.54). Art was used in her teaching as "means towards a better, fresher view" of other subjects.

Technology

One of the latest trends in interdisciplinary programs involves the use of technology. The ever-changing world of technology adds impetus to the development of interdisciplinary programs. With the aid of computers and "cyberspace," students can access billions of facts within seconds. Students need skills to creatively and critically deal with this information. Technology and the interdisciplinary approach can help students create a self-chosen thematic portfolio, which will lead students down a lifelong learning path.

Gregory (1995) described the process as "Emancipatory Constructivism", a student-generated inquiry curriculum approach (p.8). In an inquiry curriculum, students become the primary influence in deciding curriculum topics based on personal interests. The technology approach utilizes interactive, integrative, and multi-sensory computer programs that interact with text, graphic, audio, and videodisc information. Gregory (1995) believed the new media has "the power to transform the mundane happening into exciting multi-sensory adventures" (p.11). Computer programs can be developed to integrate several disciplines around themes, concepts, movements in history, or time periods, which would allow students to make cross-disciplinary connections (p.12). Gregory (1995) perceived the potential value of technology has just begun to be anticipated by educators (p.7).

Although my focus was on elementary programs, I was interested in a research study by Corwin and Perlin (1995) at the Kennedy High School in New York. Their study emerged as one of the first utilizing Videodisc technology and integrated art with American history. Corwin used two control groups and concluded that the group, which linked art and social studies, not

only improved the quality of learning historical concepts, but also increased their scores on a standardized history test (1995, 22). Also included in the study was the positive impact the non-verbal approach had on inner city students. This interdisciplinary technology approach demands more research and study as the 21st century approaches and technology becomes an increasingly important aspect of our lives.

Characteristic Patterns

The previous section presented a historical view of the interdisciplinary approach with supporting theories and programs. By reviewing and analyzing programs, characteristic patterns can be identified and create a broad base on which an interdisciplinary program can exist. In addition, characteristics that impede implementation also help to illuminate the struggles and complexities experienced by teachers during development of such programs. The next section presents characteristic patterns of interdisciplinary programs.

Curriculum Issues

Curriculum design is a continuous, ongoing process. Technology, research, methodologies, and education mandates require a revision of the old and an inventing of new curricula (Fowler, 1988, 9). The most common reason for designing interdisciplinary curriculums results from a fragmented curriculum. We live an interdisciplinary life and curriculum is only relevant when connections and meanings are made to real life (Jacobs, 1989; Caine and Caine, 1995; Jensen, 1995; Ross and Olsen, 1995; Drake, 1993). Recent developments in theories of multiple intelligences, learning styles, and brain-based learning contribute factors that encourage changes to the current fragmented curriculum.

The first step in designing effective curriculum is to decide what is important to learn; and second, to create the conditions for curriculum implementation (Eisner, 1991, 10). In an interdisciplinary curriculum, combining disciplines into a curriculum adds a critical component. Teachers should decide "what counts" before implementation can begin. Miller (1988) cautioned: "While general education is inherently interdisciplinary, a thematic or interdisciplinary curriculum is not inherently a general education program" (p.164). The issue raised by Miller involves how topics are selected and studied and to what end they are studied (p.164). The topics, methods, and activities vital to each discipline, should add to the entire educational value. Jacobs (1989) described this concern as a "Potpourri Problem" with a little of this being studied and a little of that being studied within each discipline (p.2). Jacobs stated the interdisciplinary approach must have a scope and sequence.

Another issue raised by Jacobs (1989) reflected the importance of choosing themes. Jacobs found that often "cute" themes are chosen instead of themes that evolve around a scope and sequence of guiding questions (1989, 72-73). Jacobs claimed that the theoretical substructure analyzing patterns, similarities, and differences within and across the disciplines must be established (p.2). These processes take time to develop and implement before the results can be assessed.

Interdisciplinary curriculums combine disciplines but the result can also crowd it (Lipson, et al., 1993, 254). Some activities may benefit one discipline but not another and the combination can lack educational value and become busywork (Brophy, 1991, 66). Brophy (1991) asserted that an activity is appropriate because it promotes progress toward valuable educational goals not merely because it cuts across subject matter lines (Brophy, 1991, 66).

Disciplines are the "bedrock of the curriculum" (Ross and Olsen, 1995, III-13). As stated earlier by Drake (1993), educators must dissolve curriculum boundaries. One of the problems cited by Ross and Olsen (1995), was that

education reformers are products of the discipline approach. Dissolving the boundaries requires a rethinking of beliefs.

Time

The issue of time stands out as a common concern in interdisciplinary programs. First, finding the time to coordinate planning for topics and activities is critical (Raywid, 1993; Jacobs, 1989; Mitchell, 1993; Drake, 1993). Raywid (1993) stated the collaboration of time for teachers to undertake and maintain school improvement may be more important than equipment or facilities (p.30). Jacobs (1989) described a two week K-6 interdisciplinary unit implemented in Elizabeth, Colorado where the teachers estimated the project took 164 hours of planning (p.51).

The second time issue involved flexibility of scheduling (Jacobs, 1989; Mitchell, 1993). Larger blocks of time for longer sessions help to integrate activities. However, the lack of common planning times in schedules has hindered teachers to collaborate and plan interdisciplinary themes. Integrating the arts represents a collaboration of classroom teachers and specialists (art, music, and/or gym). However, specialists are responsible for a classroom teachers' students while the teacher engages in contractual planning time. Raywid (1993) conducted a survey of how schools made the necessary collaboration time. The results ranged from sharing lunches, financing teams of substitutes to cover classes, teachers receiving compensation time, day long staff developments, to redesigning staffing patterns having a team of six teachers for four classes freeing teachers on a rotating basis (p.31).

Change

One of the driving questions in my mind throughout this literature review process was why more schools do not use the interdisciplinary approach, especially with its long history of positive results? The most prevalent cause for its lack of universality reflected the nature of change itself. Change in schools is difficult (Eisner, 1992; Fulbright, 1994; Caine and Caine, 1997). Fulbright in her speech for the Arts and Humanities Awards Ceremony (November 10, 1994) mentioned change involves uncertainty, ambiguity, low points, mistakes, frustrations, and possible outright chaos. Eisner (1992) claimed it is easy to change policies but it is more difficult to implement change within the schools (p.610). He asserted that teacher empowerment was critical for change to be effective and that teachers need authority and responsibility (p.616). In order to implement change, one needs to be a "risk-taker." It is difficult for some teachers to take a step into an unknown territory when they are comfortable in their present approach. Jacobs (1989) recommended a gradual change involving the needs and possibilities of individual schools (p.124). Thus, implementing an interdisciplinary program is an ongoing process.

Another critical component for designing and implementing change is to involve parents (Drake, 1993; Jacobs, 1989). Jacobs (1989) stated that keeping parents informed and involved is important since few parents have had experience with this approach to learning, the unknown can cause doubt and confusion (p.10). The other vital component is the need for support from administration and school committees.

Interpersonal Skills

Teachers are instrumental in implementing interdisciplinary change (Eisner 1992). The transition of implementing a curriculum change can cause personnel problems (Jacobs, 1989; Drake, 1993). The interpersonal skills of the staff are important for groups to come together to plan and implement program changes. Caine and Caine (1994) felt teams of teachers working together can easily be sabotaged by conflict and lack of communication skills (p.127). Abbey (1976) asserted that teachers lacked skills to deal with interdisciplinary teaching and cited attitudes, values, beliefs, and preferences of the teachers involved as critical to successful programs (p.35). Interdisciplinary teaching requires cooperation and collegiality in building collaborative partnerships. MacGregor (1993) defined collaborative partnerships as "one in which each of two or more parties contributes to and receives benefits from an enterprise" (p.4). Collaboration brings ideas from two points of view and new ideas can emerge that neither teacher alone might have thought of (Meyer, 1990, 49). The collaborative partnership also enables teachers to demonstrate ways subjects are integrated by helping students see how various concepts interact and effect each other (Caine and Caine, 1994, 127).

Modeling expected behavior is important in teaching any discipline, but students having the opportunity to witness two collaborating teachers modeling learning, especially from different perspectives, is a valuable learning experience (Mitchell, 1993; Kronish, 1989; Caine and Caine, 1994). Teachers can learn from one another and from students (Kronish 1989, Gandini in Vecchi, 1993). Walmsley (1994) referred to the issue of learning along with the students as "bumping up one's knowledge of a topic" (p.24-25). Further, Walmsley stated that when teachers acquire new knowledge they become more enthusiastic and excite their students. This behavior creates teachers

who are lifelong learners. However, Walmsley forewarned teachers not to "tell and show" students their new found knowledge, but to lead their students through the investigative process.

Territoriality

Territoriality is one of the concerns that may holding back development of interdisciplinary programs in schools (Jacobs, 1989; Abbey, 1976). Jacobs (1989) described this concern as a "polarity problem" where two or more disciplines create tension and become territorial about their subject (p.3). Jacobs (1989) stated this issue can be resolved by teachers establishing the need for interdisciplinary possibilities, defining the terms used in each field, and presenting a set of assumptions to guide effective practice (p.3).

A solid foundation in all disciplines is important before students can fully benefit from interdisciplinary studies (Jacobs, 1989; NAEA, 1994; Cohen and Gainer, 1995). As stated earlier, the NAEA national standards not only supported the arts standing alone and taught for their intrinsic value, but also arts education could be taught in an interdisciplinary approach. NAEA (1994) stated that teachers helping students make connections between concepts and across subjects brings together different perspectives (intro).

Time to gain familiarity with the approach is one concern, but also necessary is a "willingness to give" (Krogh, 1990, 257). A willingness to give means giving time to plan, sharing of resources, and sharing of knowledge. This characteristic becomes important when curriculum designers examine the scope and sequence of study (Jacobs, 1989, 9). A willingness to give is defined by Caine and Caine (1997) as "letting go" of deeply held beliefs and volunteering to participate in restructuring the learning environment. They stated: "The key to successfully transforming education lies in transforming ourselves" (Caine and Caine, 1997, 11).

Assessment and Evaluation

A true measure of success in any program rests with evaluation procedures. Kindler (1987) reviewed interdisciplinary research and raised skepticism towards authentic research-based benefits of such programs. Although many examples of programs exist, Kindler claimed little research backed the beneficial claims, and the evaluations of most programs are "intuitive-based" (1988, 52). She claimed that integration with the arts contributed to developing skills in other subject matter areas was a learning assumption and not based on research (p.52). More recent qualitative and quantitative research since Kindler's assertions in 1987, can be found in McLaughlin (1990) and Welsh and Greene, et al., (1995) and supports beneficial claims to learning.

A debate between the verbal and visual modes of learning arises in the area of assessment. Janet Olsen, Associate Professor and Chair of the Art Department at Boston University (in Mammen, 1993) stated the visual modes of learning are not viewed as a valid tool for assessment. Olsen argued: "Who understands more about a tree, the child who can draw it in great detail or the child who can speak about it in great detail?" (in Mammen, 1993, 4). Olsen recognized one of the problems holding art back in the value of education is that the discipline is viewed as a frill and entertainment and not as a valid tool for learning (p.5). When Olsen compared the goals of the National Council of Teachers of English with the goals of the National Art Education Association she found similarities: "Both are modes of communication, ways of thinking, and primary means of experiencing and understanding the world around us." (in Mammen, 1993, 7).

The collaboration of the art teacher (visual) with the classroom teacher (verbal) provides an opportunity for students to express themselves visually

and verbally. Two or more teachers have the opportunity to assess the progress of student's learning from different points of view (Cohen and Gainer, 1995).

Teacher Training and Experience

A concern which emerged in the literature review was the lack of teacher training to implement an interdisciplinary program (Olsen in Mammen 1993; Eisner, 1992). Olsen (in Mammen, 1993) stated many pre-service programs do not include training in artistic growth and development and art courses don't focus on art as a process of learning (p.7). Eisner (1992) pointed out efforts in education reform do not provide time for teachers to develop the skills needed to implement changes (p.611). Eisner further cited that teachers are isolated in closed environments not conducive to professional development with colleagues, and in-service training lacks personal application to individual teachers (p.613-614). In addition, many professional development programs are scheduled *after* the school day.

Part One : Summary

Interdisciplinary teaching is recognized by many educators and researchers as a viable and beneficial component to student learning (Eisner, 1991; Gardner, 1985; Jacobs, 1989; Caine and Caine, 1994; Jensen, 1995). When I began to investigate the history of the interdisciplinary concept and discovered various aspects of the approach have been explored by educators and researchers during this century, I wondered why all schools have not fully embraced this learning approach. Teachers' apprehension characteristics, including willingness to change, collaboration of staff, time, visual vs verbal assessment, and curriculum territoriality, will provide a base for data analysis

in this study. Similarities and differences of this study compared with characteristics gleaned from the literature review will help to ground this study in its educational context.

Part Two: A Brain-Compatible Learning Environment

The second section of the literature review presents a historical context for designing brain-compatible learning environments. If teachers understand how the brain works, then they can restructure the learning environment to enhance the learning process. The focus in this section is to define brain-based learning elements in order to identify characteristics of a brain-compatible learning environment. This section is relevant to this study because the intent in Phase Three, the student directed approach, was to place some brain-based learning elements into a real-life learning context. In that environment, grade four students made their own interdisciplinary connection with the arts.

A Historical Perspective

President Bush declared the 1990's as "The Decade of the Brain". Developments in technology, such as PET SCANs (Positron Emission Tomography) combined with MRIs (Magnetic Resonance Imaging), have provided three dimensional images of the brain in action showing location and level of activity. Scientists and researchers now have an opportunity to explore and monitor an actual living brain during the processes of thinking, feeling, solving problems, creating, and dreaming.

By studying the brain from every possible view, neuroscientists have come up with various theories about how the brain works. The basis of the brain-based learning theory is to maximize learning by understanding how our brains learn best (Caine and Caine in Pool, 1997, 11). As educators, our

responsibility is to establish conditions in the learning environment which help to facilitate the learning process.

The most important element in brain research is that it is ongoing and updated continually. For example, Jensen (1997) at a recent brain-compatible teaching conference cited that neuroscientists once believed that no new neurons in the brain developed after birth, however, more recent research may prove this theory is false. Other outdated brain research includes the Triune Brain Theory developed by Dr. Paul MacLean, former director of the laboratory of brain and behavior at the U. S. Institute of Mental Health in Bethesda, Maryland. His theory separated the brain into three distinct sections: the brain stem, referred to as the reptilian brain; the limbic system, referred to as the mammalian brain; and the cerebral cortex, referred to as the neomammalian brain, or new neocortex (Hart, 1983, 33-45). MacLean thought each section of the brain evolved over time covering the brain stem (the reptilian brain). Instead, research has shown that all parts of the brain are closely interconnected.

Description of the Brain

The brain weighs about three pounds and consists of multiple parts each controlling specific tasks. Yet all areas are interconnected, may engage simultaneously, and brain activity is unceasing. The inner most structure of the brain is the brain stem, and its primary function is survival. This area controls instinctual behaviors and regulates the heartbeat, breathing, eye blinking, and the sleep and wake cycles. This area has no language capacity and involves nonconscious thought. Every second this area receives thousands of external and internal messages and sorts them to determine which ones require "conscious thought."

The middle part of the brain, known as the limbic system, consists of multiple parts including the amygdala (emotions), the thalamus (sensory data), and the hippocampus (source of memory) (Wolfe, 1996). This area of the brain regulates feelings of hunger, thirst, blood pressure, body temperature, and blood glucose. The limbic system is rich in neurotransmitters which establish states of fear, joy, pleasure, anger, aggression, and other emotions. This area also involves nonconscious thoughts and, every moment, it receives thousands of messages. It would be impossible to consciously think about all of them. This area can be referred to as "The Gatekeeper" (Ross and Olsen, 1995, I-7). The Gatekeeper examines messages to determine which ones gain our attention requiring conscious thought or which messages to ignore. Emotions are the domain of this location. Short-term memories are held here for up to fifteen seconds before a decision is made to ignore or process the information at a higher level in the cerebral cortex (Wolfe, 1986).

The cerebral cortex is the outer layering of the brain, also referred to as the neocortex, which means "new bark." This thin membrane covers the other sections of the brain and comprises about 80% of the brain's mass (Ross and Olsen, 1996, I-7). This area controls speaking, being aware, reasoning, problem solving, analyzing, creating, synthesizing, and handling a multitude of tasks (Ross and Olsen, 1996, I-8). In the neocortex, incoming messages are sent to different areas for conscious processing through a series of connecting neurons. Each neuron, or brain cell, consists of a nucleus and a branching dendrite. Dendrites make connections with other brain cells. The brain has more than 100 million neurons. Each neuron, has the capacity to make more than 20,000 connections with other neurons thus its capacity for learning is viewed as "more powerful than the world's most powerful computer" (Dryden and Vos, 1994, 109).

Incoming messages processed in the brain result in thousands of connections. The patterns of these connections make incoming messages

meaningful. How the brain is "wired" is different for each person. We process incoming information in our own unique way based primarily on experiences. Pat Wolfe, a leading expert and presenter on brain-based learning affirmed our uniqueness by stating: "Our brains are probably more unique than thumb prints as far as chemical composition and as far as how they are structured and how we learn." (1996, Audiotape)

Because brain activity is mainly chemical and electrical, it needs two very important elements: oxygen and water. These elements directly influence how the brain functions through blood flow and chemical balance. Nutritional elements are another important factor as food nourishes our blood. Research has indicated how easily the brain dehydrates. Drinking water should be available throughout the day (Jensen, 1995; Hannaford, 1995). Oxygen is a vital element because if the brain is starved for oxygen, it dies in a matter of minutes (Jensen, 1995; Hannaford, 1995).

Research by Carla Hannaford (1995), a neurophysiologist and educator, not only incorporated these two elements, but also added movement. Physical exercise helps pump oxygen faster to the brain through the blood stream. Her research with special needs students in an elementary school used Dennison and Dennison's (1989) brain exercises called the "Brain Gym". Dennisons' research seemed to demonstrate that various cross lateral movement exercises helped to stimulate different areas of the brain. The stimulation resulted in increased learning abilities. More recent research on "peptides" have further interconnected our body and brain. Peptides are the chemicals that link the nervous system, the endocrine system, and the immune system (Caine and Caine, 1997, 87- 88).

The brain physically constructs and colors the world for us through our senses and each of us sees and constructs a view of the world differently (The Discovery Channel : Evolution and Perception, 1994). For many years, the belief was that our five primary senses: sight, sound, touch, smell, and taste

provided incoming messages to the brain for understanding and action. However, recent technology revealed that our body receives and sends thousands of bits of sensory data to our brain per minute through nineteen senses (Ross and Olsen, 1995, I-10.) (For a list, see Appendix A, p.221).

Brain Research in the Learning Environment

One of the first pioneers to consider brain functioning with the learning process was Leslie Hart. Hart (1983) recognized the core problem faced by educators: "How does one bring about learning?" (p. xiii) Hart investigated how people learned and defined the process as "The Proster Theory". The Proster Theory began to describe how the brain functions and learns naturally. Hart defined the word, Proster, as the combination of two words -- program and structure. The process involves deciphering cues, recognizing relationships, and indexing information. Hart believed learning was the structuring of programs within our brain. "To carry on activities, one must constantly *select* a program from those that are stored in the brain, and *implement* it - put it to use" (Hart, 1983, 83). Therefore, he believed that learning was influenced by previous learning. Hart's research highlighted a key characteristic of the neocortex, the ability to detect and make patterns.

Currently, the most noted authors in the area of brain-based learning are Geoffrey and Renate Caine. The Caines (1994) contributed to Hart's (1983) research by reviewing and synthesizing many different research areas and developing twelve principles to serve as guidelines for defining and selecting instructional programs and methodologies. More recently, with the influx of updated brain research, the Caines slightly revised their original twelve principles in their latest book, *Education on the Edge of Possibility* (1997). The principles are:

1. The brain is a complex adaptive system.
2. The brain is a social brain.
3. The search for meaning is innate.
4. The search for meaning occurs through "patterning".
5. Emotions are critical to patterning.
6. Every brain simultaneously perceives and creates parts and wholes.
7. Learning involves both focused attention and peripheral perception.
8. Learning always involves conscious and unconscious processes.
9. We have at least two ways of organizing memory.
10. Learning is developmental.
11. Complex learning is enhanced by challenge and inhibited by threat.
12. Every brain is uniquely organized.

(Caine and Caine, 1997, 104-108)

In the next section, I have placed these twelve principles alongside characteristics of a learning environment to develop a definition of a brain-compatible learning environment. The principles are not presented in numerical order, but instead, I have placed them appropriately in context with learning environment characterisitics.

Characteristics of a Brain-Compatible Learning Environment

The learning environment is an arrangement constructed by teachers and students and is in a constant state of flux. This first section presents a description of an enriched learning environment. Then I have attempted to identify characteristics of a brain-compatible learning environment as gleaned from a review of the literature. I separated the characteristics into two components, the physical and the active. The physical component consists of concrete influences such as the classroom itself and its contents. The active component involves the human influences, which establish the social climate and the learning experiences.

Enriched Environment

Brain research, which has been conducted for over thirty years by Dr. Marion Diamond at U. C. Berkeley in California, has demonstrated that brains "grow" in an enriched environment. In such an environment, brains physically become denser and heavier by increasing the number of connections between dendrites. Brain growth is termed "plasticity" and is the basis of Caine and Caine (1997) tenth principle: Learning is developmental. Brain growth results from our experiences throughout life, and those experiences shape our ability to make and strengthen new connections (p.107).

Diamond's research utilized rats. The enriched environment provided rats with variety and challenges which were changed often. She also discovered that brains of any age can increase plasticity (in Jensen, 1994, 300). When Diamond compared her results with the same research in a foreign country, she noticed similarities to her research except for one feature. Diamond's rats lived approximately 700 days and the foreign rats lived 900 days, almost a third longer! She wondered about the difference, so she sent a team to investigate further. The team noticed the cages were identical; the rats were feed the same food; they lived in the same square yardage; and were given the same challenges including toys such as ladders, wheels, and other play things. After several observations, the team noticed the technicians holding the rats up against their lab coats when they changed and cleaned the cages. When Diamond incorporated that distinction in her research, she also found similar results: the rats lived longer. She concluded that stress was a factor in developing brain growth and longevity (Wolfe, 1986).

Diamond's enriched environment included elements of challenge, variety of activites that change often, and low stress. In the following section, I have attempted to identify other characteristics which may contribute to creating a brain-compatible learning environment.

Physical Elements

The physical component of the learning environment incorporates classroom elements including its size, location, lighting, temperature, humidity, furniture, resources, and accessories. As demonstrated in brain research, these physical features have an effect on the brain (Jensen, 1994); even wall color can influence learning (Benson and Stuart, 1992). The classroom's location in a building fixes some of these elements. In many schools, older architectural features do not present the best environment. Some classrooms are too small with small, few, or no windows. In others, lighting is poor or the climate control which regulates the temperature and humidity is inefficient.

One physical feature of the learning environment, which is in control of the teacher, is the layout design -- how the learning environment is physically arranged with furniture, resources, and accessories. It is possible the furniture may or may not be controlled by the teacher, but once the furniture is in the environment, its arrangement affects learning. The availability of resources, which may be limited, also influences the layout design. Accessories are the "added extras" making a learning environment more aesthetically pleasing and include objects, plants, tablecloths, legal animals, etc. Research conducted by NASA has indicated that living plants oxygenate the air (a process called ionization) which is absorbed by the body and ultimately helps the brain perform better (Jensen, 1994, 314).

Caine and Caine (1997) second principle is: The brain is a social brain. This principle influences the physical elements in the layout design. The arrangement of furniture and resources requires creativity on the part of the teacher to create multiple contexts for individual work as well as group work. The layout design also influences the social aspect by establishing areas for traffic flow and meeting areas. Utilizing learning centers, a variety of seats

including cushions and pillows, and tables are ways to create an interesting and social learning environment.

Another physical consideration in the layout design is establishing a multisensory environment to reflect the Caine and Caine's (1997) first principle: The brain is a complex adaptive system. This principle reflects the thousands of incoming messages from the learning environment through all of our senses. Multisensory includes the visual, auditory, kinesthetic, olfactory (smell), and gustatory (taste) elements.

Researchers found that some learning occurs through peripheral surroundings and Caine and Caines' (1997) seventh principle is based on this research. The seventh principle is: Learning involves both focused attention and peripheral perception. The brain absorbs information both intentionally (discussed in the "Active Elements" section, p. 52) and "beyond the immediate focus of attention" (p.106). The peripheral perception includes the visual stimuli that adorn the physical walls, doorways, and ceilings. A visually pleasing atmosphere includes wall decorations, mobiles, stimulating posters, and student work, which, as demonstrated in Diamond's research, should be changed often.

Peripheral perception also reflects body language, such as facial expressions and posture (Caine and Caine, 1994, 91). Students are aware of nonverbal communication when a teacher is speaking. Visuals, story-telling, metaphors, analogies, and movement are all stimulus being multiprocessed in ways we have yet to understand (Jensen, 1995, 36). The teacher's position in the environment also sends a peripheral message to students as well. If a teacher is busy "doing other things" and not involved with students who are engaged in activities, it may send a peripheral message that the student activity is not important.

The kinesthetic element requires areas in the layout design where students can become fully immersed and interactive with the content of

curriculum. Learning centers and areas of interest provide opportunities for students to manipulate their learning experiences. Immersion helps to create more memorable learning (Caine and Caine, 1994, 1997).

Another multisensory element involves the auditory sense. Learning styles research illustrated learners' differences. Some students need quiet space, while others function better with sounds around them. Therefore, different locations within the classroom should accommodate the differences. Tonality of voice also becomes a factor, but this is an "active" element discussed later in this section (p.53).

Our brain operates on different frequencies or brain waves: delta, theta, alpha, beta, high beta, K complex, and super beta. The beta and alpha are awake states; and the theta and delta are relaxed and sleep states. The K complex involves the "AHA" or "Eureka" of creative and cognitive thoughts and super beta involve deep meditative states. Certain types of music can relax the body and alter the beta waves to the alpha and theta states. Brain research indicated music as an important component in facilitating learning (Jensen, 1995; Dryden and Vos, 1994; Brewer and Campbell, 1991). Baroque music is one type because its sixty to seventy beats per minute is identical to alpha brain waves. However, research has shown that different types of music should be used at different times. Jensen (1995) cited music variables including: "the cultural background of the learner, the learning styles, the circumstances, the way the music is used, the volume, the type of music, and carrier of the music" (p.68). Music, rhythmic patterning, and melody in language is everywhere (Brewer and Campbell, 1991, 15). Music can be used for focused attention in the learning environment or as a peripheral element in the background.

Research has also indicated a link between the neuroscience of smell and human basic feelings of anxiety, fear, hunger, depression, and sexuality (Jensen, 1994). An aroma has the effect of causing people to remember

certain events. When adults enter an art room, the smell of art supplies can bring back memories both positive and negative. Jensen (1994) claimed: "Smell is an entire sense that we have been under utilizing in learning" (p.5). He claimed our understanding of its influence is just beginning and more research and practice with this sense may affect learning environments in the future.

Active Elements

The active learning environment consists of the social climate and learning experiences created by its members. In this section, the first elements considered in the social climate are the ones that impact individuals including: uniqueness, emotions, and downshifting. Then the social climate is defined by elements of a community. The last section defines elements of learning experiences-- activities which engage the learner.

Social Climate : The Individual. Although each brain consists of the same parts, including our senses and basic emotions, no two brains process information exactly alike. Caine and Caine's (1997) twelfth principle is based on this individuality: Every brain is uniquely organized. Pat Wolfe in her seminar on brain research pointed out that:

> You never teach a group. You're teaching individual brains, each of which brings to a learning experience its own background, its own understanding, its own prejudges, its own experiences, its own emotions, and processes. Each individual brain processes that information differently than the brain next to it. So even though the same information goes out to the different people, people will hear different things and make different sense of it. You are making sense out of it all the time based on your experiences." (1986, audiotape)

Each person brings to the active environment their own "baggage" of experiences. This "baggage" enhances our uniqueness. Our ability to make connections depends on pattern recognition and it is based on experiences (Hart, 1983; Caine and Caine, 1997; Wolfe, 1996). "What is meaningful to one learner's pattern is another learner's hodgepodge" (Ross and Olsen, 1995, 30). Artists often strive to be different and unique in their expressions.

Making sense of our experiences is the basis of the Caine and Caine's (1997) fourth principle: The search for meaning occurs through "patterning". Hart's (1983) brain research revealed that the brain seeks to make sense of the world by creating programs. If the brain cannot find a place or category for placing incoming information, then it will create one (which may be a misconception) or discard the information. Research has shown that only eighteen seconds determines whether incoming messages are kept or discarded (Wolfe, 1986). This has a profound influence in the classroom. Not only does information get processed differently in each individual, but also each time the information is revisited, it may have different meaning to the learner based on intervening experiences.

The brain's unceasing activity exemplifies our uniqueness. This activity encompasses Caine and Caine's (1997) third principle which is: The search for meaning is innate. Our brain has a natural tendency to survive. "The search for meaning cannot be stopped, only channeled and focused" (Caine and Caine, 1994, 89). Hart (1983) recognized the brain's search for meaning as a built-in natural function to detect, construct, and elaborate patterns (p.60). If facts and skills are learned in isolation, not linked to prior knowledge and actual experiences, then storage and recall is more difficult (Caine and Caine, 1994, 93).

Although each brain is unique, Caine and Caine's (1997) ninth principle: We have at least two ways of organizing memory, reflects a similiarity between brains and how incoming information may be processed. The two

types include a spatial memory system and a system for rote learning. The spatial memory system does not need rehearsal. "It is always engaged, inexhaustible, and motivated by novelty" (Caine and Caine, 1997, 107). Spatial memory consists of contextual information and needs no rehearsal. Experiences in three dimensional space help place memories into context.

The other memory system is for rote learning. Rote memory requires practice and rehearsal. An example of rote learning are procedural memories. Memories are created through practicing and repeating a sequence of neuron connections. The practice then creates a program that can be executed unconsciously, for example, tying a shoe. An adult can tie his or her shoe and talk about something else at the same time because the program is triggered by the first action. However, for a four year old, this program is "new." The child must concentrate on the task, which is the primary focus of attention (Caine and Caine, 1994).

Another development in brain research revealed that learning is not just a cognitive process, but it is also interconnected emotionally and socially. "Body, thought, and emotion are intimately bound together through intricate nerve networks, and function as a whole unit to enrich our knowing" (Hannaford, 1995, 50). Although people uniquely express emotions in a given situation, there are universal emotions. There is no mistaking expressions of happiness, sadness, surprise, fright, or anger. Emotions play an important role in the learner's "state of mind." Jensen commented on the importance of emotions:

> While excessive emotions can impair rational thinking, the absence of emotion and feeling is equally damaging to reason and rationality. Positive emotions create an excitement and love of learning. They spur motivation to learn and tell us if we are confident. (1997, conference)

As stated earlier, experiences in context help make learning more memorable, but the learner must also have an emotional commitment (Hannaford, 1995, 56). Without emotional commitment in the learning environment, failure is plausible.

Caine and Caines' (1997) fifth principle is: Emotions are critical to "patterning". This principle embraces the belief that engaging emotions helps make learning more memorable. Learning experiences are "patterned" in the brain and if a strong emotion is tied to a memory, then recalling the experience becomes easier (Wolfe, 1996; Jensen, 1997). Daniel Goleman in his book, *Emotional Intelligence* (1995), claimed that emotional intelligence may be more important than IQ. The sense of smell can trigger emotional states and more research (as discussed earlier) needs to be conducted to discover its educational influences.

One of the nonconscious behaviors of our brain termed, downshifting, is an important characteristic in the active environment. If the brain perceives danger or threat, blood rushes to the brain stem (and other parts of the body depending on the "threat") and a person does not think rationally, reacts instinctively, and reverts to primitive, automatic behaviors (Wolfe, 1986). Downshifting, also referred to as the "fight or flight" response, is a survival mechanism. Threat downshifts the brain to primary functions creating a feeling of helplessness.

This response is important to educators because it establishes a "state of mind" for learning. Students are not usually faced with physical danger in classrooms. However, everyday students are faced with psychological dangers and "the brain does not distinguish between them" (Wolfe, 1996, audiotape). Feelings of anxiety can undermine our intellect causing a downshifting response (Wolfe, 1996). The active learning environment must be safe and nonthreatening so that students can stay upshifted to conscious thinking

states (Hart, 1983; Wolfe, 1996; Caine and Caine, 1997; Jensen, 1995, and Ross and Olsen, 1995).

Downshifting is a primary influence in Caine and Caines' (1997) eleventh principle: Complex learning is enhanced by challenge and inhibited by threat. Downshifting can be removed in a climate of "relaxed alertness" (Caine and Caine, 1997, 107). Relaxed alertness is an environment with low threat and high challenge. In this climate, "students are safe to try, think, speculate, and make mistakes on their way to excellence" (Caine and Caine, 1997, 124). "Low threat" is very important in the learning environment, however, it does not mean "stress-free." "Occasional stress and anxiety are inevitable and are to be expected in genuine learning" (Caine and Caine, 1997, 107). Learning involves changes and at times, those changes can be intrinsically stressful (Caine and Caine, 1997).

Downshifting is also exemplified in Caine and Caine's (1997) eighth principle: Learning always involves conscious and unconscious processes. "Most signals that are peripherally perceived enter the brain without the learner's awareness and interact at unconscious levels" (1994, 92). Conscious processing allows the opportunity to reflect and develop personal meaning. Unconscious processing may evoke downshifting. If students have had unpleasant experiences in classrooms, entering through a classroom doorway can cause a "downshift", even if it is a new class with a new teacher (Jensen, 1995). Previous experiences and emotions will be recalled, create the downshift, and leave the learner with a feeling of helplessness.

Social Climate : The Community. Humans are social beings. Caine and Caine's (1997) second principle (The brain is a social brain) was discussed as a physical element, but it also encompasses the active environment. Our identity and sense of "finding a way to belong" is established through social relationships (Caine and Caine, 1997, 104-105). Social relationships establish

a community and provide a sense of coherence and orderliness. Orderliness is "a pervasive sense of acceptable behavior as practiced by everyone" (1997, 150-151). Caine and Caine defined the social community as having features including: a set of norms, routines, celebrations, and mutual respect (p. 160). In the community, members make decisions continuously and one decision may work for one kind of learner and not another. The same decision may work one day and not the next. Through interactions and feedback from members, the learning environment fosters a sense of community and establishes a safe, nonthreatening environment. These elements "set the stage" or "prepare the ground" for meaningful learning to take place. Otherwise, individuals revert to downshifting modes and states of helplessness.

The teacher's beliefs in human potential and capabilities of students is also critical to the social climate (Caine and Caine, 1997, 124). The involvement of students in creating and changing their visual environment is a physical component as well as an active one. Student's involvement in their learning environment may enhance ownership thus making the classroom more meaningful.

Learning Experiences. As demonstrated in Diamond's (1996) research, learning experiences in an enriched environment should be challenging, offer variety, and changed often. Diamond's research also stressed that a single enriched environment will not completely satisfy all learners for an extended period.

> The range of enriched environments for human beings is endless. For some, interacting physically with objects is gratifying; for others, working with creative ideas is most enjoyable. But no matter what form enrichment takes, it is the challenge to the nerve cells that is important. Data indicate that passive observation is not enough; one must interact with the environment.
>
> (Diamond, 1996, 6)

Hart's research (1983) concurred with the idea of interacting with the environment. "Young children especially must *manipulate* what they deal with" (Hart, 1983, 168). The interactions create experiential learning experiences, which should be open-ended and meaningful (Caine and Caine, 1997, 119).

The learning experiences, as influenced by Caine and Caine's (1997) sixth principle (Every brain simultaneously perceives and creates parts and wholes) reflects Sperry's Split Brain research (as discussed on pp. 16-17). The left and right sides of our brain process information differently. The halves are connected by the corpus callosum, a chemical electronic "relay" system, which is constantly interactive. Global overviews are as important as individual parts. Similar to a jigsaw puzzle, the whole picture helps put the pieces into place. As "pieces of learning" are presented in the learning environment, students must connect that information to the "whole picture."

Caine and Caine's (1997) first principle (The brain is a complex adaptive system) was discussed as part of the layout design in the physical environment. This principle also becomes important in the active environment. In relation to learning experiences, the Caines (1994) stated: "No one method or technique can adequately encompass the variations of the human brain" (p. 88). Activities must be varied to keep the brain motivated and interested. This principle supports the interdisciplinary learning approach with information viewed from different perspectives. "Learning is best when information is embedded in rich, meaningful experiences" (Caine and Caine, 1997, 18).

Caine and Caine's (1997) tenth principle is: Learning is developmental. This principle connected to the brain's plasticity which is interconnected with our experiences. Activities in the learning environment should connect with past experiences and develop into new experiences for optimal brain development. According to Caine and Caine, "active processing" in learning

experiences also adds to the development of the brain. The questions: "What did I do? Why did I do it? What did I learn?" induce metacognitive processes. The self-reflective questions allow students to take charge of their learning and aid the process of making personal meaning (1997, 122).

As stated previously, repetition is one means for reinforcing neural pathways enabling a learner to remember. In the active environment, learning experiences which offer a multisensory approach enhance repetition by allowing the learner to gather information through touching, hearing, seeing, tasting, and smelling. The more sensory systems that are utilized, the more interactive experiences, the more likely the learner will remember. Each sense memory is localized in a different part of the brain, thus, the more senses involved, the more connections. Tonality of voice becomes an important element when speaking, specially for auditory learners. Differing the pitch and expression of sound when speaking words helps to capture the learner's attention.

Caine and Caine's (1997) seventh principle (Learning involves both focused attention and peripheral perception) impacts the learning experiences in the active environment. Focused attention is an element which reflects the brain's ability to pay attention. A fundamental question in learning experiences is: "What's in it for me?" (Jensen, 1995). The brain can pay attention to only one thing at a time. The teacher may think the students are paying attention, but there is no guarantee all learners are focused on the words being spoken. Many times after a teacher gives and repeats directions, a student raises his or her hand and asks: "What are we supposed to do?" Also, if students are listening to a teacher speak, then they are not consciously "making-meaning" through activities (Caine and Caine, 1997; Jensen, 1997).

Research has shown that shifting focus in activities allows opportunity for processing and it is known as "Pulse Learning" (Jensen, 1995, 114). Pulse learning is age-related cycles of focused attention and downtime. The cycle in

an average-aged elementary student, for example, is ten minutes of focused attention followed by two to three minutes of downtime repeated throughout the learning experience. Shifting focus is a time to "go inside" and link the present with the past. Jensen cited three elements of downtime: nonconscious learning, meaning-making, and neural fixing (1997, conference). Evidence from neuroscience indicates that experiences interplay in neural activity (Jensen, 1995, 129). The interplay relates to our brain as a multi-processor.

Novelty. Novelty is one means of gaining a student's attention. The brain is attracted to movement, contrast, and color changes. The brain "automatically registers the familiar while simultaneously searching for and responding to novel stimuli" (Caine and Caine, 1997, 105). Jensen (1995) stated: "Any stimuli introduced into our immediate environment which is new (novel) or of sufficiently different emotional intensity (high contrast) will immediately get the learner's attention" (p.111). He referred to the novel experiences as a "hooking device," a way to capture the attention of the learner.

Novel experiences can be visual, auditory, tactile, olfactory, or any combination of our senses. Think of how many times something has "caught your attention." Discovery and challenge also stimulate our innate search for meaning (Caine and Caine, 1994, 89). Caine and Caine's (1997) fourth principle (The search for meaning occurs through "patterning") relates to this phenomenon because if something is novel, the brain searches to find the pattern and make meaning of the experience.

Part Two : Summary

Educators need to know how the brain functions because the implications of brain research affect the physical and active learning

environment. The physical environment should be rich with furniture, resources, and accessories. A brain-compatible learning environment is a nonthreatening, safe environment in body comfort and emotional issues. If the student feels threatened, then the brain downshifts to a state of helplessness. Social elements of a community are important in a brain-compatible learning environment. The active environment consists of multisensory learning experiences, which should be varied, challenging, interesting, novel, and connected to emotions and experiences. Pat Wolfe pointed out:

> If there is no emotional hook, information is hard to remember.
> If there is no personal meaning, connecting to previous knowledge,
> then information will not be remembered.
> (1996, audiotape)

In summary, the learner must be challenged and comfortable both physically and emotionally in the learning environment. Only then will the brain deal appropriately with focused attention for learning. The brain-based learning theory is meant to develop "students who can think, behave, and engage in lifelong learning and who know how to find and use information for almost any purpose" (Caine and Caine, 1997, 179). Jensen's analogy of the brain's functioning to a rain forest illuminates the fact that there are multiple complex systems all working simultaneously to produce a growing environment (September, 1996). A learning environment can facilitate a brains' growth or can contribute to its stagnation or demise.

Part Three: Role of the Teacher in the Learning Environment

The learning environment is where the process of learning takes place. The process of learning can be defined by the topic of inquiry (curriculum content), the method of study, (activities), the time frame for inquiry, and the

evaluation (outcome). The teacher's role in the learning environment is to assume full responsibility for establishing and structuring the learning process for students (Oyler, 1996). If the teacher shares this responsibility, allowing students an opportunity to make decisions, then the result separates the learning process into three approaches: teacher directed, teacher-student directed, or student directed. This part of the literature review examines the role of the teacher in each of these approaches and cites advantages and disadvantages of each type. The purpose here is to identify characteristic behaviors in each role.

Teacher Directed

Comprehensive research of classrooms conducted by Good and Brophy (1987) and Goodlad (1984) identified that most learning environments are teacher directed. In addition, "teacher talk" is high: between 70 - 80% of the talk in classrooms done by the teacher. "Telling" is the largest most fundamental aspect of this type of instruction. Rogers and Freiberg (1994) defined characteristics of the teacher directed approach: the curriculum is prescribed, students are given similar assignments, standard tests are administered, and the teacher chooses grades as a measure of learning (p.37). This approach is a traditional top-down control with constant supervision and specific rules of behavior and communication (Caine and Caine, 1997, 63).

Glasser (1997), founder and president of the William Glasser Institute in Chatsworth, California, defined this approach as "bossing." "Bosses use coercion freely to try to make the people they boss do what they want" (p.600). This role places students in a passive role by receiving direction from the teacher and waiting to be told what to do, hear, and see.

Teacher's Role

The teacher's role in the teacher directed approach is to be a director, one who controls the learning process and all decisions. The teacher plans, distributes, and interprets student information through lectures, assigned readings, demonstrations and selected activities (Glasgow, 1997). In addition, the time devoted to student activities is governed by the teacher. Students are monitored as a group through teacher-chosen assessments and evaluations. The teacher designs the layout of physical learning environment by deciding where furniture, resources, and accessories will be located and whether students sit in rows or clustered in groups. The role is to be the provider and dispenser of knowledge and the students are the receivers.

Advantages

One of the advantages of the teacher directed approach is standardization. Standardization implies that students are exposed to the same information. (Glasgow, 1997, 32). This approach can be referred to as "Back to Basics", as it reflects the belief that students learn with direct instruction. The approach is traditional, customary, and universally accepted. It is the approach most familiar to parents, students, and educators. One characteristic in this approach is the potential for learning to be sequential (Tomlinson, 1995). Sequential learning activities are planned and presented in a consistent and predictable manner. Outcomes can be clearly stated.

Disadvantages

A disadvantage of the teacher directed approach is that it is not brain-compatible. Significant elements include the exclusion of each student's

uniqueness, their interests, their abilities, their pace of learning, and levels of understanding. Another disadvantage places students in passive roles. Students are not challenged to think for themselves (Rogers and Freiberg, 1994, 8). Because this approach relies heavily on rote memorization, it neglects interaction of the brain in complex, natural learning experiences.

Glasser's (1997) "Choice Theory" research (described later in this section, p. 68) demonstrated a disadvantage of the teacher directed approach. His research demonstrated that the more learners feel controlled, the more resentful they get. Resentment can be expressed through frustration, anger, lack of discipline or suppressed through detachment, sabotage, or cynicism (Glasser, 1997, 596-602). These elements reflect the brain-based element, downshifting. Students who are motivated and interested in learning are less likely to feel frustrated or disinterested in activities.

Student Directed

The opposite of a teacher directed approach is a student directed approach. Terms commonly used to reflect the student directed approach may include student-centered, student-inquiry, person-centered, emancipatory, or constructivist. The process of learning in the student directed approach is individualized and directed by the student's needs. This approach empowers the student, but does not eliminate the teacher. Carl Rogers advocated such an approach in his book, *Freedom to Learn* (1994). Rogers believed that if the individual learner was given the proper environment, students could find the excitement of learning and make responsible choices. The student's role changes from being passive to becoming an active participant in the learning process. The students decide what they need to know (choosing the topic of inquiry), what they should be able to do (goals for evaluation), and how they are going to do it (method of study) (Glasgow, 1997).

The intent of the student directed approach is to maximize a student's capacity for learning. Instead of absorbing information and using rote memory, students become active in the decision making process. Their interests and past experiences effect the active and physical learning environment. The premise is that learning is most effective when students are engaged in relevant and interesting topics (Tomlinson, 1995). Success is dependent on the student's maturity, the nature of tasks, and the classroom conditions established by the teacher (Tomlinson, 1995, 19). In this approach, students construct their own personal meaning of their world. Most student directed learning has been reserved for students with above average academic abilities, such as in gifted and talented programs or, for private school situations.

The student directed approach is grounded in brain-based learning theories. Hart (1983) asserted: "the ability *to make plans and carry them out is the key aspect of human intelligence*" (p.49). One innate element of our brain is its capacity to "self-oganize" around a set of beliefs. "Self organization is the ability of living systems to organize into patterns and structures without any externally imposed plan or direction" (Caine and Caine, 1997, 62). This element has a profound effect on teacher's "letting go" and "trusting the process."

Gardner's Theory of Multiple Intelligences supports a student directed approach. Everyone represents the world mentally in different ways using their own blend of intelligences (as discussed earlier). Gardner expressed his thoughts about "uniform schools" at the Massachusetts Teacher's Association Professional Development Conference in March, 1997:

> Everybody 's taught the same thing, in the same way and they're assessed in the same way, and it's seen to be fair because everybody is being treated alike. However, I submit that it's really unfair because it's picking out one kind of mind, typically the language-logic mind, over all others.

> I call for the individual-centered school, not in the sense of being narcissistic, but in the sense of taking the differences among kids very seriously.
>
> (Gardner, 1997, 25-26)

Teacher's Role

In the student directed approach the teacher's role changes from being a director to being a facilitator. The facilitator could be referred to as a mentor - someone who nurtures and supports the processes of the learner, or coach - someone who stimulates and encourages students to strive to be their best. The role of the teacher is to be the provider of opportunities for students to gather their own information (Brooks and Brooks, 1993). The teacher guides students in engaging interests into the learning process by assisting students with establishing and accomplishing learning goals. The role of the teacher is also to become a learner, developing their own knowledge and new methods of instruction (Airasian and Walsh, 1997).

Advantages

One primary advantages of the student directed approach is that it acknowledges the importance of metacognition. Learning how to learn is the primary influence of this approach, not necessarily what is learned. This attention to how we learn allows students to become active participants in sharing the responsibility for their learning (Charbonneau and Reider, 1995, 76). Teachers entrust students with self-direction as they make choices about how to spend time in the classroom (Charbonneau and Reider, 1995, 74). Another advantage arises when students develop skills to evaluate their own strengths and weaknesses (Glasgow, 1997, 35). These are life skills and include the opportunity to practice self-discipline, self-acceptance, self-

reflection, and self-initiated learning. Hart (1983) also found attention spans in students were longer when the activity was self-selected (p.117).

An advantage of the student directed approach is that teaching and assessment are not standardized, a *one size fits all* approach. Eisner (1994) claimed "standardized teaching from an educational perspective is an 'oxymoron' because no schools or student can be equated as the same" (pp.6-7). The ever-growing world of technology and computers in the classrooms connected to the Internet and the World Wide Web provide an unlimited resource data base for individualized learning. "Coming to terms with the fact that we no longer own the information, and that information is everywhere available in the world of instant access" (Caine and Caine, 1997, 28); is an advantage that is more easily internalized by some teachers than by others and fundamental to an student directed approach.

Disadvantages

Some disadvantages of the student directed approach surfaced as dilemmas of the individualized instruction and open-classroom education of the 1970's. One flaw, for example, was the difficulty of organizing and managing thirty students in individual programs. To some teachers, the process "looks messy and somewhat hard to manage" (Glasgow, 1997, 36). Teachers did not have the training to plan individual curriculum or to meet the needs of the children (Charbonneau and Reider, 1995; Rogers and Freiberg, 1994; Tomlinson, 1995). Charbonneau and Reider (1995) believed this type of approach failed because:

> Teachers found that just putting children in large open learning areas with a large quantity of equipment did not produce the discovery of concepts, the mastery of skills, or the independent learning that had been the watchwords of open education. (p.10)

A misconception by educators was that "open-ended implies permissiveness -- license, if you will, to do as one pleases all day long" (Charbonneau and Reider, 1995, 11). The uncertainty of how to manage such a program hindered teachers from trying the approach (Tomlinson, 1995, 29). The sequential instruction of the teacher directed approach was lost as skills became fragmented to "match" each student (Tomlinson, 1995, 4). Organizational problems also occurred with finding resources, allowing time for each student to complete tasks, and individual assessments and evaluations (Glasgow, 1997, 36).

Another disadvantage of this approach encompassed the insecure feelings in students, parents, and faculty (Glasgow, 1997, 36). Most students were familiar with their passive role, therefore, the qualities and skills needed to implement this student directed approach were unfamiliar to them. Change was difficult for some teachers who feared trying a new approach because it "made waves." They were also inhibited by bureaucratic rules (Hart, 1983; Rogers and Freiberg, 1994).

Another disadvantage was that some teachers feared losing control (Rogers and Freiberg, 1994). The authority role is inherent in teaching.

Teacher-Student Directed

The teacher-student directed approach is a median between the first two extremes. The difference between this approach and the student directed approach reflects the belief that students need more structure. Hart (1983) referred to structure as "rules of the game" and "home base" (p.147). The teacher-student directed approach views the general curriculum as providing that structure. The teacher is a leader and shares authority and decisions in the learning process. This approach allows students choices and may include

students' interests within the content of the curriculum. The teacher-student directed approach is developmental and, over time and through experience, students gain the ability to manage oneself. Once a student proves to hold independent skills, then more freedom can be given (Tomlinson, 1995).

Carol Ann Tomlinson, an assistant professor of education at the University of Virginia, described a version of the teacher-student directed approach as "Differentiating a Classroom". Tomlinson's (1995) Differentiated Classroom is based on some brain-based learning elements: "Students have multiple options for taking in information, making sense of ideas, and expressing what they learned" (p.3). Although the curriculum content in her Differentiated Classroom may be the same for a group of students, the program allowed independent learning and different activities for groups of students. Factors which affect the process include the teacher's personality, nature of the subject, grade level, and learning profiles of students (Tomlinson, 1995, 22). Assessments vary in the Differentiated Classroom and they are based on individual learning goals. Together, the teacher and student adjust learning activities and pace to fit their needs (Tomlinson, 1995, 50).

Caine and Caine (1997) describe a version of the teacher-student directed approach as "Orchestrated Immersion" (p.119). "Orchestrated" means the overall learning process is not haphazard and tightly controlled, but influenced and guided (p.121). Students are immersed in meaningful complex experiences which are open-ended. Caine and Caine describe the process as a dynamical system which is "open to the environment, exchanging matter, energy, and information" (p.58). As with the nature of change, it is difficult to predict what will happen.

Teacher's Role

The teacher in the teacher-student directed approach does not give up the authority role, but instead establishes a leadership role organizing learning opportunities. The role fluctuates between being a director and being a leader because students' abilities and interests differ. Some students may need more direction while others thrive on the freedom to learn (Hart, 1983; Rogers and Freiberg, 1994). The teacher knows the desired outcomes but also recognizes multiple paths to achieve the outcomes (Charbonneau and Reider, 1995; Tomlinson, 1995). Multiple paths include using "a variety of instructional strategies to help "match content, process, and product to the readiness, interest, and talents of their students" (Tomlinson, 1995, 28).

The teacher's role is to share responsibility in the decision making process and become partners in the "pursuit of understanding" (Caine and Caine, 1997, 18). The teacher negotiates with students *who* has control over classroom procedures and content (Oyler, 1996, 3). "Shared authority" (Oyler, 1996) or "Negotiated choice" (Whamsley, 1994) develops the collaboration between teachers and students.

Advantages

An advantage of the teacher-student directed approach is that students have a voice in their education. The shared authority role develops a common destination or agenda as negotiated by the group (Oyler, 1996, 23). In this approach, teachers offer choices. Another advantage is the opportunity for teachers and students to learn together (Tomlinson, 1995, 10). As students choose topics of interest, teachers may learn new knowledge. The approach acknowledges and responds to elements of brain-based learning.

Disadvantages

Disadvantages of the teacher-student directed approach mirror some of the same organizational and management concerns raised in the student directed approach. Tomlinson (1995) addressed this issue in *The Differentiated Classroom* to ease teacher apprehensions. She suggested teachers choose key concepts and then choose a variety of learning activities for different *groups* of students. Each student is not studying a different topic at the same time as may be the situation in a student directed approach.

Another disadvantage incorporates the readiness level of students. Some students are ready for independent work and others are not, which adds to management concerns (Tomlinson, 1995). In addition, strategies, which may work one year, will differ in consequent years depending on the learning profiles of students. Therefore, this approach requires flexible management strategies and skills.

A third disadvantage also cited in the literature on the student directed approach is that some teachers have trouble with "letting go" (Charbonneau and Reider, 1995, 76). The decision-making power is a characteristic that some teachers enjoy and cannot seem to share easily.

Synthesis

Teacher directed, teacher-student directed, and student directed represent three approaches to learning (see Figure 1, The Continuum). One extreme is for the student to be the receiver of information under the direction of a teacher (TD) and the other is for the student to be in control of the information received (SD) with the support and guidance of a teacher. The teacher-student directed (TSD) approach can slide along a continuum between the two approaches.

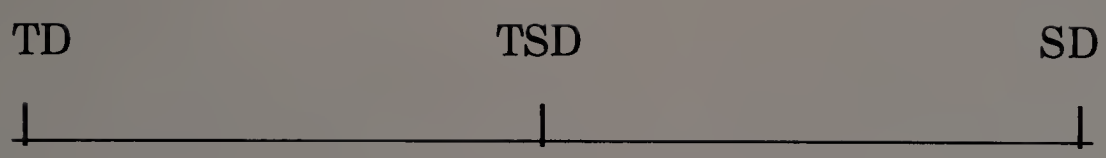


Figure 1. The Continuum

The position on the continuum line where the teacher-student directed approach (TSD) is located depends on the experiences, interests, and expertise of the participants involved. Oyler (1996) defined the teacher directed approach to be a "hard place of teacher authoritarianism" and the other end as a "soft place of abdicated authority" (p.24). The teacher-student directed approach is finding a balance between receiving and constructing knowledge. Important choices among the ideas, concepts, and issues educators want students to learn will always be undergoing change. Theories of brain-based learning present new ways of thinking, acting, organizing, assessing, and presenting opportunities for educators to change.

No matter which approach is implemented, one important characteristic of the teacher's role in the learning environment is "teacher prestige." This is defined by Caine and Caine (1994), as the trust built in the eyes of students that the teacher has authority, expertise, and credibility (pp.144-145). The climate in the learning environment must also reflect understanding that the teacher values students ideas. Rogers and Freiberg (1994) stated: "Research shows that when a teacher is real, understanding, and caring, students learn more of the 'basics' and, in addition, exhibit more creativity and problem solving qualities" (p. xxiii). These characteristics build rapport and respect. Students must be able to trust their teachers and believe in their personal character. After all, students are children looking to adults for support, guidance, and validation that they are unique.

A Practical Approach

The program in this study moved from a teacher-directed approach to a student-directed approach. Therefore, I was interested in locating research which provided a picture of such a continuum moving toward a student directed approach. I searched for programs that encouraged teachers and students to work together to create meaningful curricula learning experiences (McRae, 1992; Oyler, 1996; Kovalik in Ross and Olsen, 1995; Glasser, 1997; Roebuck and Aspy in Roger and Freiberg, 1994; Hopfenberg and Levin et al., 1993).

The story of one teacher who relinquished her director's role to allow students the opportunity to experience self-directed learning is described in *Freedom to Learn* (Rogers and Freiberg, 1994, 71-84). Barbara J. Sheil was a sixth grade teacher who took a risk, let go of direction, and implemented a variation of the student directed approach for the latter half of a school year. In her classroom, with the support of the administration and parents, she established two groups: non-directed and teacher directed. The largest group of students were in the non-directed group. Only one parent objected to the approach, and her child remained in the smaller teacher directed group. During the development of her program, students fluctuated among groups depending on interests and the responsibility of each student. With Barbara's encouragement, students developed work contracts to plan and evaluate their progress.

Throughout implementation, Barbara kept a daily personal journal to record her thoughts. When reflecting on her journal entries, she noticed changes in herself as well as in students. As the program adjusted, she realized the time it takes to learn the skills needed to facilitate such a program. She recommended a "gradual weaning from the spoon-fed approach" (in Rogers and Freiberg, 1994, 74). Barbara also witnessed some students feeling "frustrated and insecure without teacher direction." (p.74). In other students, she viewed

initiative and self-responsibility, and sensed that students could teach themselves. Students would self-group, regroup, and on occasion, work independently. Her students moved "The Continuum" towards the student directed approach.

Barbara's students experienced flexibility with time when completing their contracts. They set their own pace for learning. Barbara made the state curriculum guide requirements available for students to use a framework, so they could determine the amount of time needed for each subject each week. She believed students needed to learn to work in conjunction with state regulations, as is required by all teachers.

In the beginning when Barbara relinquished teacher control, she observed some students displayed inappropriate behavior among themselves. A lack of self-discipline was also displayed among some students who did not stay on task with their activities. To address these concerns, Barbara established a meeting time each day to discuss issues. This open discussion helped students to respect and to communicate with each other as they moved towards developing the ability to make responsible choices.

As Barbara considered her teacher's role during this process, she experienced fluctuating feelings between optimism and concern. She found herself needing to exercise "holding back control" to provide students with the opportunity to self-discipline. "I've come to realize that one must be secure in one's own self-concept to undertake such a program" (p.76). A teacher must understand and accept oneself and be committed to the belief that students can teach themselves before this type of approach can be implemented.

Other research by Roebuck and Aspy (in Rogers and Freiberg, 1994) reviewed hundreds of student-centered classrooms. Their research, which was documented over time, revealed "students learn more, attend school more often, are more creative, and more capable of problem-solving" (p.248). They cited one uniting feature among studies as "attitudinal climate." Attitudinal

climate is created by the teacher and factors include trust, realness, understanding, and freedom (in Rogers and Freiberg, 1994, 161). This can be equated with the Caines (1994) "Teacher Prestige" (as described on p. 66).

William Glasser conducted research in which students were allowed more choice in their education. The results reflected positive student development. In 1996, Glasser changed the name of his "Control Theory" to "Choice Theory." Choice theory is based on the belief that each person controls only his or her own behavior. His theory is driven by four psychological needs: "the need to belong, the need for power, the need for freedom, and the need for fun" (Glasser, 1991, 599). He defined the teacher's traditional role as a coercive one, and his Choice Theory defies the ability of a teacher to coerce students to learn.

One study by Glasser involved middle school level students and elementary students. First, he trained teachers with Choice Theory strategies and activities. After implementing elements, teachers and students evaluated the program. When he asked students in the study why they were no longer disruptive and why they were beginning to work in school, they responded: "You care about us . . . and now you give us choices and work that we like to do" (Glasser, 1997, 601). The program did not follow the district's regular curriculum and teachers allowed students to work at their own pace. Teachers instilled the belief within students that *they could <u>not</u> fail* and *<u>only</u> <u>they</u>* possessed the ability to make learning work (emphasis is mine). As a result, the 170 middle school students who had failed at least one grade, 147 students were promoted to high school. In the elementary school, the percentage of students who were measured by the standard MEAP exam scored 88% in reading and 85% in math, as compared to state averages of 49% and 60% respectively (p.601). It is important to note that teachers volunteered in the training of this program. Glasser continues to work with over 200 schools who

choose to implement this theory and believe that students should have a voice in their education.

Teacher Collaboration

Most teachers work in closed environments which are isolated with "little contact with adults in the context of their classrooms." (Eisner, 1992, 613). Teachers seldom view other teachers teaching. This may be a result of rigid schedules or it may be that they choose to work alone. However, when teachers work together, it provides an opportunity for collaboration or team teaching.

Collaborative teaching reflects some similar processes of cooperative learning. Cooperative learning involves groups of students interacting and problem solving. The role of the teacher moving from authority to collaborative team leader is a major ingredient of cooperative learning (Adams, 1994, 23). Cooperative learning has proven to be beneficial in the learning process in research studies conducted by David Johnson and Roger Johnson at the University of Minnesota and Robert Slavin at Johns Hopkins University. Their research has concluded that when the teacher takes a facilitator role, student gains are made in achievement and motivation. "The opportunity to learn from each other in the classroom is becoming recognized as a viable approach to increasing student motivation and learning." (Rogers and Freiberg, 1994, 265). Collaboration provides the same opportunities for teachers.

Advantages

When teachers group together in a collaborative experience, several factors emerge as necessary for success including flexibility in time, flexibility in space, modeling communication among peers, and potential to expedite

instruction and evaluation (Rockefeller, 1977, 62). Members of the collaborative team must be compatible, harmonious, and cooperative (Charbonneau and Reider, 1995, 137). Communication among peers "draws on the unique strengths of two or more" (Charbonneau and Reider, 1995, 137). In addition, students have an opportunity to see teachers model the collaborative behaviors. These same characteristics were cited as important in interdisciplinary programs. Use of time may be more flexible because two teachers can negotiate responsibility of working with groups or individuals. Flexibility in space becomes available if each teacher is assigned a learning environment. The collaboration may offer the opportunity to utilize different environments for different purposes.

Disadvantages

Disadvantages for collaborative teaching were much like those that impeded interdisciplinary learning. The main disadvantage surfaces with the processes of change. "The familiar is often more comfortable than the uncertainty of the unknown" (Eisner, 1992, 617). The collaborative approach involves risk-taking in adventures not tried before.

Other disadvantages include teachers feeling uncomfortable teaching subjects with which they are not familiar, especially in the arts (Eisner, 1980). Eisner (1980) postulated that classroom teachers are uncomfortable teaching the arts because training is meager or nonexistent (p. 2). Inflexible teaching schedules (especially for art teachers) and lack of time to plan also present disadvantages of collaborative teaching. And finally, collaboration of teachers may result in poor personality matches.

A Practical Approach

One practical application of a collaborative effort implemented in a Massachusetts school revealed the importance of uniqueness. Graillert (1991), an art specialist who was hired to establish collaborative teaching experiences in an Acton school discovered that no two teachers are alike and no two students are alike. She commented: "Every classroom is unique in its environment and in how the curriculum is implemented" (p.261). She recognized no prescriptive measures-- every individual situation must be considered. Rogers and Freiberg (1994) defined this as an "Internal Locus of Evaluation" (p.81). Teachers decide what is working, and is not working. Then, they make program adjustments keeping open-minded and flexible and base judgments on evidence. When making a change in program development, teachers go through stages of introspection, questioning, and implementing change (Rogers and Freiberg, 1994, 84). It is important to remember that "any one program will not meet the needs of every child (Rogers and Freiberg, 1994, 264).

Teachers who do decide to implement change need support. Oyler (1996) stressed the importance of supporting and encouraging teachers who challenge traditional pedagogies. Oyler (1996) claimed: "Such change involves risk taking and serious intellectual work" (p.29).

Part Three: Summary

The purpose of this section of the literature review was to identify characteristics of the teacher's role in the learning environment in three approaches: teacher directed, teacher-student directed, and student directed. These characteristics provide a framework for data analysis (for a list, see Appendix B, p. 223).

The teacher plays an important role in structuring the learning environment. The teacher's role in the teacher directed approach is to direct the learning process. Teachers in the teacher-student directed approach organize the process of learning sharing accountability and some of the responsibilities. The student directed approach requires a teacher to facilitate the process of learning. The teacher directed approach places one person in charge, while in the other approaches teachers and students negotiate responsibilities. The movement of the teacher- student directed approach along a continuum towards a student directed approach depends on the members of the community in terms of interests, abilities, experiences, commitment, and expertise. One major element in facilitating moving from a teacher directed to a teacher- student directed or a student directed approach is understanding the nature of change. Before teachers can implement any changes in the process of learning, they may need to let go of deeply held beliefs (Caine and Caine, 1997). Other major elements required to ensure the success of any apporach are administration and parental support and adequate resources.

CHAPTER III

METHODOLOGY AND PROCEDURES

Nature and Design of the Study

The purpose of this case study was to examine and describe the development of an interdisciplinary program in an elementary setting. Robert K. Yin, President of COSMOS Corporation, a research and management technology firm specializing in social policy problems defined a case study as follows:

> A case study is an empirical inquiry that
> • investigates a contemporary phenomenon within its real-life context, especially when
> • the boundaries between phenomenon and context are not clearly evident. (Yin, 1994, 13)

Developing an interdisciplinary program is a contemporary phenomenon supported by current national reform initiatives, brain research, and arts in education research. Descriptions of three approaches, which were attempted in this study over a fourteen month period, blend phenomenon with context. "Because phenomenon and context are not always distinguishable in real-life situations," data collections and analysis strategies are an important part of the case study design (Yin, 1994, 13). Multiple sources of data and theoretical issues guided data collection and analysis. An in-depth look at interdisciplinary learning within one elementary setting through teacher stories and collection of data, provided insight into the nature of how the program developed. Conclusions about any patterns that emerged during analysis will be presented and discussed in Chapter IV.

When the administration in this setting informed me in March 1995 that the art room was to become a preschool classroom within four week time frame, and my program was to become "Art on a Cart" traveling from

classroom to classroom, the top down decision became a catalyst for me to propose an alternative art program. I had wanted in the past to work more closely with classroom teachers, but common planning times and available open times in my art schedule hindered implementation of the approach. Because of the difficulty of traveling three floors with art materials and no time in my schedule between classes, I proposed an alternative approach. The purpose of the program was to revise and reshape the way art was taught in this setting and I titled the program, "Art's New Face". One focus of the revised art program was to keep art lessons during one week and to implement interdisciplinary learning experiences the alternate week, thus an A/B week schedule would be employed. The "A Week" would be for an art class, the "B Week" would be available for interdisciplinary sessions. With this type of schedule, our school would gain an interdisciplinary program, but classroom teachers would lose forty-five minutes of planning time every other week. The main focus of the program was to bring the art specialist into participating classrooms to explore curriculum topics <u>with</u> classroom teachers and students.

The Setting

The site in this study was an urban elementary school located on a college campus in Central Massachusetts. Morris Campus School is part of the teacher education center at Baxter State College (pseudonyms). The city of Baxter has a multi-ethnic population around 41,000 including a mix of Caucasian, African-American, Hispanic, Latin American, and Asian people. Many family households are bilingual with Spanish and Mong as their primary languages. The city has two middle schools and one high school. Morris Campus School is one of five elementary schools. The twenty-four year old, three story, red brick school building is " T " shaped dividing the school into three wings. Elementary classrooms are in the A wing (left top of the " T ");

the gym, library, auditorium, and cafeteria are in the B wing (bottom of the " T "); and the C wing contains college classrooms (right top of the " T "). The enrollment at Morris Campus School was approximately 640 students. The city experiences a high rate of "move-ins" and "move-outs". In the A wing there are twenty-three classrooms for kindergarten through grade 5, two preschool classrooms, a day care center, and five additional special education classrooms including a language development class and a behavior modification class. Special education students were integrated into the art, music, gym, and library classes. All students received forty-five minute weekly classes in art, gym, music, and library.

The staff consisted of thirty-eight members including classroom teachers, specialists (art, music, gym, and library), special needs, chapter one, and title one teachers. In addition, there were many paraprofessionals, college students, and parent volunteers who assisted teachers and students in classrooms. The support staff included three secretaries, three custodians, and lunch room personnel. Most of the school staff consists of "city teachers", employed by the Baxter school system. There were eight teachers hired by the college and referred to as "state teachers" (three second grade, one fourth grade, one fifth grade, and the art, music, and gym teachers). The principal was employed by the state as the Dean/Principal of Morris Campus School and the vice principal was employed by the city. During the development of this program, the two-system staff posed scheduling conflicts reflecting differing contract requirements (described further in Chapter IV). I chose this research site because of my full time employment there and, more importantly, for the opportunity to put research findings into practice.

Participants

Participants in this study (teachers and students) vary in number because of the program's three phase development during a fourteen month period. In the figure that follows (Figure 2, Interdisciplinary Program Time Line), the number of interdisciplinary teams, the dates of three phases, and the title of each phase is presented. Pseudonyms are used to protect students' and teachers' confidentiality. The participants in this study were not random selected as in some research.

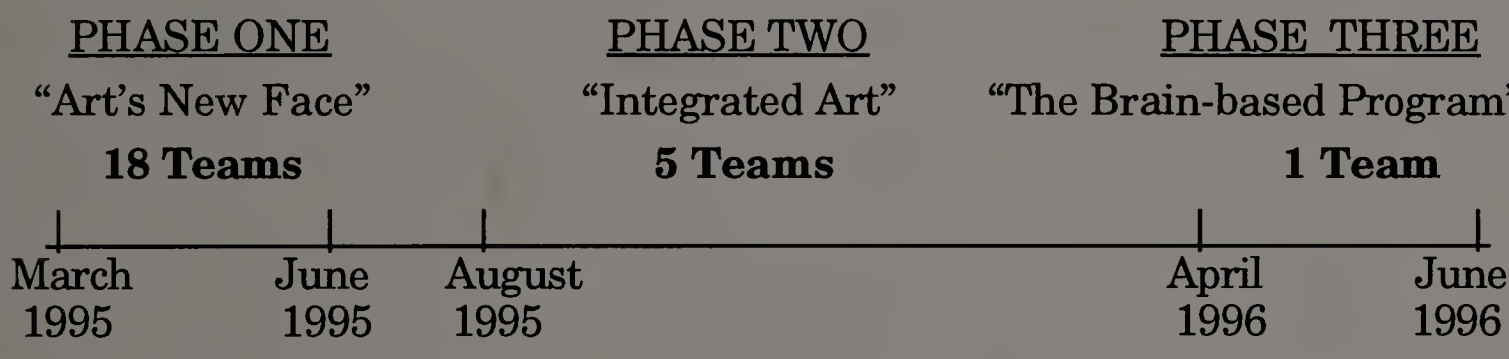


Figure 2. Interdisciplinary Program Time Line

Phase One of "Art's New Face" allowed eighteen open slots in the art schedule for interdisciplinary sessions. Eighteen teachers out of a possible thirty-eight voluntarily chose to participate in the program for a ten week period. In August 1995, the beginning of Phase Two, "Integrated Art", a new location for the art room changed the art schedule. The biweekly art classes of Phase One returned to a weekly schedule reducing the number of interdisciplinary sessions to five. Teachers voluntarily requested to participate during this phase after I placed an invitational letter in all staff's mailboxes (See Appendices C, Invitational Letters, p. 226). Four of the five Phase Two teachers also participated in Phase One. Phase Three, The Brain-based Program began in April 1996 with one grade four team - a classroom teacher, her students

(N=24), and myself. Selecting this particular class represented "purposive sampling" as described by educational researchers, Lincoln and Guba (1985), to "maximize the scope of the information obtained" (p.274).

The profile of the grade four teacher, Jackie Clapp, appears in Chapter IV, Presentation and Analysis of the Data, p 102. I selected her because she participated in all three phases of the program and her perspective provides opportunity to verify characteristics of this program from a classroom teacher's point of view. Also the twenty-four students in her class experienced Phases Two and Three of this program.

Jackie was selected for several reasons. She was one of the first teachers to express interest in participating in the program and scheduled *weekly* interdisciplinary sessions in Phase One. The other teams in Phase One participated in a bi-weekly schedule. Jackie was able to schedule weekly classes because the time and day she chose were open both weeks. On the first program request form (3/95), Jackie was the only teacher to suggest areas for interdisciplinary sessions which included:

- Ideas for Choice Time (anything is possible)
- Help kids illustrate stories
- Work on project for unit (i.e. design houses for electricity unit)
- They love computer work!
- Teach kids graphics on computers
- Work with small group

I believed Jackie's suggestions indicated that she was a person truly interested in the process of learning. In addition, she was willing to take a risk by participating in this program.

I also was interested in profiling Jackie because of her classroom management skills. Consistently over a five year period, I had noticed her

students demonstrating a cooperative atmosphere when they participated in my art classes. I believe the overall classroom behavior outside a student's homeroom reflects a classroom teacher's management style. In five years, I had never experienced an uncooperative group from this teacher's room.

My interest in profiling this teacher also resulted from an experience, which demonstrated her commitment to education. A year before the conception of this program, Jackie had expressed to me her disappointment in the end product of a science robot unit she had used over the past few years. On her own initiative, she requested my assistance to help her students design and build robots. In her classroom, she prepared her students by beginning the science unit. In the art room, I demonstrated a three-dimensional drawing lesson (cubes, boxes, cylinders, and value shading with pencils). In her classroom, the students began building a three-dimensional robot and then brought the projects, in-progress, to the art room. During art class, I offered suggestions and assistance to help students with the construction and combining of units. At the end of the project unit, Jackie commented:

> You could see that the kids really focused more on the size and the shapes. They were just much better looking. The first two years I did the Robot Unit without you. The third year we did it with you and it was a remarkable difference. (5/95)

The result of our first experience together was an interdisciplinary lesson. However, we separately approached the curriculum topic at <u>different</u> times in <u>different</u> locations. We did not collaboratively teach at the <u>same</u> time in the <u>same</u> location as we would do in the interdisciplinary program under study here.

The fourth reason I selected this teacher relates to her professional experiences. Jackie is an active teacher inside and outside her learning environment. During the 1994-1995 school year, she was our school's After-

School Coordinator. This responsibility required hours of coordination and management of all after-school activities. She also taught a two hour, gifted and talented science program, one day a week, for an entire school year. During the same year, I offered an after school program in Computer Graphics and Making A Clay Mural. At the conclusion of these after school programs, we coordinated a reception for parents and the school community to view students' projects.

My interest in selecting Jackie for an in-depth profile in this study also resulted from our first two formal interviews (5/95 and 6/95) and my observations during our interdisciplinary sessions in Phase One and Phase Two. The interviews gave me insight into her pedagogical beliefs and her teaching perspectives. My observations during program sessions gave me an opportunity to view this teacher in action verifying her teaching beliefs.

Before beginning this program and through its development over the past two years, I witnessed Jackie demonstrating an interest in providing her students with the best educational experiences possible. At the beginning of Phase One, I knew this teacher only on a professional basis with limited interactions. Profiling her perspective of this program's development adds dimension to this study. Her profile in Chapter IV illuminates the teaching and professional qualities I witnessed as part of our collaborating teaching experiences.

Description of the Learning Environments

During the development of the program, interdisciplinary sessions took place in teacher's classrooms, the cafeteria, outside the school building - on and off school grounds, and the art room. A detailed description is given for the art room and Jackie's room because those rooms reflect the narrower focus of this

study. The remaining classrooms at Morris Campus School can be classified as average in size and shape.

Art Room

In September 1995, the beginning of Phase Two, I established a new art room in the bottom level of the A wing. Northeast light from a wall of windows floods the yellow walls of this room with natural light. On entering the room, a blue counter leads the way to a work area containing six rectangular tables. A large open floor space on the northwest side is covered with twelve feet of homosote board and used as a display and meeting area. A chalkboard is to the left of the display area. On the opposite side of the room is a "U - shaped" activity center where art supplies, resource materials, creativity puzzles and miscellaneous supplies are stored. A four foot square table stands in the center. A storage rack for "wet work" is to the right and a teacher work area is to the left of the activity center. The teacher work area consists of a desk, a storage cabinet, a file cabinet, and a paper cutter.

Next to the art room, connected by an interior door, is an additional classroom known as the clay studio. It is a standard size classroom, which has three work tables (cafeteria style table-bench units on wheels), two six foot work tables, seven pottery wheels, six metal shelf units, two sinks, a clay wedging table, a pug mill, and a kiln (which is vented outdoors). This room has no outside windows, which is why it is not used as a "full-time" classroom.

Grade Four Classroom

Jackie has set up her learning environment by creating a large open area in the front of the room with a 9' x 12' rug. She refers to it as the "Meeting Area". Her classroom is typical in size and painted beige. The area to the right

of the entrance door stands a counter sink, a chalkboard, and a comfy green chair. Along the opposite wall is an area where crates are stacked for students' personal belongings. Next to the student "cubbies", Jackie has set up a math center, a science center, and a computer center. The area to the left of the entrance door has a display area, a grow light with plants, a row of upper cabinets and a blue counter which contains lower cabinets. The opposite wall has two windows and located between them is a large three-sided book rack area displaying hundreds of various types of literature. Jackie adorns the walls with posters, student work, a daily agenda chart, and classroom rules. The rules are generated by students and agreed on as a group at the beginning of the year. The posters above the math center include the multiplication tables, measurement configurations, and strategies for solving problems. Language art posters illustrate cursive samples and editing notations near the literature center. The classroom rules are posted on the cabinet doors. Jackie hangs selections of various writing genres including poems near the location where students place their writing samples.

During Phase One, Jackie positioned her desk near one of the windows towards the front of the room. At the beginning of Phase Two (Sept. 1995), Jackie removed her desk and condensed her management materials to a shelf unit and window sill. A supply cabinet located in the center of the room stored various types of paper, writing utensils, and other miscellaneous supplies. Six tables with chairs were arranged around the supply area. Above each table hung a colored math symbol. To help facilitate transitions between activities (such as assembling reading or math groups), Jackie's referred to each table as the red trapezoid, the blue rhombus, the purple octagon, the yellow hexagon, and the green triangle group. Students used all areas of her classroom as well as the hallway outside her classroom. Students were not assigned seats in her classroom. Every day, students could chose to sit at any table. Only during times of behavior management and if students formed "cliques," would Jackie

intervene and assign seats to individuals. The organization of Jackie's room was thought out to assist students in organizing their work and activities.

Data Collection

Qualitative methodologies of data collection used during the program's development include: participant observation fieldnotes; formal and informal interviews; researcher-made survey questionnaires; videotapes; researcher's journal; and student documents including projects, process papers, and mind maps. The data collected helped to add meaning to the interdisciplinary learning approach by investigating what students and collaborating teachers were experiencing throughout the program's development. The multiple means of collecting data help to validate responses and provided triangulation of data by comparing and contrasting emerging patterns (Yin, 1994). In this section, the methodology is presented first followed by how these data guided responses to answer the dissertation's focus questions (pp. 91-94).

Participant Observation Fieldnotes

Fieldnotes written after each interdisciplinary session described what happened during the fourteen months. As described by Bogdan and Biklen, (1992), the fieldnotes also contained observer comments to raise issues of subjectivity and biases (pp. 107-124). In the fieldnote margins, I numbered and coded fieldnotes as to the type of interdisciplinary experience in use. Codes included: Curriculum Areas combined with art (math, science, social studies, and language arts), Thematic Unit (TU), One Time Lesson (OT), Planning Meeting with Teacher (PT), Planning Meetings with Teachers and Students (PTS), Spontaneous Activity (SA), or an activity on an As-Needed Basis (A-N).

"Another Set of Eyes", a video produced by the Association for Supervision and Curriculum Development (ASCD) provided analysis techniques for coding fieldnotes concerning the role of the teachers: Was the level of student involvement active (SA) or passive (SP)? Who was in control? How much time was teacher directed (TD), or shared (TSD) such as in group brainstorming activities? How much time was student controlled (SD)?

Researcher's thoughts came to me throughout each day in and out of the research setting. I recorded the ideas, perceptions, reflections and questions on whatever paper was available. I dated the notes and kept them in sequential order in a looseleaf binder. The notes became a record of how my perceptions of the program were evolving; and they helped shape the next day's actions. The binder allowed freedom for different size and shape papers. This binder became my researcher's journal. In coding the journal, I separated my beliefs from facts by asking a self-reflective question - Is this my opinion or my observation? In the journal I also recorded moments when I recognized insights (AHA) as well as moments when I did not feel things were going well (OH NO) as suggested by educational researchers, Hubbard and Power (1993).

Five functions of peer coaching as defined by Showers (1984) and reported in a NAEA Advisory (Spring, 1996) helped me to code journal entries, fieldnotes, and interview transcripts in areas of: Companionship (C), Feedback (F), Analysis (AN), Adaptation (AD), and Support (SU). Companionship included discussions about successes and failures of teaching. Feedback depicted objective, non-evaluative feedback about sessions and ideas. Analysis embodied times when collaborating teachers critically discussed their approach. Adaptation reflected moments when the collaborating teachers molded a lesson to meet the needs of the class. Support delineated opportunities when the collaborating teachers assisted each other in applying a new strategy during lessons. I chose these five functions to assist coding

data because they reflected the types of interactions that were occurring during the program's development.

Interviews

In-depth interviewing provided important data in this study. Interviews are important to case studies "because most cast studies are about humans" (Yin, 1994, 85). The interview methodology of qualitative research, in combination with observations, allows the researcher "to check description against fact" (Marshall and Rossman, 1989, 82). Open-ended questions in qualitative interviews permit the participant's perspective to unfold (Bogdan and Biklen, 1993; Marshall and Rossman, 1989). Limitations of this mode of inquiry include the quality and type of questions asked during the interview process, the personal interaction between the researcher and participant, and the essential cooperation of participants (Bogdan and Biklen, 1993; Marshall and Rossman, 1989). In spite of careful design, interview questions may not evoke the responses that will necessarily support key themes or patterns emerging during analysis, or the interviewee may not be truthful or may give responses that the interviewer may wish to hear. Another limitation cited by Yin (1994) is that the interview is only a verbal report and the interviewee may be biased, have poor recall, or poor articulation (p.85). I addressed these limitations through the use of informed participants. As a teacher in this setting, I was familiar with teachers and their students. In addition, I had the opportunity to have daily ongoing discussions with participants to clarify thoughts and validate findings. These opportunities provided "member checking" on the perceptions of our interdisciplinary approach. "Member checking" is an opportunity for the researcher to share perceptions of what was happening and to question them for accuracy and credibility from the participant's point of view (Lincoln and Guba, 1985, 264).

During Phase One I conducted open-ended interviews (5/95) with two teachers (Jackie and Sarah), once, half way through the ten week program and the other in June (6/95). At the end of Phase Two (6/96), I conducted open-ended interviews with four teachers, in addition to, two interviews with Jackie (3/96 and 7/96). One additional interview with Jackie took place six months after the completion of Phase Three (2/97). The final interview presented an opportunity to "member check" preliminary analysis. The purpose of the interviews was to obtain a classroom teacher's view of the interdisciplinary approach, our particular program, and their role in the program.

I talked informally in an open-meeting format with grade four students in two classes at the end of Phase One to obtain the students' view. The group discussion allowed students to reveal their perceptions of the program. Before the discussion began, I requested that students be honest with their comments. I told them that I trusted their ideas and stated their reflections would help to shape the program in the next school year.

Jackie's grade four students were informally interviewed at the end of Phase Three. I shared the same requests concerning honest comments as I did with students in Phase One. In addition, I conducted post-program interviews one year after the completion of Phase Three (5/97) with eight students. The intent was to determine what phase of the program they preferred and what parts of the program were memorable. If the student expressed difficulty remembering what we did, their folders from Phase Three helped to refresh their memories. I selected these students based on my observations during program sessions using a criteria of their work habits and enthusiasm during sessions and their interdisciplinary projects.

I tape-recorded all interviews after receiving oral consent. Participants were aware they could stop the interview at any time without prejudice. I transcribed all interviews and sequentially numbered each transcript and coded the type of conversation in the margins. Types of conversations were

coded according to characteristic patterns of interdisciplinary programs gleaned from Jacob's book: *Interdisciplinary Curriculum: Design and Implementation* (1989) and include: Curriculum Issue (CI), Scheduling Issue (SI), Time Issue (TI), Flexibility Issue (FI), Process of Change (CH), Interpersonal Skills (InterS), Role Expectations (RE), Intrapersonal Skills (IntraS), Territoriality (T), Assessment and Evaluation (E), Teacher Training and/or Experience (TTE). In addition, the NAEA Advisory (Spring, 1996) five functions of peer coaching were used (as described earlier).

I documented informal conversations from participating teachers and students that occurred outside of sessions (in the halls, lunch room, playground, etc.) in my researcher's journal. Entries were coded as described above.

Survey Questionnaires

Data were collected through researcher-designed survey questionnaires (see Appendices D, Survey Questionnaires, p.234). I consulted Borg and Gall's (1989) qualitative research source book, *Educational Research*, when designing survey questionnaires. One limitation of the survey questionnaire data gathering method is its reliance on the "honesty and accuracy of participants' responses" (Marshall and Rossman, 1989, 83). I addressed this limitation by utilizing multiple sources of data gathering, which helped to validate responses on the surveys. The survey questionnaires obtained participants' perspectives towards the program throughout the developmental process. At the end of Phase One (June 1995), I administered one survey to non-participants and another to participants. Two months after the beginning of Phase Two (October 1995), I distributed another survey to nonparticipants to help verify the beliefs and concerns in this setting about this type of learning approach from the first survey. I administered two surveys to grade four students in

Phase Three. The first survey (April 1996) provided baseline data before Phase Three began and the second survey (June 1996) yielded data concerning students' attitudes towards brain-based learning elements, their interdisciplinary projects, and their preference towards the type of interdisciplinary approach they favored. I designed the "Brain-Stuff" section of the survey according to Thomas Armstrong's (1994) visual response technique. Armstrong is an educator, author, and advocate of Gardner's Theory of Multiple Intelligences. To assist analysis, I added an additional column to the survey to verify the visual images with verbal terms. Students responded on the surveys anonymously and their comments helped to yield data about this program from a student's point of view. Before I distributed surveys, I told students how important their responses were and how their comments would aid future development of this program. I shared with students that I wanted to hear the "good" and the "bad," so honesty was important. I also stated that their names should not be written on the surveys. The limitation of their responses were controlled by comparing responses with fieldnote observations and videotape transcripts. I coded survey responses into categories including: Concerns (C), Attitudes (A), and Suggestions (S). Characteristics from Jacob's book (1989) and NAEA Advisory (1996) five functions of peer coaching (as described above) were also used in coding. I sorted the visual and verbal responses of grade four students in the Phase Three "Brain Stuff" survey to determine the participants' attitudes towards brain-based learning elements used in sessions (for example, the use of water, music, weekly brain facts, mind maps, brain exercises, and an attention-grabbing strategy - a jello brain).

Videotapes

Videotaping sessions document events in the natural setting. This methodology is "particularly valuable for discovery and validation" because videotapes record the natural occurrences within the classroom, validate fieldnote observations, and provide the opportunity to view observations for later analysis (Marshall and Rossman, 1989, 86). I only videotaped Phase Three sessions because I was the lead teacher during those times. The videotapes helped me to create detailed fieldnotes after sessions. The limitation of videotaping raises concerns about professional bias and the interests of the filmmaker and the ethics of ethnographic filming (Marshall and Rossman, 1989, 86-87). I controlled the limitation of the bias of the filmmaker because I set up the video camcorder in a corner of the art room and allowed it to run continuously during program sessions. The camera only captured what was happening in half the room at any one time. During group brainstorming sessions, the camcorder's audio sound captured the dialogue of the entire group. Another limitation of videotaping is the awkwardness of the camera in the classroom (Marshall and Rossman, 1989, 86-87). I believed that, at first, students would be inquisitive of the "addition" to our environment, but the program's involvement with hands-on activities would allow the camera to become just another piece of furniture. I coded the video transcripts as Participant Observation Fieldnotes according to the methods described above.

Documents

Documents are useful rich sources of information "relevant and grounded in the contexts they represent" (Lincoln and Guba, 1985, 277). These unobtrusive data gathering instruments are "methods for collection of data that do not require the cooperation of the subjects and are invisible to them"

(Marshall and Rossman, 1989, 100-101). The document sources used in this study helped provide multiple means of triangulation. The following are the types of documents used in this study.

Mind Maps. Tony Buzan (1978, 1994), a leading authority on the brain and learning techniques and Chairperson of the Brain Foundation, developed the Mind Map concept. Mind mapping is a way to facilitate how our brain links ideas, key words, images and patterns and is similar to brainstorming and webbing techniques (Buzan and Buzan, 1994). The method begins in the center of a piece of paper where an idea or concept is drawn (or written). From the center, branch supporting ideas and facts. Only one word is used on each branch to represent an idea or fact. Graphics are added with personal preference. Branches continue to radiate out with descriptive words and pictures. Grade four students and collaborating teachers created Mind Maps in Phase Three. The maps yielded data about topics of interest and favored school subjects. I sorted the maps into different types, which represented visual modes of expression. Types included: linear (S); spokes and bubbles (SB); spokes, bubbles, and artwork (SBA); and free form (FF).

Project Folders. During Phase Three, each fourth grade student kept a folder. Folders contained a time log, mind maps, project plans, and other process papers related to their topics. Process papers resulted from students answering two questions about their topic choices: What do you know? What do you need to know or want to find out? The papers included written paragraphs, lists, zeroxed research materials, drawings and mind maps. I categorized process papers into types: Visual (V) - mind maps and sketches; Written (W) - topic paragraphs and informational lists; both Visual and Written (VW); and Research (RW) - zeroxed information obtained from outside sources.

Projects. Student projects reflected interdisciplinary connections. At the end of Phase Three, collaborating teachers asked students to share their project and knowledge during a presentation. Students had the choice to present to the class, the teachers, or a "buddy" from another class. Questions to assist student presentations included: Tell us about your project. What worked? What didn't? Were there any surprises? These questions aimed at uncovering what was most meaningful to students and if they connected to any new knowledge. The project presentations were videotaped. I coded student responses for discussion content. Coding categories included: Description (D) - describing project component parts; Topic Knowledge: art related (TKA) - student used art terminology : line, shape, color, texture or content related (TKC) - student described detail parts of project; Giving Excuses (E); Technical Difficulties (TD); and Connection to New Knowledge (NK).

Data Analysis

Data analysis "is the process of bringing order, structure, and meaning to the mass of collected data" (Marshall and Rossman, 1989, 112). Analysis searches for meaning to generate relationship statements among categories of data (Bogdan and Biklen, 1992; Marshall and Rossman, 1989). The review of the literature helped me establish coding categories by identifying characteristics of interdisciplinary programs, brain-compatible learning environments, and a teacher's role in the learning environment. I searched the data for verbal evidence which illustrated examples of each characteristic. Preliminary data analysis took place during the program's development and formal analysis took place over a one year period following the completion of Phase Three. This time allowed me an opportunity to incubate emerging patterns and to recheck them for validity. I examined multiple sources of data

for evidence which corroborated facts which provided triangulation. I checked back and forth to seek similar descriptions of the same theme.

Fieldnotes, interviews, survey questionnaires, videotapes, and student documents provided data for analysis to answer the dissertation's focus questions:

1. How did the interdisciplinary program develop over a fourteen month period? What were the various styles of implementing interdisciplinary learning that developed in this setting?

2. What is the effect of the collaborating teachers' role on the learning environment in an interdisciplinary approach?

3. What factors affect students' choices when deciding the topics and interdisciplinary connections for projects?

I printed each focus question on a large piece of paper to enable me to establish categories and determine patterns. Data were separated into three main sections representing each focus question. I further separated data into subcategories relating to the type of approach: teacher directed, teacher-student directed, or student directed. Then categories were assigned colors and transcripts and fieldnotes were color-coded. Colors visually helped to give an overview of recurring patterns and made viewing the data more "pleasing to the eye" and "enjoyable" (a brain-compatible component for me). I reduced the categories by looking for themes and any strong evidence of a "finding" which were possibly in more than one category.

The first focus question could be answered by sorting the data collected through Phases One and Two from fieldnotes, interviews, questionnaires and my researcher's journal. Data analysis would describe styles of

implementation attempted and uncover participants' beliefs and concerns about this learning approach.

To answer the second focus question, I coded and sorted data by answering the following questions: What learning environment was chosen for sessions, What interdisciplinary connections were made? Who chose the connections? Who chose the activities? Which type of approach was used? How did participants view their role? Answering these questions yielded patterns to determined the effect of the changing role of collaborating teachers.

The third focus question aimed at determining what factors affected students' choices when deciding topics and interdisciplinary connections. Data were sorted by answering the following questions: What interdisciplinary connections did students make? What curriculum topics and arts methods were chosen? What school subjects do students favor? What activities do students like to do at home? Then I searched for relationships among their choices. How do their connections relate to favored school subjects and/or personal interests? How do their projects relate to brain-based learning theories and principles? Which approach did the students favor and why? Data analysis of Phase Two and Three also revealed grade four students' perspective towards this learning approach.

After coding and sorting the data, I then juxtaposed my findings against the characteristics gleaned from the literature review to see what patterns were present. I examined the research questions that guided the inquiry and searched for similarities and differences. I made several passes over the data to check and recheck for sorting accuracy. I conducted each pass several months apart allowing the opportunity to incubate thoughts and to view the data "with fresh eyes." Analysis takes many levels of inquiry and as Marshall and Rossman (1989) pointed out, "alternate explanations *always* exist." (p.119) I reviewed the data a number of times to take a second view and challenge the patterns that seemed apparent. I then coded the categories

into a smaller number of themes by clustering categories with established relationships. In Chapter IV data is presented and analyzed for each of the three focus questions along with excerpts that illustrate the themes and most prevalent patterns.

Marshall and Rossman (1989) described the analysis step as "the most difficult, complex, ambiguous, creative, and fun" (p.115). In my experiences as an art educator, "fun and creative and the feelings of ambiguity" are user-friendly. The "complex and most difficult" characteristics have become user-friendly from my experiences in qualitative research graduate courses and in the documentation of this program. Data analysis provided a deeper understanding of the interdisciplinary learning approach in this setting. Analysis also had the potential of strengthening the collaborating teachers' pedagogical techniques as findings were shared among participants and then infused into program sessions.

Limitations

A limitation of educational research is the lack of such research being translated into practice (Eisenhart and Borko, 1993; Witherell and Noddings, 1991; Hubbard and Power, 1993). One problem related to time. How do teachers find the time to read extensive research? Another problem related to teachers being able to translate and understand research. Eisenhart and Borko (1993) offered two sets of criteria for educational research to be useful and valuable. First, the research concerns must related to the questions and situations of teachers. Second, the research must be available and *readable* to teachers (p.76). This study fits the two criteria because the research was designed, implemented, and analyzed by a teacher and the participants, classroom teachers and students, were integral parts of the developmental process (as described earlier).

Eisenhart and Borko (1993) raised a concern of educational research: "[researchers] tend not to be engaged in efforts to apply, or use, the results of their research to improve educational practice in the sites of their study" (p.13). In my study, this limitation was eliminated because of the collaboration of teachers. I, as researcher, did not leave the study setting when the data gathering was completed. The program will continue to evolve fitting the needs and interests of participants in this setting. The study has implications for the pedagogy in this particular setting as the researcher will analyze the data and share the findings with collaborating teachers. The teachers' reflections on the processes involved during implementation may contribute to revisions and modifications in the program. Interpretation of data gathered from this program may provide insight to other educators and curriculum planners who anticipate designing and implementing interdisciplinary learning experiences.

Trustworthiness

Trustworthiness encompasses issues of credibility, transferability, dependability, and confirmability (Lincoln and Guba, 1985). These issues help assure that the study was conducted appropriately and that the resulting data are sound and believable. In order to make my study credible or believable, I interviewed several teachers, several times during the fourteen month period. In addition, I had the opportunity to have daily ongoing discussions with participants to clarify thoughts and validate findings. These opportunities provided "member checking" on the perceptions of our interdisciplinary approach. "Member checking" is an opportunity for the researcher to share perceptions of what was happening and to question them for accuracy and credibility from the participant's point of view (Lincoln and Guba, 1985, 264).

My integral relationship to the setting also increases the probability of credibility. I have worked with teacher participants for seven years prior to the study and continue to work in this setting after the completion of this study. I attempted to describe accurately, both positively and negatively, what happened in the development of this study. In addition, before I completed writing this dissertation, Jackie had the opportunity to read and respond to my descriptions of her pedagogical style, how we implemented the approach, and my conclusions about the study.

Transferability entails the conclusions of this study being generalized to other settings. In order to address this issue, I provided clear descriptions of my themes and patterns which were supported by quotes from the data. I do not intend to make generalizations to other elementary settings which may use different methods of the interdisciplinary approach. This study is limited to the interdisciplinary experience of one elementary setting. Readers will be free to determine how much transferability to their own experiences seems reasonable (Lincoln and Guba, 1985).

Confirmability relates to the concept of objectivity. I took the following measures to ensure confirmability. As described by Bogdan and Biklen (1992), my fieldnotes contained observer comments to raise issues of subjectivity and biases (pp. 107-124). In coding my journal, I separated my beliefs from facts by asking a self-reflective question - is this my opinion or my observation? As potential patterns emerged during this fourteen month period, I attempted to remain open to the data without imposing preconceived expectations. I did not set out to implement any one style of the interdisciplinary approach. I allowed the interests and needs of collaborating teachers to define the styles in this setting. Only during Phase Three, did Jackie and I collaborate to implement an alternative approach, the student directed approach, to help answer an underlying question: Who should choose the curriculum areas, topics, and related arts projects?

Another measure I took to ensure confirmability was to employ research partners who played "devil's advocates" and critically questioned my analysis. Over the past two years, I established "debriefing conversations" with a colleague, K.T., outside this setting in order to talk about my research. Debriefing conversations are conversations with a "noninvolved professional peer with whom the inquirer(s) can have a no-holds barred conversation at periodic intervals" (Lincoln and Guba, 1985, 283). K.T. is an art specialist in the process of teaching an arts-based middle school curriculum at an art museum. I encouraged her to look at her situation from a researcher's perspective through a researcher's lens. I shared the methodology of qualitative research and what I was experiencing. Our conversations reinforced my approach and reminded me to view my work objectively. Our discussions about data analysis gave me an opportunity to "*hear myself*" and her questions helped me look at the data with objective eyes.

I also held conversations with a college-level colleague in this setting. Jamie Finch just finished earning her Ph.D. at the University of New Hampshire. Our conversations helped to validate the processes I was experiencing. This quotation reflects how I felt at times during this process:

> If you look at any of the work on creativity and learning, or if you look at the lives of great scientists, or if you look at your own creative process, it's not a nice orderly step-by-step process that moves you toward a great idea. You get incredibly frustrated, you feel you'll never solve it, you walk away from it, and then Eureka! -- an idea comes forth. You can't get truly transforming ideas anywhere in life unless you walk through that period of chaos.
>
> (Wheatley, 1995, qtd. in Caine and Caine, 1997, 118)

I experienced times of "downshifting" and "helplessness". Sharing stories with someone who had been through this process helped to alleviate the "chaos" of feelings. Our discussions also illustrated another brain-based element:

emotions are interconnected to our cognitive processes. Jamie also volunteered to be a "reader," which assisted me in clarifying how the data were presented. Jim (a state teacher at Morris Campus School who is a published writer) also volunteered to "read for clarity."

Dependability is the attempt of the researcher "to account for changing conditions in the phenomenon chosen for the study as well as changes in the design created by increasingly refined understanding of the setting" (Marshall and Rossman, 1989, 146-147). The dependability criteria met with the above processes.

The potential contribution of this study may be to make understandable educational change in the learning environment when implementing an interdisciplinary approach. Such research may help others to understand the complexity of collaborative teaching and resolve some apprehensions educators may have towards this type of approach.

CHAPTER IV

DATA PRESENTATION AND ANALYSIS

Context

This chapter presents the events, which occurred from March 1995 through June 1996, that relate to the development of an interdisciplinary program with the arts. Data were gathered and analyzed to answer the following focus questions:

1. How did the interdisciplinary program develop over a fourteen month period? What were the various styles of implementing interdisciplinary learning that developed in this setting?

2. What is the effect of the collaborating teachers' role on the learning environment in an interdisciplinary approach?

3. What factors affect student's choices when deciding topics and interdisciplinary connections for projects?

The interdisciplinary program in this study developed in three phases. Phase One describes the events which took place from March 1995 through June 1995. The sessions were teacher directed with the exception of one team who attempted a teacher-student directed approach. Phase Two began in August 1995 and developed throughout the school year to June 1996. Phase Two also represented a teacher directed approach, with the exception of one unit involving Jackie's team in October 1995. During Phase Two, I began to wonder who should choose the topics and activities for interdisciplinary sessions, teachers or students? This question led me to attempt a student directed approach with one team. In April 1996, Jackie's team attempted a student directed approach and those events are described as Phase Three. The following vignette captures a moment in this study's learning environment which took place during the student directed approach:

Phase Three : Session 7

Sunlight fills the art room on this Thursday morning as a mockingbird sings melodically outside. Mozart's piano concerto #18 playing in the background complements the mockingbird's concert. A fourth grade class arrives at the art room door carrying folders under their arms. Cups of water on the blue counter await their arrival. As students enter, they pick up a drink and walk to different work areas. The art teacher welcomes the class, then speaks briefly to the classroom teacher. The classroom teacher leaves with two students to conduct research in the school library. Some students open folders and shuffle papers as they begin their activity. Susan skips to the blue counter for some paper. Doug walks to the counter for some glue and scissors. James strolls over to get an eraser with his arms waving up and down as if flying as a bird. Other students unwrap plastic from their clay projects. The piano concerto continues to play *quietly* in the background as students *quietly* engage themselves in their projects.For the next forty minutes, students monitor their own level of involvement in their projects and level of discussion with one another. Once Doug and Shane stand up and *horse around* in a playful arm-wrestling game for ten seconds before settling back to their projects. Soon after, James demonstrates *shooting baskets* to Manuel who then models the hoop shot. After their brief demonstration, both students settle back to their projects, which involves making a gym game. During this class, the art teacher meets with three students at the conference table, then she walks by each work area to see how students are doing. Doug and Shane are experiencing technical difficulties assembling parts of their wooden projects. The teacher sits with these students to explore construction possibilities. During this entire session, the teacher talks to the whole group twice. Once, fifteen minutes into the session to remind students to log-in time in their folders and, at the end of the session to announce it was time to clean up.

The significance of this picture of learning is that it represents the first time I witnessed an answer to a question that I have often thought about: What would happen if elementary students chose their own interdisciplinary connection with the arts?

This chapter is organized into three parts. The first part presents a profile of Jackie, the grade four teacher who participated in all three phases. The profile also describes her students who participated in Phase Two and

Phase Three. The second part presents the three developmental phases and places them in context in this elementary setting. The third part of this chapter presents each of the study's focus questions and discusses the themes and emerged patterns from analysis.

Grade Four Team Profile

Jackie Clapp is a fourth grade teacher who began teaching at Morris Campus School in 1991. Before this experience, she taught a primary level Chapter One program for one year at a different Baxter school. She earned a bachelors' degree in education and a master's degree in school administration. When I asked Jackie if her future plans included being a principal, she responded:

> Yes, but right now I like what I am doing too much. I'll stick with that for a while. I would like to be vice principal first because I think it's a decent job and maybe someday look for a principal's job. (5/95)

During our last interview (2/97), I asked Jackie to reflect on why she became a teacher. I began by asking Jackie if she role-played being a teacher when she was a little girl (as I did). Jackie responded:

> Oh, yes! Oh, yes! I am always a teacher. . .I feel like I am a teacher all the time, inside and outside of school. . . I really enjoy being with kids. . .Teaching is so unpredictable. You act on the moment. I feel as though I can go into work and I know we are going to sit down and laugh together. I kid around with the kids; they kid around with me. I know that I'm all excited about this bat unit, how can I pull in social studies? The other day I was thinking about bats. I want to learn more about bats not just that I want to teach them about bats. I want to learn more. I can't wait! I mean, what job pays you to go in and learn things, to pour through books?

> I love to sit down with my kids and take a small group of kids and read a book and talk about why it moved us. Who gets to read books and talk about them?.....We argue about books. We laugh about books. I cry. I cried when we read: *Where the Red Fern Grows*. Who would pay you to sit and read books with kids and talk about it and laugh about it, and then to hear their stories when they write. . .Where can you go with a group of people and sit on the floor and play a game together and laugh and teach kids how to be respectful to one another and then watch them do it! (2/97)

Over the past six and half years, Jackie is often seen walking in the halls smiling and laughing with her students, some of them even holding her hands. That scene is usually more common with lower grade levels and I feel it indicates the type of relationship she tries to build with her students. She is married and during Phase Two, she became pregnant with her first child. She is now a proud parent of a baby boy.

As a teacher, Jackie genuinely cares about her students and sets high expectations. She described her view:

> I want them to be the best that they can be, to do the best that they can do. I know that everyone is not in the same place and never will be in the same place and that's okay with me. But I want each person to do what's best for them. . . .I feel like, at times, I am very demanding of my students. I am very..(pause)..a task master kind of thing. I really want them to put their best foot forward at all times. People will say you have bad days. Yes, you have bad days, but every day my students should learn something new. Every day. Every day they should learn something and every day they should do their best. Because if they left fourth grade having learned only half of what they should have, or a quarter of what they should have, then that would bother me. I really feel that every day of their life is important to their future. It's important to them now, too. It's important to their lives, their well-being, and their happiness. (6/95)

When I asked Jackie if she thought students should be in charge of their own education, she responded:

To a certain degree, yes. There should be some choices but choices need to be structured. Some students are very self motivated and want to learn anything and everything. Some students are very lazy and want to sit and do nothing. 'I'll be out to recess all day and that's where I will be'. And so, I think choices are appropriate, but they need to be structured. I think that if a student is interested in something and they want to take it further, then they should be encouraged to do so, and guided, and helped to do that. But if a student is 'laxidasical,' wants to sit and do nothing, that's not okay with me. . .In reading my students choose the books they want to read, the books they want to read together, but there are choices. It is not as if they can do just anything. I try to get books that I think they will be interested in, but it's within reason. . .And there are choices in writing. If they want to choose a writing topic, that's okay with me...Choices within reason are appropriate and some students are not capable of making that, of making those choices and need to be guided more so than others. Some students are very self motivated and want to learn and should be allowed to go off in directions that they want to. (6/95)

Jackie encourages students' input, but she also recognizes the teacher-student continuum moves in both directions depending on student's behavior. Jackie commented:

> You've got to know when to take and when to give. Know when to be firm. 'This is what we're doing', be it unpopular. (4/96)

Jackie reflected about what influences her decisions in the classroom and where she gets her ideas:

> The way it comes to me..(pause)..I get ideas wherever I am. I'll be driving home in my car and I get an idea of what I want to do. I do this with just about everything I teach. And then, I think of my resources and the best way to utilize those resources. (6/95)

Jackie's pedagogical style consists of project-based units. She chooses topics from a guide list printed by the city's school department. Jackie tries to integrate the process of learning by including reading, writing, arithmetic, social studies, and science into her units of study. Jackie discussed her units:

> First of all, I want to know what they already know, or what do they want to know. We do that through a brainstorm list. I don't feel as though it always has to to be a list. When we started the bat unit, we did it on tape and then we listened. (2/97)

> I try to make things as meaningful and real as possible. I try to have them involved in something that is meaningful to them. I pick the topics from that list and do a unit of study, like the electricity unit and the solar system unit. Then I try to incorporate all of our curriculum areas into that unit. I try to integrate into it as much as possible. For example, in our unit on electricity, we wrote a poem about electricity. It was kind of funny because the kids, did you see it outside in the hallway? It's hilarious. It's more like a rap than a poem. They used some of the facts they knew and wrote a poem and [Kevin] was sitting there going...(she starts to make rap rhythm sounds, and we both laugh.) I like to keep the units going about a month. Sometimes they go over; sometimes it goes under. It varies. Sometimes it goes on the interest level. There are some [students] that keep it fascinating, so we spend a long time with it. (5/95)

When Jackie teaches a unit, she encourages students to apply their knowledge.

Jackie reflected on this several times throughout the study:

> It could have all been a worksheet or a written test. It was more meaningful when they had the example of the house. It was more meaningful when they had the flashlight and they could show me how the switch worked instead of writing a switch needs such and such. They showed me. So I think with the visual, they see it; they remember it. They work it; they understand it. (5/95)

> If they are having fun, they are remembering it. That is the stuff they remember most. More fun, more meaningful. (4/96)
>
> As much as I can, I like to give them the real thing, though that's not always possible. Then I like to move to a model, if that isn't possible, you go down. But the ultimate goal is to give them the real thing. Let them experiment and work with the real thing. (2/97)

Two of Jackie's students reflected on project units in their post-program interview (5/97):

> I liked how she [Jackie] had us doing that town. We had jobs and everything. We had an election for Mayor and we got to argue [debate] and do things like that, where should the schools be? The map outside in the hall, I liked that. I liked how we got to experience it [being a member of the town]. Say if we were a real town and we lived in those houses. That was an experience for us, but not an actual one, but it was pretty much like an experience for us.
>
> I like science because you mostly do hands-on and I like hands on.

Some of the classroom management strategies Jackie utilizes are based on components of "The Responsive Classroom," a social curriculum based on research by Dr. Stephen Elliott from the University of Wisconsin. The Responsive Classroom was developed by the Northeast Foundation for Children (NEFC) in Greenfield, Massachusetts and their curriculum integrates teaching, learning, and caring in the classroom. Six key components include: Classroom Organization, Morning Meeting, Rules and Logical Consequences, Choice Time, Guided Discovery, and Assessment and Reporting. Jackie began implementing some of The Responsive Classroom strategies a few years ago. She commented on why she turned to their strategies:

> It always bothered me when they [students] wouldn't listen to each other, or when they were disrespectful to each other. And I would let them know, but they really didn't..(pause).. you need to teach them to be respectful. I needed to teach them, showing respect. You assume they know it, but they don't always. . .I think that I needed The Responsive Classroom to understand them more; to understand why; what is good for them. (2/97)

The Responsive Classroom strategies assisted Jackie with guiding her students to behave in a responsible way and help her to build rapport between teacher and students, and students to students. Three of her students chose an aspect of The Responsive Classroom, "Morning Meeting," in their student directed projects during Phase Three. One student commented on why she chose this topic:

> I chose Morning Meeting because it is the best time of day. I chose the greeting for the scenery because the greeting is one of my favorite parts. I like it because you get to hear what other people like and other people's experiences. I could picture a diorama in my head and knew it would express my idea. (5/97)

Jackie values group involvement and utilizes a variety of grouping techniques variable on the nature of the planned activity. I asked Jackie how she formed groups and she said:

> It is important to me that groups change and change frequently to avoid cliques.
>
> [R]: Are you in charge of those changes?
>
> Actually, long ago, we sat down and we talked about all the different ways we could form groups randomly. Then we also talked about ways we needed to form groups to have people's strengths utilized. We brainstormed all those ways. So they are really the kids' ways.Groups are formed in all different kinds of ways. Mostly to avoid cliques. And that's why we

> have no assigned seating. I really want kids to feel like they can work with everyone. (7/96)

Jackie establishes a sense of community in her classroom by involving students in originating classroom rules. She facilitates group dynamics by involving student participation in frequent sharings. Jackie believes group sharings encourage critical thinking skills and her belief is reflected in this comment:

> I think that process is foremost. They need to know how to use critical thinking skills. We talk about process when we do a sharing. We do frequent sharings with all kinds of activities. You don't necessary have to have a book published before you can share. We will do an activity and we will share what we did to reach the results that we did.
>
> [R]: Are they self critical with their successes and their weaknesses?
>
> They are real good at pointing out their successes. They have a hard time point out their weaknesses, a really hard time. I think they're looking for environmental reasons for why it failed as opposed to, 'I shouldn't have done what I did'. It's not okay to fail in everything, but it's okay to fail in some things. You learn from that. You make adaptations and you move on until you meet success. But I think they have a hard time looking at their weaknesses and saying, 'Ya, this is a problem for me.' And I don't know if that's because they haven't had enough opportunity with that, or developmentally that's where they are. (6/95)

Jackie is genuinely concerned with incorporating students' interests into curriculum. "I like to find out about what they want to learn because I want to be sure to tap into their interests." (7/96) She reflected on one of her curriculum units:

> The state research unit was very much guided by their interest, what they wanted to learn about? We talked as a class about what do you think is important to

> have, but it is very much what do you want to learn about here. What interests you in a state? They picked states they wanted and they got to pick what they wanted to learn about. They had to do a brochure. How they set up the brochure was completely up to them, although we did have to talk about ways that we could set up a brochure.....They had a choice to do whatever they wanted and then present their state to the class. (7/96)

Jackie also incorporates students' interests in an area of her curriculum called Choice Time. Choice time is a block of time three or four times a week when students choose an activity. The basis of Choice Time resulted from The Responsive Classroom Guidelines. First her students brainstorm activity choices which creates a list and then they choose from the list. Jackie discussed Choice Time in one of our interviews:

> My kids love Choice Time...They need to take an area of the curriculum - it's more teacher directed than what you did [in this study]. Basically why I did choice for my students was because I wanted them to have power in their learning. I wanted them to have an opportunity. They almost looked at it as if it was the best time of day for those kids. They worked. It was an opportunity for math skills, math games, or to make their own. They had to work on academic skills through a method that we both could agree on. (7/96)

Jackie always reflects and assesses student activities. One example of her skills emerged in a discussion about "Choice Time." Jackie reflected:

> I started choice near the end of last year [1994]. This year it became more narrow. At first, choice was center oriented: the science center, the math center, the reading center. Last year, choices were very broad. This year, choice was more activity oriented. More narrow, and in some ways I lost. As far as choice goes, at some points during the year I said to myself, 'I'm not doing this anymore'! Because at some points during the year, I'd say to myself, this looks like recess or I get scared: 'What are people going to think, my kids are just playing.' (7/96)

Jackie's reflection and assessment of Choice Time revealed her value of students' choices, but also revealed concern with the educational value of their choices. She wanted the activities to be more constructive, to validate students' use of time, especially if someone viewed the students' behavior should they look into her classroom. She commented:

> That was part of it, but I wanted to be able to justify it to myself. There were kids wandering. There were kids, because so much was going on and I can only be in one spot at one time, there were kids wandering and there were kids who have difficulty with that kind of set up. (7/96)

Jackie expressed her disappointment with Choice Time to other teachers who also incorporate aspects of The Responsive Classroom and engage in choice activities with their students. She also confided with one of The Responsive Classroom instructors. Jackie remembered her conversation with the instructor:

> I don't know. I don't know about the set up. Then [Judy] asked me: 'Do the kids like it?' The kids! They love it! That's their reason for the whole day. 'Is it choice time today? Do we get choice time today?' (7/96)

After confiding with several sources and some reflection time, Jackie returned to her students and expressed her disappointment with how some students spent time during Choice Time. The entire class negotiated changes and established a set of rules. Once a choice was made, they had to stay with it for the entire activity period. In addition, the choices had to be on the list at the start of the day, not added when Choice Time began. This was to ensure that thought went into choices.

When the interdisciplinary program became available in this setting, Jackie viewed it as an opportunity and a collaborative effort. She reflected about the opportunity several times throughout the study:

> I saw an opportunity to have some extra help and I am always looking for extra help. It is sometimes difficult when you have a project going, like the electricity houses and the kids need [my attention]. One group over there needs help and one group over there needs help, too. So I feel that if we involve experts on our units then I think you get a better product in the end. So, I have been thinking along those lines, the extra help, have a better polished piece, and looking for expert advice. The kids, they want help. They need guidance, or they just want to share. 'Look at what I did'. Sometimes I feel like I am torn in so many different ways. 'Okay, I will [come see your project]. It is really important to me, but I'll be there as soon as I can.' (6/95)
>
> I think we need to work together and share our expertise. . . You have knowledge to bring in and I have knowledge to bring in. (5/95)
>
> Your involvement gave us another dimension. (6/95)
>
> It's almost like cheating the kids not to do it. (2/97)

Jackie's statements clearly defined one of the important feature of this program: additional support in her classroom and viewing topics from different perspectives. When I asked Jackie what she had hoped to gain from this program, she responded:

> Well, I would like to be able to judge more what my students can and can't do... So I think maybe in watching you and seeing your modeling, the ways that *you* talk with students about their artwork. I would like to be able to do more of that myself. But again, see, I don't think of myself as a talented artist, I'll say: 'Well, maybe this person just can't do it.' Where as, you would say: 'Come on, let's get back to this. You can do this'. Whatever, so I would like to gain more experience in

> that respect. I also would like to continue having people come in and work with us so that activities can be as meaningful as possible for the kids. (5/95)

Jackie's anticipation of potential benefits from this program reflect her commitment to the process of learning. As evidenced in her profile, Jackie enjoys teaching, would like to expand her skills, values her students' potential, allows students choice and incorporates their interests into her units, looks to her colleagues for suggestions when faced with learning dilemmas, and then incorporates her reflections into her classroom pedagogy. Her project based units reflect several brain-based learning elements including: varying activities, meaningful activities, including interests and enjoyment, connecting to past experiences, integrating subjects and immersion in the learning environment. Brain-based learning supports these types of experiences in three dimensions to help make contextual information more memorable.

There were twenty-four students in Jackie's class during Phase Two and Three, eleven girls and thirteen boys. The students represent a mix of ethnic groups including Caucasian, African American, Hispanic, and Asian. When student quotations are presented in this chapter, I left the original spelling and grammatical errors intact. I enclosed the correct spelling or meaning in brackets only when a word was not obvious. One important observation, noted by me during all phases of this program, reflected the rapport between teachers and students. During all of the interdisciplinary sessions, the teachers did not reprimand students for inappropriate behavior. I noticed that students were always willing to participate. Students referred to the program as "Integrated Art" and the following representative quotations from the PreQ (See Appendices D, Survey Questionnaires, p.238) define the program from their view:

> Integrated art is where the art teacher comes into your classroom and helps your teacher with a science or social studies lesson. It helps you be a better artist with utensils that have to do with art.
>
> Integrated art is a place where we learn and draw.
>
> I like the sience-art combonation.
>
> Well, it's where you make something on what you're studying.
>
> I like the integrated art because we do a lot of interesting thing in integrated art.
>
> I think the best way to describe the integrated art is it not just art. It's more like activities.
>
> (PreQ, 3/96)

The students' comments reflect a favorable perspective of the program. Jackie's students described school as "cool, nice, fun, awesome, nice teachers and students, and a place where you get smart." Only four students expressed dislike or unsure attitudes with comments such as: "I would describe school as long and boring!" At home, as evidenced on the PreQ (See Appendices D, Survey Questionnaires, p.238) and their personal mind maps, Jackie's students enjoy active outdoor activities such as: games, throwing snow, visiting friends, bicycling, and running. Some of their favorite passive activities include watching TV, playing Sega or Nintendo, drawing, reading, or listening to the radio.

Phase One : "Art's New Face"
March 1995 - June 1995

The interdisciplinary program in this setting began in March 1995 when the administration replaced the art room with a preschool. Due to the difficulty of traveling three floors with no time between classes, I proposed a change to the art program which would allow an interdisciplinary program with the arts

to begin in this setting. On Friday, March 10, the principal informed me, ten minutes before a school council meeting, that we were presenting information about the additional preschool and the proposed art program change. After the meeting, the administration placed an agenda notice in staff mailboxes. The notice announced a voluntary faculty meeting scheduled for the following Monday (3/13) and listed two items:

1.) Preschool coming

2.) A/B Art Schedule

He attached a revised art schedule to this brief notice, which reflected biweekly art periods for all classroom teachers and the addition of preschool classes to the specialists' schedule. The specialists in this setting had never been responsible, before this time, for teaching preschool classes. The notice caused tension among some staff members as groups of teachers gathered in the halls and stairways after school to discuss the notice. No explanation about the origin of the proposed changes accompanied the brief notice leaving feelings of confusion among staff members over a weekend period. It was not my intent to inform the staff in this manner. The administration had control of this notice.

At the voluntary staff meeting on Monday, March 13, the principal shared the city's dilemma concerning a new preschool location. Their existing location in another school building possibly violated state regulations. A new preschool location needed to be found and moved into within a four week period. The superintendent and this administration had chosen this setting as the new site, and this administration had chosen the art room as the new location. After the principal's comments, I shared my thoughts about this situation with the staff. I had accepted the fact that my art room was chosen as the preschool site and my concerns about a traveling art program. My vision for this school offered an opportunity for growth. The new art program would integrate art into classroom learning experiences thus incorporating an

interdisciplinary approach. My intent was not to take away valuable planning time from teachers, but to provide an alternate method of instruction. For this new art program to be implemented, it needed support from the staff. This program was a paradigm shift in this setting that was risk taking for all involved. Change is difficult and I felt unsure about liking the change myself. I concluded my remarks at this meeting by stating that my thoughts about an interdisciplinary approach had been incubating for a couple of years and now, I had an opportunity to implement the approach on a trial basis. Only twelve weeks remained to the school year and the administration assured the staff that this preschool location was only temporary. This administration promised a more amicable location for the preschool would be found in the city before the start of the next school year. This school setting was losing an art room temporarily, but gaining a potential opportunity. At the end of twelve weeks, the staff could assess the program for possible future implementation.

When I concluded my remarks, the staff applauded spontaneously, which I did not expect. The administration shared a letter from the superintendent stating his appreciation for the staff's flexibility to make changes allowing temporary space for the preschool. A one and one half hour discussion of possible alternative preschool locations within our school followed. The consensus of the remaining staff decided that not enough of the faculty remained present to make a decision. The vote to accept or reject the art program proposal was postponed until the following Monday, which was a scheduled faculty meeting. During the March 19 faculty meeting, after more discussion and questions from the staff, a written secret ballot vote was taken to accept or reject the art proposal. Despite some of the ill feelings towards this setting as the chosen site for the preschool, and some staff resentment towards the administration for lack of being informed sooner about these issues, and the loss of planning time every other week for classroom teachers, the proposal passed. Afterwards, some teachers expressed opinions

concerning the voting being unfair because everyone on the staff (paraprofessionals, specialists, guidance, etc,) voted. Some teachers felt that only those whose teaching schedule would be effected should have been given a vote.

As of March 19, I had the opportunity to begin to implement my proposed idea. I gave all staff an informative letter, participating request form, and art schedule (See Appendices C, Invitational Letters, p.225) on Wednesday, March 22 with a return deadline of Friday, March 24. By Friday afternoon, I received four forms, one of which was Jackie's. Other request forms arrived during the first two weeks of the program and I scheduled each request on a first come - first serve basis. Some teachers did not want to begin sessions until after the April vacation, which represented the fourth week of implementation.

On Monday, March 27, Phase One, "Art's New Face," began and continued for a ten week period ending in June on the last day of school. The program began to take shape as I walked into participating classrooms with a note pad in hand. I did not want the classroom teacher to feel as though I was evaluating the class so my notes were kept brief. I used the note pad to clarify thoughts or ideas and illustrate points or drawing skills with collaborating teachers and/or students.

Seventeen teachers, out of a possible thirty-eight staff members, participated in the program. In addition, one college professor participated along with a grade one teacher to make the total number of interdisciplinary teams equal eighteen. A list staff totals and participating staff members is presented in Figure 3. Phase One Participants. Each session took place in the participating teacher's classroom. The program's shape can be visually described as an intricate web of strands woven as the art specialist moved from classroom to classroom connecting with teachers, students, and the school's curriculum. Jacobs' (1989) book: *Interdisciplinary Curriculum: Design*

and Implementation provided me with some background information about various interdisciplinary approaches. However, it was important to me that the program's design evolve from the classroom teachers' needs and interests. After all, they had lost forty-five minutes of planning every other week when the art room became a preschool classroom and the art proposal passed.

This list represents participants:	This list represents staff totals:
2 - Preschool	3 - Preschool
1 - Kindergarten	3 - Kindergarten
4 - Grade One (all)	4 - Grade One
1 - Grade Two	4 - Grade Two
0 - Grade Three	4 - Grade Three
2 - Grade Four	4 - Grade Four
3 - Grade Five	4 - Grade Five
1 - Specialist (library)	3 - Specialist (Gym, Music, Library)
0 - Chapter One	6 - Chapter One
1 - Special Ed (Language Dev.)	3 - Special Ed
1 - College Professor (Piggybacking Program)	
2 - used program on an as-needed basis (1 third grade and 1 kindergarten)	

Figure 3. Phase One Participants

I entered each participating classroom open to ideas allowing the program to develop in a natural way taking its shape from the lead of classroom teachers. My role was to make available my art expertise and creative abilities to classroom teachers, similar to the role of the atelierista in The Reggio Emelia School (Vecchi, 1993, 125). When a teacher expressed interest for ideas, I gladly shared thoughts with them. Planning and decisions about integrated activities occurred in the teacher's room before school, during lunch, passing in the hallway, or by notes left in teacher mailboxes. These meetings and notes were brief and more of an informative nature of what would be occurring during our scheduled times. A detailed description of the styles of

implementation that respond to this study's focus questions is presented later in this chapter (pp. 127-145). On average during the ten week phase, I visited each participating classroom four to five times, with the exception of Jackie's fourth grade class. Due to her weekly session schedule, I visited her classroom nine times.

During the program's first week, confusion arose among the state teachers concerning daily planning times. The state teachers' contract provides daily planning in their schedule. This program did not violate the city teachers' contract in planning time. My original proposal scheduled the state teachers with weekly art classes. To alleviate unfair art curriculum time for the state teachers' students, I designed their alternate week to work on community art projects. I plan those projects when the administration, the P. T. O., or the college request special artwork to benefit the community through its display. An example includes decorations for the P. T. O.'s annual Spaghetti Supper or the college's Diversity Day. Although my original proposal offered planning times for this group of teachers, the administration felt differently and had alternative thoughts. The principal felt as though the entire staff had voted to implement the program and planning times should be equal for both staff. He instructed me to eliminate the state teachers' weekly art class from the new art schedule. That action resulted in the state teachers filing a union grievance. Four state classroom teachers did not direct their grievance towards me or this program, their disagreement strictly reflected a contract violation. One state classroom teacher visited me after school one day and stated her disagreement with the new program: "This is quite the nightmare you created." During the third week, the state teachers won their grievance and I reinstated their weekly art classes. One state classroom teacher left during the program's sixth week on an extended sick leave for the remainder of the school year. The administration decided that her substitute

would follow the biweekly schedule. This reopened slots in the art schedule for teachers who wished to participate on an as-needed basis.

During the seventh week, I requested permission from the administration to design and administer a staff survey to assist in assessing the program. The purpose was to uncover the staff's understanding of an interdisciplinary approach, their concerns, and their experience with this program. With the administration's approval, during the eighth week, the staff survey was distributed, one for non-participating members and one for participating members (see Appendices D, Survey Questionnaires, p.234). Each morning, the school's Morning Announcements are distributed to teachers and on the announcements, I notified teachers about the survey and its purpose before it was distributed. On Friday, May 26, I placed a survey in all staff's mailboxes. I drew a pink wiggle line in the upper right hand corner to alert attention to its deadline. I placed a reminder of the deadline on the next Wednesday's and Friday's Morning Announcements. Nineteen staff members, out of thirty-eight, returned surveys. During the ninth week, I presented the survey summary at the June 5 faculty meeting. At the end of my presentation, the staff applauded spontaneously, which again, unexpectedly surprised me. At the meeting some staff members voiced their support:

> It's a wonderful idea, but we need more planning time.
>
> Could more people integrate in other areas?
>
> It was helpful to have you there for the whole unit. You could pulled things out that I didn't see.
>
> This type of program could not work or be as successful in every school. You have to be a special kind of person to make it work, like Laurie.
>
> (Staff meeting, June 5, 1995)

During the meeting, I recommended that the program continue in the fall and the principal voiced his support. No one voiced disagreement at this time. Therefore, it was my understanding that the program would continue, as is, during the following school year. I knew from several conversations with teachers in the hall and in the teacher's room as well as from the survey responses, that a few teachers still felt uncomfortable losing planning time every other week.

After the staff meeting, I sent thank you notes to all participating teachers. It was especially important to me to thank participants for their part in the program and their willingness to try something new. During the last week of school, unrelated events concerning administrative decisions surfaced (one included an unexpected transfer of two teachers), which increased tension among some staff members. A group of teachers drafted a letter of concerns and presented it to the administration. On the last day of school, at a faculty luncheon presented by the administration, the principal addressed each issue, one of them was the A/B art schedule.

When the topic of the A/B art schedule arose, one teacher pointed out that only half of the surveys were returned and that should not lead to the assumption that everyone was in favor of the program. Other teachers spoke in favor of the program and their interaction with me. Another teacher voiced concern towards the loss of planning time. I reminded teachers that this school received more planning time than other schools in the city and did not violate the city's contract. I asked why concerns weren't raised at the June 5 faculty meeting. One teacher suggested that I offer the A/B schedule for anyone who wanted it. Then, the principal stated that the decision was made June 5 to keep the program as is. He then moved onto the next concern on the list. At this time, I felt comfortable with the approach, especially when hearing supportive remarks from those who experienced the program. However, I also felt a little uneasy about the few teachers whose primary concern was losing

forty-five minutes of planning every other week. I know that anytime there is change in education, it is unrealistic and difficult to gain total consent from participants. I also hoped that time and experience would bring other teachers more familiarity with the approach.

Phase Two : "Integrated Art"
August 1995 - June 1996

Phase Two began in August 1995 and encompassed the entire school year resulting in ten months of development. After the completion of Phase One, the summer brought time for me to reflect on the next step. The beginning of a new school year excited me. I reestablished an art room in a new location (as described in Chapter III, Methodology, p.81). In August, two weeks before school began, I met with the administration. He informed me that he intended to force the biweekly schedule on the state teachers once again. The principal stated that he was prepared to begin the grievance proceedings again to try to equal the number of planning times for both city and state teachers. I left the meeting feeling uncomfortable with his decision. The state teachers are my colleagues; I am a state teacher. I also knew that some city teachers were not happy with losing planning time. I did not want to begin a new school year shrouded with a dark cloud over this potential program, nor did I wish to alienate myself from my colleagues with this program. The following day, I telephoned the principal and requested permission to alter the program's schedule by returning to weekly art periods for all teachers. The result would reduce the number of available interdisciplinary sessions from eighteen to five. However, classroom teachers could still choose to participate in a biweekly schedule. Although the principal did not fully agree with my modification, he approved the proposed change. I prepared a modified proposal notice to inform teachers of the change, to offer a

time to discuss ideas, and an opportunity to earn Professional Development Points for recertification (an education reform initiative in this state) by participating in after-school group discussion sessions (see Appendices C, Invitational Letters, p.229)

After I presented the new proposal on the first day of school, staff members did not ask any questions or make any comments. One teacher attended the information meeting on Wednesday, August 30. The next day three teachers expressed interest in participating but could not, or forgot to attend the meeting. During the first week of school, six teachers expressed interest in participating in this program and I could only schedule five teachers. No available times remained in my schedule for one staff member who expressed disappointment and frustration with the overcrowded schedule. Another teacher, who returned from a sick leave in October, expressed interest in the program, but no times were available at that point.

Phase Two, referred to as "Integrated Art," consisted of five interdisciplinary teams. Four teams had participated in Phase One and the new participant was a grade five teacher. I scheduled weekly sessions for four teams and biweekly sessions for one team. One grade one teacher opted for the biweekly schedule. The teams consisted of two grade five, a language development class, a grade one, and Jackie's grade four. The remaining staff members in this setting did not express interest in participating in the program and I conducted weekly art classes with their students.

The first interdisciplinary session of Phase Two began the second day of school with Jackie's class. The other sessions began during the month of September. In October, I requested permission from the administration to administer another staff survey (see Appendices D, Survey Questionnaires, p.237). The purpose was to inquire why teachers chose not to participate, what their thoughts were for future involvement, their interest and knowledge concerning brain-based learning, and any questions they might have towards

this program or an interdisciplinary approach to learning. I presented the survey results at the October 29 staff meeting. The following month at another staff meeting, I shared the progress of participating interdisciplinary teams. The opportunity to share development of the interdisciplinary program at staff meetings ended in November. Starting in December, this school's involvement in an Accelerated School Project encumbered all faculty meetings for the remainder of the school year. The Accelerated School Project, sponsored by The Massachusetts Department of Education, is based on Henry Levin's Accelerated School philosophy (as described in Hopfenberg and Levin, et al., 1993). This setting's involvement with the Accelerated School Project did not affect this study because the first phases of the Accelerated School Project involved discussion of theory and ideas only.

In January 1996, I began to wonder about involving students in the decision making process. My idea to design a student directed approach resulted from an experience during Phase One when I witnessed grade five students in a social studies class choosing art projects from a list they brainstormed and not from the art project list I suggested. I realized then that these students knew what they liked to do and became vested in the learning experience when given an opportunity to do what they liked. I also witnessed the same phenomenon in another unrelated experience with a grade one art class. The art lesson involved clay and my focus emphasized sculptural techniques. A first grade student created a set of teeth complete with a toothbrush. I immediately guessed that his project reflected a classroom curriculum topic and my hunch was confirmed when I asked him. This grade one student had chosen, on his own, to make an interdisciplinary connection! Another independent student interdisciplinary connection occurred in an art class during the spring of 1996 when a second grade student showed me her *Charlotte's Webb* sculpture, complete with Wilbur and friends. Witnessing these elementary students choosing their own interdisciplinary connections

utilizing the processes of art encouraged me to design a different approach to interdisciplinary learning, a student directed approach.

As I thought about a student directed approach, I contemplated about which team would be agreeable to let go of teacher control and allow students to make all the decisions. I narrowed my choices to the two grade five teams and Jackie. In January 1996, I spoke to all three teachers about my student directed idea. At first, Jackie wondered how students would make responsible choices: "How will they know what to do? What to choose?" (Researcher's Journal: 1/17/96). Her questions helped me to clarify my thoughts about trying a student directed approach. As a result of our discussions, I felt this teacher would allow her students to control their learning experiences. After several informal discussions and my sharing Buzan's (1978) Mind Mapping method (description on p.88), Jackie agreed to participate. She reported her interest:

> I didn't know where students would go. Now I see that they will look at math and look at fractions and connect. Oh, I want to make a game. This sounds interesting!
> (4/96)

Phase Three : "The Brain-Based Program" April 1996 - June 1996

Vignette

Part One : The first "Brain Day"

As students arrived at the art room door, the art teacher welcomed them in as she waved for them to join her in the meeting area. There, on a pedestal, wiggled a model of a brain made from jello. Students began to speak freely and excitedly: "Jello!". . ."Jello!" . . ."Oh!". . ."Oh!". . ."Oh my God!". . ."It's a brain!". . . "Is this dessert early?" (laughter from students) "Are we going to eat this?". . ."It looks like a brain!" Several students agree: "YA!" One of the students notices I am wearing a hat with a design of a brain printed on it. "You're wearing a brain hat!". . ."Is today a brain day?". . ."It's a brain!". . ."Yew, don't

> touch!" The brain jiggles from the movement of the pedestal as students huddle to get a closer look. "Are we going to eat it?". . . "That thing is awesome!"

The students, intrigued by the Jello brain, were eager to know what was going on. The hooking device, as described by Tony Buzan (1978) and Eric Jensen (1995), had worked! I wore a brain hat during program sessions to remind students that we were using our brains.

Phase Three began in April 1995 and continued to the end of the school year (see Appendix E : The Brain-Based Program Calender of Events, p.242). The purpose of the program was to introduce students to the student directed approach. The vignette at the beginning of this chapter (p.101) epitomizes the approach. Students were independently working on projects they chose. There was very little teacher talk required to keep students on task.

The only team to attempt this approach was Jackie's grade four. The remaining teams continued their participation as described in Phase Two. The remaining staff members in this setting were not involved in this phase.

My desire to incorporate brain-based learning and a student directed approach resulted from a review of the literature and my attendance at Eric Jensen's Conference in September 1995. Those experiences enlightened my awareness about brain-based learning. As I thought about incorporating a student directed approach, I also wanted to share some of my "new found" brain facts. I wondered if students learned more about how their brain worked and how each person has unique talents and intelligences, would they become more vested in the learning process?

I designed The Brain-Based Program to be a process oriented brain-compatible learning experience. The program offered students an opportunity to create their own learning experience based on personal interests. Several purposes guided this phase. One purpose was for me to design a program that could place brain-based learning principles into a real-life learning context. I

wanted to establish a brain-compatable learning environment for the second purpose, to implement a student directed approach to interdisciplinary learning. The aim was to capture intrinsic motivation to enhance learning. For seven months Jackie's students had participated in the teacher directed and the teacher-student directed approach. By incorporating the student directed approach, Jackie's grade four participants would have experienced all three approach types. Their perception of each approach would help to deepen the description of this program and their perceptions are discussed in the last section of this chapter (pp.155-161). I wondered which interdisciplinary learning approach: teacher directed, teacher-student directed, or student directed, would students favor and why? The answer to this question is in the last section of this chapter as well.

The Brain-Based Program sessions took place weekly on Thursdays, from April through June 1996 from 9:00 to 9:40 in the art room. One element to establish a brain-compatible learning environment was to provide bottled spring water at each session because there is no drinking fountain or sink in the art room. I also used a radio tuned to station 102.5 FM to provide background music each week. This 24 hour classical radio station played a "Mozart Block" during our program session times. In addition, each week I introduced a different brain fact which gave focus to the sessions. Students kept a folder and maintained a time log to document the amount of time students worked on their projects. The folders stored mind maps, Project Plans, and other process papers related to their topics. Students could use Choice Time in Jackie's classroom to work on their projects in addition to program session times. I used Post-it notes as a means of communication between myself and students to offer feedback, ask questions, and give answers because of the weekly time gap between sessions. I encouraged students to do the same. The end of the year approached rapidly and students were pressed for time to complete their projects. Two days before school ended,

students presented their projects. During project presentations, students responded to the following: Tell us about your project. What worked? What didn't? Were there any surprises?

The final session took place in Jackie's classroom at their meeting circle. I wanted to share with students my perceptions of the program and I encouraged students to give me feedback. After all, I had been asking them for their opinions throughout the program and I wanted them to respond to my comments. The discussion was also a way for students to feel important knowing their opinions would influence the program in the fall. We celebrated the ending of the program with another Jello brain. The student's outreached arms, licking of lips, and voices of enthusiasm witnessed as I scooped spoonfuls of jello into their cups reminded me of a mother bird feeding her fledglings with their open beaks and bobbing heads all struggling to get a taste! The program ended on an upbeat note.

In the following sections, I have attempted to answer this study's focus questions and weave the themes uncovered during analysis with highlighting patterns by presenting excerpts of the data.

Approach Styles

This part of Chapter IV attempts to answer the first focus question of this study: How did the interdisciplinary program develop over a fourteen month period? What were the various styles of implementing interdisciplinary learning that developed in this setting? Data were gathered from multiples sources including: fieldnotes, surveys, interviews, researcher's journal, and student projects.

I have defined the program's development in three phases. Phase One represents the events that occurred from March 1995 through June 1995, a ten week period. Phase Two portrays the events from August 1995 through

June 1996. Phase Three delineates the events from April 1996 through June 1996. The styles of implementation were then juxtaposed to interdisciplinary program characteristics gleaned from the literature review. In answering the first focus question, two predominant patterns emerged: time (scheduling and planning) and support (sharing ideas and gaining familiarity). This section describes these patterns in issues, concerns, and beliefs of participants in this setting.

Phase One Styles

During Phase One, seventeen teachers volunteered to participate by returning request forms. The remaining teachers in this setting did not participate in the program and instead opted for biweekly art classes. One main theme to emerge was choice. Seventeen participating teachers chose a time for their session and a curriculum area. My role was to go to their classroom at their scheduled time and allow a type of art integration to take place. At the end of Phase One, I categorized and sorted the sessions into types. Seven styles of interdisciplinary sessions emerged during Phase One:

1. Teacher Planning
   (Brainstorm ideas / discussion sessions)

2. Group Planning
   (Classroom teacher, art specialist and students planned project)

3. Pre-planned Activity : Part of Ongoing Unit Lesson
   (Classroom teacher informed art specialist of unit topic and an art lesson was pre-planned)

4. Pre-planned Activity : One Time Lesson
   (Classroom teacher informed art specialist of topic in advance and an art lesson was pre-planned)

5. Classroom Activity
   (Classroom teacher planned lesson and art specialist was project assistant helping groups of students)

6. Responsive Activity
(Art specialist went to classroom and a project was brainstormed and begun)

7. Activity on an As-Needed Basis
(Classroom teacher asked art specialist for ideas or assistance. An art project was planned and scheduled)

Style Descriptions

1. Teacher Planning

This style category represented sessions when only the teachers interacted. The meetings took place during a scheduled interdisciplinary time. Topics for sessions included planning a grade two lesson with the librarian, a grade two discussion of memory tiles, observation of preschool children, and Image-Making discussion. Five teams participated in this teacher directed approach.

2. Group Planning

This style category not only included the teacher but also his students and only one grade five team participated in this style during Phase One. The session took place during their social studies' class and the topic was the American Revolution. When I first entered this class, I observed students reading from their social studies book and answering questions at the end of the chapter. I spoke with the teacher and asked if the students could create group projects to represent a part of the American Revolution, a more hands-on type of approach. With his consent, I began to discuss my thoughts with students. I suggested ideas for group projects including making a mural, a drawing, cartoons, dioramas, or collages. The students then brainstormed additional ideas adding to the list: silhouettes, plays, puppet shows, games, and writing

songs. The results yielded projects only from their list. One student shared her excitement about her project with me one afternoon as I walked a group of students to the buses. This experience represented the first example in this program of giving students a voice in their interdisciplinary activities. In choosing their projects, students had vested interest in their own ideas and the results reflected that interest. After three weeks of preparation, the students presented their projects to the class. At the end of their presentations, I commented on the variety of projects chosen, the quality of student questions at the end of each presentation and their congenial audience behavior during the presentations (this class did not always model proper social skills in their homeroom environment). When I asked how they liked doing this project, their responses included:

> At first it was hard to come up with an idea, but then it was fun and I learned from it.
>
> It was tough but I liked doing it.
>
> It was hard and we only had two weeks to finish, but I liked doing it.

Their reflective comments indicated students were challenged and they enjoyed the process. I had hoped for more of this type of integration. However, because I was following the lead of the classroom teachers and I wanted the program to evolve from their needs, this was the only team to represent a teacher-student directed approach during Phase One.

3. Pre-planned Activity : Part of Ongoing Unit

In this style category, the classroom teacher would inform me of the unit topic in advance. This allowed me time to use the creative process by incubating thoughts and creating ideas for projects. These opportunities

challenged me with creating new ideas to fit curriculum topics. For example, a grade one class was studying bees. I planned a lesson for students to make three-dimensional hexagon honeycombs and bees. Most projects involved two or three sessions. Some other topics included: making props for a play (flutes), hot-air balloon sculptures, Chinese painting, rain forest puppets, pig pens, and memory tiles. Nine teams participated in this teacher directed approach. One team included a college professor and her college students; a grade one teacher and her students; and myself. This team was part of a program called: "Piggybacking" whose participants engage in math and science activities during the college semester. My involvement in their Piggybacking Program included three weeks when I integrated art with math and science. The students made clay pigs in collage environments. I had been a part of their program for the past three years.

Of special interest in this category is a style of integration referred to as "Image-Making within the Writing Process" developed by Beth Olshansky (1994). In this chapter, I present Image-Making in detail because this method became a focus for two teams in Phase Two. Data excerpts from these teams helped to corroborate this study's patterns and themes.

Image-Making integrates the processes of collage with the processes of writing. First, students created portfolios of hand-painted textured papers to inspire ideas for stories. Students cut the papers and assembled shapes to create collage illustrations. Books by author illustrators such as, Eric Carle, Leo Lionni, and Ezra Jack Keats, provided models for the collage method. The process is kinesthetic as students manipulate the paints and paper, then cut and glue paper shapes into collages. Olshansky's (1994) research claimed that students moved away from personal narrative to write more fiction and that fiction contained descriptive language. The process also encouraged children with diverse learning styles to write.

The interdisciplinary team in Phase One, which attempted this approach, involved a language development class headed by Sarah (pseudonym). Sarah learned about the Image-Making model at a workshop she had attended in the fall of 1994. After that workshop, she asked me to help her create a portfolio because she was going to present the integrated model at another workshop. Although she had never tried this process with students, she was very interested in its potential. When this program began, it provided an opportunity for her to participate and experiment using this model with her students.

Sarah has twenty-six years of teaching experience and earned a Bachelor's degree in Psychology and Elementary Education, a Master's Degree in Hearing and Language Impaired, and a Master's Degree in Education Leadership and Management. Her special education class consisted of no more than seven primary-aged students who have difficulty with developing language. Her students must show at least a two year delay in most language areas. Sarah has recognized through her experiences that children with language problems generally have an above average artistic ability. She tries to incorporate their talent in lessons by integrating art into her curriculum. Sarah explained:

> My hope was that through art we could develop the language and if they were motivated to draw then we could talk about what they were drawing. (5/95)

Children with language problems tend to write narrative about themselves and events that are happening to them. I asked Sarah what she had hoped to gain from this experience:

> Well, I expect that they will very much enjoy the process. And certainly anything they produce we will feel proud about and what I am most hopeful is that

> it will just be the first step. And from that we can begin to develop some nice verbal language and some very creative ideas and then we can follow the process and develop whatever written work they would like to do around their art . . . So I think we will probably run the gamut in terms of the end product and hopefully what I will see is an increased level in terms of their language production if nothing else.
> (5/95)

Sarah's excitement about trying this model matched mine. Our only regret was the time factor. It was the end of the year and we didn't have much time to see the process through to completion. Olshansky's (1994) research did not focus on the language impaired, although there may have been some special needs students mainstreamed into the regular education classes in her research.

When Sarah's students saw her portfolio and viewed a video by Eric Carle, which demonstrated his method of creating paper, illustrations, and writing, her students expressed excitement about beginning the process. Every day they would ask Sarah if this was the day they would make their portfolios.

In the first session, I set up four stations for creating the hand-painted textured papers: bubble printing, string painting, tissue collage painting, and sponge painting. As I demonstrated each station, students spontaneously verbalize creative ideas as they began brainstorming ideas for stories. These are some of the student remarks I heard:

> Hey, looks like claws!
>
> It looks like the moon and these are the stars!
>
> I made some wind!
>
> Wow, a dog with a triceratops' head!
>
> It's the Oklahoma bomb. This is the fire.

At each station, brainstorming ideas continued. In the second session, when students laid out their work, each student first expressed ideas individually and then the other students offered additional ideas. The verbal discussion brought a variety of creative ideas, and no ideas represented a personal narrative nature. Most topics reflected objects and animals and some related to curriculum topics they were studying. The students' interest in the texture of the papers evidenced as they felt the paper and turned it over to look at the back. The remaining sessions involved students creating collages and writing stories. Sarah commented that one time, students spent three consecutive days working on their portfolios because they chose to:

> We worked at least eight sessions and some of them were all morning, from 8:30 to 9:45. It is very unusual that we would stay at a task for that long. So that in itself says a lot. Usually, they would wind down and you would need to change to something else. But even at quarter to ten, they would say: 'I'm not finished yet'. So I would say: 'Let's take a break for recess and snack and we will go back to it later'. So they had extended periods of time to work on it, because they chose to do that, not because we imposed it on them, and that was very unusual.
>
> (6/95)

After the student stories were written and attached to each picture, the last session presented a "Sharing in the Author's Chair." The students showed their book and read their story to the group. Sarah commented that her students enjoyed the final session and asked if they could do it again once they completed their covers and the books were assembled.

4. Pre-planned Activity - One Time Lesson

This style category represented sessions when the classroom teacher informed me in advance of the lesson topic. I would then plan an activity

representing the topic. The session was not part of an ongoing unit, as in the previous category, this style represented a one time lesson only. Examples of sessions included creating artwork after stories were read and creating buttons to give as gifts to college students. Two teams participated in this teacher directed approach.

5. Classroom Activity

This style category represented sessions when the classroom teacher planned a lesson and my role was to be a project assistant helping groups of students. Five teams participated in this teacher directed approach. The sessions included assisting students with creative writing illustrations and activities in science, social studies, and math. Most times, I was unaware of the topic for the session until I arrived. I would spontaneously utilize my creative abilities and expertise to visually enhance the lesson involved. For example, in one grade four session, students were creating illustrations for their creative writing assignment. I sat with a group of two students as they were struggling to fit words inside of a speech bubble in their comic illustrations and then I sat with another group of girls who asked me to give them feedback on their story. In Jackie's class, a student was drawing a picture of a computer for the electricity quilt. I reminded him how to draw a 3-D box and add shading (I referred to a past art lesson drawing robots). This style category reminded me of the Reggio Emelia Approach. The art teacher visited classrooms to offer ideas from a different perspective.

6. Responsive Activity

This style category emerged when I arrived to a classroom and saw potential for an activity. I would share my idea with the classroom teacher

and, if agreed on, a project would begin. Five teams participated in this teacher directed approach and topics included May flowers, tangrams, and 3-D weavings. In one fourth grade class, students were preparing for Writing Workshop when I arrived. The classroom teacher asked if I would sit and brainstorm ideas with the topic search group. I asked if I could get some art prints, which may spark ideas for stories. With her agreement, I left to get some art prints. I returned a few minutes later with two prints: Rousseau's "Surprised! Storm in the Forest" and Vivancos's "Village Feast." I offered students an opportunity to write a story or poem describing the artwork, or describe what was happening in the picture, or write about any topic if the print reminded them of something else. The students viewed the prints silently before the group shared thoughts, which led to new ideas. Then I talked about the artists and their style of painting. This is a poem one grade four girl wrote about Rousseau's picture:

Fire in the Tiger's Eye

There is a tiger running
from what looks like
fire in the jungle.
It is thundering and lightning.
Bushes are snapping against
the tiger's face and body.
His paws are sinking in the mud.
The tiger's tail is far behind and
his roar is echoing.

The artist's print inspired her descriptive use of language. Students accompanied their written work with illustrations, so the assignment also increased their art abilities adding another dimension to this integrated experience. Rousseau's print also inspired another grade four boy to write a story about rain forests:

A Rain forest

Rain forests are being destroyed. People destroy rain forests to get wood to make more towns and cities. Animals are being made extinct because people drive cars and make factories. Rain forests are neat, but people do not take care of them as much as they are supposed to.

There are only a couple of animals in this rain forest story. It starts out on rainy day. In the rain forest, animals are taking cover in their homes. There are still animals out in the rain hunting to get food for themselves and their family members.

"BANG!" All the animals hear something. Trucks, smoke, and machines were all around the rain forest destroying plants and flowers. Then a tiger darted past the equipment. Then he took cover in a tree. He wasn't safe yet. Then the equipment cut down trees. Some animals died and some were lucky.

There was a fire. A huge machine started it. The tiger snaps at the machines. Next, one of the machines dumped oil into the river. It's still raining in the forest. "Bang!" Lightning hits a tree putting it on fire.

The machines were clear-cutting the rain forest. The rain stopped. When it stopped, it was 5:30 at night, everything was wet. The machines left the trees, and the animals were sure they would come back some day.

The forest was destroyed. The animals were not happy. That rain forest may still have people cutting down trees. That's why we have to take care of this earth and other living things.

His story integrated several curriculum topics into one writing assignment. The boy who wrote this story incorporated his knowledge of rain forests (a past unit of study in his class) with elements in the artist print. A drawing also accompanied his writing assignment, which further expanded the integrated experience.

This responsive assignment also incorporated social skills in this classroom as some students asked other gifted art students to draw a picture for their story. Students recognized other students' unique talents and they capitalized on that expertise. Two weeks later, when I visited the classroom again, I brought two new prints: Dali's "Persistence of Memory" and El Greco's

"View of Toledo." This time, more students flocked to the table. Even a special education student (who is difficult to motivate and in his words "I don't like to do anything") began a story when looking at Dali's print. Dali's surrealist style and images especially intrigued this student as he said: "That picture has to do with reality." Our discussion not only sparked ideas for stories and illustrations, but also the experience incorporated art appreciation and art history into their learning experience. This responsive activity had potential for developing a new style category: Art Appreciation Creative Writing.

7. <u>As-needed Activity</u>

This style category emerged as some teachers expressed interest in consulting with me for ideas but did not want to be scheduled in the biweekly schedule. One example involved the third grade preparation for a Memorial Day program. One third grade teacher approached me for ideas to create a backdrop for the stage. For the past three years, the third grade planned a Memorial Day program and did not involve me. I felt they utilized my expertise this year because of the interdisciplinary program. During two sessions, I demonstrated and facilitated a lesson with her class to create an 8' x 10' American flag for a stage backdrop made from red, white, and blue paper chains.

A kindergarten teacher accessed this category in a different way. She asked me to correlate an art project with her unit on Japan. In the regular art class, her students made clay rice bowls, which they used in a culminating project in their classroom. Although the topic was integrated, the interdisciplinary aspect took place at different times in different locations.

Jackie's Participation

During Phase One, I visited Jackie's classroom on a weekly basis for a total of nine visits. There were twenty-two students in her class during Phase One. The interdisciplinary experience we established represented style category #5 - Classroom Activity, a teacher directed approach. She chose the curriculum area, topic, and planned the project. Curriculum areas chosen for integration included science, social studies, and math. My role represented a project assistant who helped groups of students with their projects. Each time I arrived, either Jackie already had actively engaged students in projects, or the group was getting ready for a new activity. If Jackie was giving directions to the students, I would interject comments, questions, ideas, or suggestions, thus adding another perspective.

Phase Two Styles

Phase Two began in August 1995 during the first week of school with Jackie's class. As stated earlier, I modified the program and returned the art schedule from biweekly classes to weekly classes. Five open slots remained in my weekly schedule for interdisciplinary sessions. I gave each teacher an invitational letter (see Appendices C, Invitational Letters, p.229) and offered them a weekly time or participation in a biweekly schedule. During Phase Two, five classroom teachers were scheduled for participation in the program and two teachers expressed interest but were not scheduled (one did not find the times convenient to her schedule and the other returned in October after the schedule was in place). The remaining teachers in this setting did not express interest in participating in the program. I conducted weekly art classes with their students.

Style Descriptions

The approach style, which four teams experienced during Phase Two, represented style category #3 - Pre-planned Activity - Part of an Ongoing Unit. My role was to schedule the session times with teams and the classroom teachers were in control as to what curriculum areas would be chosen for integration. Two grade five teams integrated math and two teams experienced Image-Making. Jackie's participation continued to represent approach style category #5 - Classroom Activity. In October during a science Bat Unit, we experienced style category #2, Group Planning.

In the following sections, a description of the styles is presented along with Jackie's participation.

Grade Five Math. Both grade five teams chose to integrate math and their decision was a direct result of the time available for their session. Sessions involved forty-five minutes once a week at 11:30 A.M., their math time. The first session for both teams consisted of observation and inquiry into the curriculum topic as well as an opportunity for me to view a math lesson. After the first session, I met briefly with both teachers after school to receive more background information. This represented the only time we met after school for planning purposes. I felt nervous about integrating this subject area as this was my first experience integrating math with art. In the past, integrating topics in science, social studies, and language arts seemed to integrate easier with art processes through curriculum topics. However, by using the creative process, allowing time to incubate thoughts, I left the meetings with an open mind and wonderment. Both grade five teachers were willing to allow me the opportunity to design an appropriate integrated lesson. That night I had an idea. The incubation period of the creative process had worked! The next morning I went to share my idea with one of the classroom

teachers. The teacher was not in the classroom at that time, so I left a note on her desk which read: "Eureka! I think I've got it! I'll talk to you later."

My idea involved students in designing and creating a multiplication game. Both grade five teachers were agreeable with this idea. Here is how one grade five teacher explained the project as part of a graduate course she was enrolled in:

> [Students] were charged with designing a multiplication math game that would reinforce the multiplication table. . .They would need to create a game based on their prior knowledge, experience, and creative thinking. What would the board look like? Does it have to be a board game? Where would the answers be found? How will it be played? What materials will be used? How will someone win - what is the object of the game?. . .Ideas were formed and discontinued. Comments were made like, 'this doesn't work' or 'I'll have to do this part over.' They knew we would have a culminating game session and everyone would have the opportunity to play all the games.
>
> When they were finished planning, designing, and creating their multiplication game, they were ready to define the objectives of their game on paper and write the rules for it. They were told to assume that they were not present when their game was being played. The directions would need to be specific and able to lead the player(s) to the desired goal.
>
> We had several game playing sessions and throughout them the excitement was obvious. The children rotated from game to game and offered (though unsolicited at this point) their praise and critiques. A group evaluation session followed and we heard from each game maker. They clearly identified their goal, what they attempted, what worked, what didn't. Their peers could ask questions and offer feedback. They had concerns about design, playability, difficulty, and materials.
>
> [Mandy]-opoly, [Frank's] Jeopardy, and Multi-opoly were a huge success! Both game creators and players benefited by this collaboration of math, art, and thinking skills. (6/96)

I noted in fieldnotes some of the student's comments as well: "Mandy's game is the best, have you seen it?" "Look at Fred's game, it pops up!" "Why did you

use those colors?" "I don't understand how to play, would you explain it again?" Students' comments reflected positive, inquisitive, and critical statements. This integrated math project ended in December. The students also had an opportunity to display their games at the Art Show in February 1996.

The math sessions integrated other learning skills such as developing group interaction skills. Students used language arts to write the directions for their game and art skills in creating the game. They planned and accomplished goals. Students practiced their ability to give and receive feedback. The behavior of students observed in all of the interdisciplinary sessions was noticeably enjoyable as evidenced in fieldnote observations. Body language, and pleasant greetings as I entered the classrooms indicated an enjoyable activity. The second time I entered one of the grade five rooms, a girl begged her teacher to let her skip going to her Chapter One math teacher. She wanted to stay and be part of what I had planned. During sessions, I observed laughter among students, teachers, and other adults in the room (parents, college students, and the Chapter One teacher), and a bustling atmosphere of cooperation and learning. During the third session, I quietly walked over to the collaborating teacher and whispered, "Should we remind them they are doing math?" We both laughed.

In January 1996, the next integrated math project began for both grade five teams and involved a unit on fractions. To integrate fractions with the arts process, I chose mosaics. Each student (and collaborating teachers too) created a design on a 10" x 10" piece of paper. The design was then fractured into symmetrical or random pieces. The design was transferred onto clay, cut, glazed, and fired in a kiln. After the pieces were removed from the kiln, students had to reassemble their designs. Some designs were so random that students had difficulty reassembling their fraction mosaics. Their original paper designs assisted in the reconstruction. Each student had the choice

whether to glue their mosaics permanently onto a board, or to keep the design, as a puzzle, to put together repeatedly.

Both projects represented a teacher directed approach. The classroom teachers chose the curriculum topic, and I chose the integrated arts project. The students chose the type of math game, design for their fraction mosaic, and expressed creativity in all stages.

Image-Making Teams. The Image-Making sessions represented approach style category #3 - The Pre-planned Activity - Part of an Ongoing Unit. Image-Making (as described earlier) is a writing/collage process developed by Beth Olshansky (1994). During Phase Two, Sarah implemented this process for her second time and the grade one grade team explored this method for their first time. The paper making sessions occurred in September and January for Sarah's team and the grade one team made papers in September and October. The remainder of sessions involved students using their portfolio papers to cut and assemble collages and write an accompanying story. Students could write their story first then create the images; or create the collage pictures first and then write their stories. The results produced illustrated books by students. The words were printed using a computer and then glued to the collage images. The pages were bound using a book binder and plastic bindings. Sarah's team not only created several personal books, but also created a group book for their dinosaur unit. In April 1996, Sarah decided to end Image-Making. Her students had been intensely working on the process in their classroom several times a week since September. She felt as though her students had become saturated with the process and needed a break. Ending her weekly interdisciplinary time allowed an opportunity for the grade one teacher to use Sarah's time and participate weekly instead of biweekly. By the end of the school year, most of the grade one students did not finish their books.

Image-Making sessions reflected a teacher directed approach. Both classroom teachers chose the interdisciplinary style and I chose the art techniques to create the textured papers. During the writing/collage sessions, collaborating teachers facilitated students with the writing and art processes. Students also had the opportunity to work on their stories outside of our interdisciplinary sessions and expressed creativity in their stories.

Jackie's Participation

Jackie's participation during Phase Two continued to reflect style category #5 - Classroom Activity. Our sessions began the second day of school and were held weekly until March. We stopped for three weeks in March 1996 due to my integrative involvement with a college professor's Piggybacking Program. When the Piggybacking unit was over, Phase Three began with Jackie's class. A list of our sessions is presented in Figure 4. Jackie's Interdisciplinary Sessions - Phase Two, and provides an overview of curriculum topics during Phase Two.

1995-1996	Unit of Study
August	Science - Adopt-A-Tree
September	Social Studies - Self Books/ floor plans
September	Science - Our Pine Tree
October - November	Science - Bats
December - February	Social Studies - Community/ "Movie Town"
March	Science - States of Matter
April - June	Phase Three - The Brain-Based Program

Figure 4. Jackie's Interdisciplinary Sessions - Phase Two

Activities for Jackie's units of study took place in her classroom on a daily basis. During our interdisciplinary sessions, Jackie would choose a curriculum area and organize a project from her curriculum unit for us to work collaboratively on. Our sessions represented a teacher directed approach. Only once during the Bat Unit in the fall, our interdisciplinary style moved to a teacher-student directed approach, style category #2, Group Planning. We moved to this approach during a session when her students were completing bat masks representing a real type of bat. I suggested to Jackie that the students should be able to use their bat masks to express their knowledge. Jackie agreed and we presented the idea to the class. Students began to brainstorm presentation ideas. The culminating project of the bat unit allowed students to choose an arts area (2-D, 3-D, movement, or music) to design and create a performance which would demonstrate their bat knowledge. They could decide whether or not to include their masks in their presentations. We allowed students to work independently or in groups. The resulting performances included: writing and singing a song, writing and performing a rap, a read-aloud drama of *Stellaluna* (three girls acted the parts as one girl read the story), and designing and playing a game show called "Bat Facts." The students performed their acts to an audience, which included their parents and grade one classes. After the performance, we celebrated with a party in Jackie's room. The students presented me with a bat necklace as a thank you gift. Jackie's students reflected on the bat unit in the PostQ (6/96):

> I like the bat performance because we get to sing.
>
> I like bat performance because we got to show people about what we learned.
>
> Bat performances was the best because some of us got to work with our friends.
>
> We got to do a show performance.

Jackie commented on the performances: "They chose it. They loved it. They wanted to perform." (7/96)

The learning environment for our sessions varied depending on the scheduled activity. Sessions took place in her classroom, or in the art room, and several times we went outside onto the school grounds. In May 1996, our learning environment included a field trip to Sturbridge Village in Sturbridge, Massachusetts. That environment was selected by the team as a conclusion to a Community Unit.

Phase Three Style

I designed the approach style implemented during Phase Three, The Brain-Based Program, to assist students in making informed choices, to establish a brain-compatible learning environment, and to share some brain facts with students. I chose to implement this style with only one group because of the newness of the approach and my uncertainty of its outcome. For the past year and a half, only the teachers had made decisions. I wanted to see what would happen if students were in charge of their learning experiences. During Phase Three, the four teams from Phase Two continued their approach as described above. The remaining teachers in this setting did not participated in this phase. Only Jackie's team tried this approach. I became the lead teacher in implementing the approach and designed the first four sessions to introduce students to Tony Buzan's Mind Mapping idea (1978, 1994). The four mind maps created included:

1. Brain Mind Map: Created by the team in a group brainstorming session. The map contained students' preknowledge facts about the brain.

2. Choice Map: Created by each student and represented topics of choice.

3. Arts Map: Created in a group brainstorming session and contained seventy eight topics and media in four categories: two dimensional (2D), three dimensional (3D), movement, and sound. Students were encouraged to personalize their copy of the map by adding other ideas at any time.

4. Me Map: Individual maps created by each student representing favorite subjects from a list of twenty three choices including school subjects and personal interests at home. The Subject List was created in Jackie's room during a different a group brainstorming session before these maps were started.

My intent behind the mind maps were to prepare students to make informed choices in their interdisciplinary connections by exploring topics of interest and favored school subjects. The mind maps, Subject list, and Arts Mind Maps assisted students when completing a Project Plan for their projects (see Appendices F, Project Plans, p.245). The session in which students completed their Project Plans was accomplished quietly and individually to avoid students choosing what their friends were planning. Students were encouraged to create a topic mind map for their chosen topics to help discover what they knew and would like to know about their topic. During sessions 8 and 9, I introduced students to Gardner's Multiple Intelligences (1985). I wondered whether grade four students would understand and relate to a multiple intelligence test, and whether it would be helpful in understanding student's connections. Students responded to a MI test (created by Ron Fitzgerald, Superintendent of Lexington Schools, see Appendices G, Multiple Intelligence Surveys, p.249). Also, students created a graphic representation of their inventory, which I called a MI Pie (adapted from Thomas Armstrong's Pizza Pie idea (1994, 38-39), see Appendices G, Multiple Intelligence Surveys, p.252). The visual representation resulted in each student having a colorful pie to call their own. I did not use the MI instruments as data gathering because I did not have any experience with

their use or reliability. However, future research may prove their use beneficial for understanding factors for students choices.

The learning environment for all Phase Three sessions took place in the art room and the clay studio. However, Jackie also took groups of students to the library to complete background research for their topics

Teachers' Beliefs and Concerns

At the end of Phase One, I distributed thirty-eight teacher survey questionnaires and nineteen were returned: eight from participating members and eleven from non-participating members (See Appendices D, Survey Questionnaires, p.234). Overall, the respondents in this setting are supportive of an interdisciplinary approach. These are some of the representative comments:

> I think it's a wonderful idea. I'm looking forward to participating in an interdisciplinary approach in the fall. I guess I incorporate some art, visual activities into my units but could definitely benefit from your expertise.

> I believe it benefits everyone involved and can be an extremely powerful learning tool.

> I am very much in favor of this approach. I feel it is absolutely essential to a process-oriented learning environment.

> I think interdisciplinary is <u>key.</u> Real lifelong learning is not fragmented. Interdisciplinary makes sense to children, they get the whole picture!

> It's the way to go! Also, it enables us to cover more areas in the limited amount of time we have. It can also make learning more interesting to the children.

Out of the nineteen responses, only one teacher responded negatively to the approach, yet offered a potential aspect of a teacher-student directed approach:

> Seems like a difficult thing to do well - would not like it to be "continued" - it should be well-planned yet spontaneous and genuine with kids input.

The staff's beliefs about an interdisciplinary approach in this setting were similar to characteristics gleaned in the literature review. Issues reflected collaboration of teaching, more meaningful learning experiences, multiple perspectives, lower teacher/student ratio, sharing resources, utilizing a resource and consultant, and unifying the curriculum. Participating members of the program in Phase One valued the experience. Here are a few of their comments:

> I thought the program was great. Not only did it give an extra hand in the class, it exposed the children to another side of you.

> I liked having another professional to work with, someone with a different perspective.

The second survey administered in October 1995, asked teachers why they choose not to participate in the program and what questions they had about the approach (see Appendices D, Survey Questionnaires, p.237). I gave participating teachers a copy so that they could respond with their interest in brain-based learning and to ask questions about the approach. Out of thirty-eight surveys, twenty were returned, sixteen from non-participants. The following are representative comments indicating why teachers chose not to participate in the program:

I have no opportunity in my schedule.

I'm not organized enough for this yet.

Time element and lack of understanding of how to integrate it with mandated subjects. Needs careful planning to implement successfully (efficiently and effectively). Need time and knowledge to do this.

Representative questions teachers had towards favoring the approach included:

I would honestly like to know what I can do to become involved with this.

I have found this approach very helpful! I would be interested in seeing how others plan for this time (also manage time).

Where do I begin??? Is it easier to choose a theme?

Are the activities used related to the previous weeks or are they separate?

How can scheduling become more flexible to accommodate this approach?

The first interesting pattern between the two surveys is the number of respondents who returned surveys and did not participate in the program. In both surveys, more nonparticipating staff members are represented than participating ones. Issues for these teachers are similar to issues found in the literature: lack of training in this approach and time to plan. Because both data gathering instruments were returned anonymously, I was unable to

question respondents' comments further, such as, how they came to their beliefs concerning interdisciplinary learning.

Time

The most dominant pattern to emerge in data analysis reflected a time issue. Time for planning was also a major concern cited in the literature for inhibiting growth of interdisciplinary programs (Jacobs 1989). The following are representative comments from the survey (6/95) in relation to time:

> How will planning time work? I'm not always sure of my role.

> I'm concerned about having enough time to adequately co-plan activities with you. The time I worked with you was wonderful, but I felt I needed more time.

In Phase One, there were eighteen openings, and eighteen teachers requested participation. In Phase Two, there were five openings and seven teachers expressed interest in participating and two more expressed interest on the survey (10/95). I began to wonder about the other staff members. Why did they choose not to participate? The surveys indicated an interest in the approach, yet when given an opportunity, the majority of staff members did not volunteer to participate. The time issue continued to dominate concerns. Losing planning time was not an issue in Phase Two, but time for planning before sessions still remained. The following comments are representative towards teachers' concerns:

> How can I get the biggest bang for the smallest buck? I don't always have the time to consult and plan, but I want to become more interdisciplinary in my approach to both teaching and learning.

> As always, time for planning is never enough. This often causes a breakdown in communication amongst interdisciplinary team members.
>
> I would benefit and look forward to working this way, but how do we find time to plan/brainstorm etc.?
>
> What is the time involved and how do you find common planning time?

When participating teachers in Phase One responded to what they didn't like about the program, their responses also reflected a time issue.

> Not enough time to plan as long range thoughtfully as I would like. I teach thematically and would have like a better planning time build into the week.
>
> Not enough time/experience with it.
>
> It's not the "I didn't like". . . I'm just not too comfortable with it yet. I'm sure this will change after I've had more experience (and more time to plan ahead).

Time is a valid concern. One intent in this program was to have planning take place within the classroom setting during sessions. I certainly believe that spending time in planning may result in a more comprehensive experience. However, I also feel that planning within the classroom setting involves students in the choices of topics and project activities.

I asked Jackie if this approach required any extra effort or additional preplanning. Jackie's responded:

> I would have done the lessons anyway. I don't think I would have necessarily done it at those times, but maybe so. Knowing that you were coming, for example, the electricity quilt. I could have done the electricity
> quilt at 12:00, I could have done it at 8:00, whatever. I knew you were coming at that time so it was easier to do the electricity quilt when you were there.
>
> There was one week or one time that I really didn't feel like I wanted to do something with my plant unit. But I really did want to do something with geometry. So, that was easy to just switch. So I don't think I planned. I
> don't think I do that no matter who works with me. I think the way I plan is to just..(pause)..I think about the units I want to teach. I think about the best way I can teach them, and I try to incorporate or include anyone that has offered to work with us.
>
> (5/95)

During our second interview, I again asked Jackie the same question. Jackie added a new insight:

> That's a good question. Actually, I have to tell you, since you asked that question last time, I might have answered it differently now. There were a couple of things that I did do this time, since that question was asked. . .I did plan some things particularly because you were coming. I had attended a science class and it was a life science person that was giving that class and she was talking about how she has her kids diagram things and label things and how important that is for them. So then, I got that idea and thought that my kids should be doing that. So I did plan things, at that point, knowing that you were coming. I'm not sure I would have done some of those things. . .I probably would have, but I wouldn't have felt as comfortable with it if you were not a part of it. (6/95)

Her response indicated that she was allowing this program to become an integral part of her planning. The collaborative approach became part of her thinking process as she planned lessons. When Jackie saw an art component within her lesson, she planned that activity during our interdisciplinary time.

Only twice did we preplan an activity and our discussion occurred during a session. Once was during the Bat Unit and the second time occurred when I inquired about the next unit. Jackie described a science unit involving observation of plants. I suggested that I could demonstrate how to observe and draw basic shapes which may enhance students' observations and drawings.

Time, the most prevalent pattern impeding participation in this setting, was not an issue with Jackie and me. I asked Jackie if she wished we had more time to sit down and plan. She responded:

> That's hard to answer because when you came in to do something with us, it ties into the whole week. It's not what we do together is something separate from the whole week. When we did the town, we did it every day, not just Thursday. (7/96)

I felt that time was an issue in this setting for two reasons. One directly reflected the loss of planning time when the A/B art schedule went into effect during Phase One. Despite the loss, the participating and non-participating staff members in this setting still valued the approach. The second reason I felt time was an issue reflected the implementation style. Jackie utilized style category #5, Classroom Activity. Our sessions integrated with what she was already doing in her classroom. Other teachers were trying to add-on another program to their curriculum, as was cited in the literature for hindering implementation of interdisciplinary programs. However, the Classroom Activity style incorporated a different aspect of interdisciplinary learning that also appeared in the literature. Jackie's sessions were integrating a visual emphasis in her curriculum projects.

Time to plan was not an issue with any of the participants in Phase Two. Planning times were reinstated for all teachers in this setting with the

exception of a grade one team member who chose the biweekly schedule. Planning for upcoming activities occurred during sessions. As stated earlier, only once at the beginning of the year, did the grade five teams stay after school to inquire about the math curriculum topics. I was in control of the integrated art activity and planned for the sessions.

From my perspective, time became an issue with the weekly gaps between sessions. Once a week, I participated in classrooms for forty-five minutes, then I had to leave to teach a regular art class. Sometimes, especially in Jackie's sessions, we would be just getting going, and I had to leave. Jackie felt this same way: "It was interesting. The only problem is that the time goes by, then it is over." (2/97) During the week, her class would make considerable advancement or were on a new topic entirely. One example happened with Jackie's Community Unit. Each week students would have to fill me in with details and I would asked questions such as: "Who won the election?" "What is the name of the town?" "Who is in the Chamber of Commerce, the Highway Department? In one respect, I suppose this gap of time helped to build relationships with students as they eagerly shared their "new found information" with me.

From a different perspective, one of the grade five math team teachers from Phase Two discussed the time issue during an interview:

> What worked? Everything except time. Time was our enemy. The students looked forward the time. They were disappointed when you couldn't come. (6/96)

Two of her students also responded to time when I asked what they didn't like about Integrated Art. Their responses: "Wednesdays!" "You were absent a lot." (6/96) Our sessions were scheduled for Wednesday afternoons and I had a half day each month for professional development which canceled their session.

Also, during the year, we experienced several snow days, conference days, and sick days on Wednesdays.

The time issue can also be viewed as an opportunity to change. Through the program's developmental growth, team members had time to adjust, learn, and become comfortable with the approach. Here is a suggestion by one participant:

> Keep it going. The more practice students and teachers have with this model, the better we will be. Offer staff development opportunities to facilitate more effective implementation. Share the positive experiences so that we can all learn from them.
>
> (5/95)

Students' Perspectives

To corroborate the perspective of this program, I informally discussed this program with two fourth grade classes at the end of Phase One. I chose Jackie's class because of their weekly involvement with the program and I chose the other class because of their art appreciation creative writing activity. Both groups sat in a circular fashion in their classroom meeting areas. I asked students: "What did you think about me coming into your classroom?" Here are a few of the representative comments:

> I thought it was better but not better. It wasn't better because we missed art, it was better because you helped us on our stories and helped give us ideas for the book buddies too.

> I liked the way you helped us, but I didn't like the way we missed art.

> I was having trouble drawing the flashlight because it was kind of hard drawing the different shapes. You showed us different shapes and how you can draw it.

I liked it when you came in because you were nice enough to bring in pictures and we wrote stories.
[R] : Had you ever done that before?
No and I liked it.

You helped me with my picture. You showed me where to shade in for that electricity picture and draw the table and stuff.

For me, I was drawing the leaf too small, the petals. You helped me with that.

It was great.
[R] : What makes it great?
Somebody else to help us.
(6/95)

Although student responses included their recognition of an extra person and help with brainstorming ideas and drawing skills, students also commented on not having weekly art lessons and an art room. Some of our regular art classes were held in the cafeteria and students recognized learning environment limitations including the lack of some art materials. One student's comment reflected one of Caine and Caine's (1997) brain-based principles involving peripheral influences:

> I wished we still had the art room. Sometimes when we were in the cafeteria, it was confusing like when they came into the cafeteria to practice a play. (6/95)

When I asked students if there was anything they didn't like about our new program, they responded with missing art class weekly and missing the art room. One student from Jackie's room responded to their schedule:

> Well sometimes we had a daily schedule and everybody used to know it, but when we started this schedule, it

would be different times and we never knew when you would be coming in because it wasn't one time all the time. It was always different days, different times.

[R]:How did it make you feel?

Kind of queer because I didn't know what was going on. I was always looking at the schedule up there (pointing to the daily agenda on the front board in Jackie's room). (6/95)

I visited Jackie's room at the same time on a weekly basis. Jackie rearranged her daily teaching schedule to fit our interdisciplinary times. This student was unbalanced by the change to the daily schedule which also illustrated the brain-based principle involving our brains as pattern-seeking devices.

When I asked if students had any questions for me, they immediately responded with wanting to know if we were doing this again next year. They also wanted to know if we would have our art room back next year. One student inquired whether I liked the A/B schedule. Students also wondered why our school was chosen for the preschool. The following is a conversation among group members:

Andy : You use that room, why didn't they just go to the Y.M.C.A?"

Kevin: They asked a whole bunch of schools and they said no. They picked our school because they asked us last.

Andy: Did you have to think for awhile to let the preschool go into your room?

[R]: No, it was not my choice.

Andy : I have a suggestion. Next year instead of helping with our work, why don't you teach an art lesson when you come? (6/95)

The A/B week schedule did not offer enough art time for these students. Their concerns reflected an issue raised in the literature concerning interdisciplinary programs : "Art for art's sake." Students enjoy their art experiences. Students also recognized the need for an art room. From the many comments I heard from students throughout the school, I knew the students missed their weekly art classes and their art room.

During Phase Two, students' perspectives continued to reflect enjoyment of the program:

Researcher's Journal : January 11, 1996

> Today I had morning duty and I was stationed at the front door. As students entered, I greeted them as they walked passed me towards the cafeteria. Justin, from Jackie's room, walked in and said: "Good Morning Mrs. D.", followed by a: "Yes! (with affirmative arm gesture, closed fist and bent elbow thrusted downward) It's Thursday, Integrated Art Day!" We both laughed. His comment made me feel good and put a smile on my face.

Justin's expression of enthusiasm represented many students' feelings towards this program as evidenced in fieldnotes, surveys, researcher's journal, and videotape transcripts. I did not interview student participants from the Image-Making teams because of their age (a grade one class and Sarah's primary students.) However, one girl from Sarah's group saw me in the hall one day in May 1996 after their team had stopped participating. She asked me: "Are we coming back down there?" I was puzzled. "Where?", I questioned. "No. No. No.", she responded, "The swirly paper. I really like the swirly paper. How come we don't go there anymore?" Her questions reflected her enjoyment of the art process of making paper in Sarah's Image-Making sessions.

Students from the grade five math teams also expressed positive attitudes towards the Integrated Math approach. The word "fun" was

repeated by many students when I asked students to respond to the question: What do you like about Integrated Art? Some of the representative responses included:

> I liked the freedom of designing and keeping projects.
>
> You get to do something other than sit in your seat and you learn in a fun way.
>
> Working with my hands.
>
> I like that you make it and you can take it home.
>
> We made games and mosaics. It was fun!

When asked what they didn't like, most responded nothing, however, two stated Wednesdays (as described earlier).

I administered a questionnaire (PreQ, see Appendices D, Survey Questionnaires, p.239) to Jackie's students to gather baseline data on how participants perceived the teacher directed and the teacher-student directed approach before we started the student directed approach. Data from the PreQ (N=21) defined the Integrated Art program from their perspective as presented earlier in this chapter (p.106). More interesting to me were the students who responded with mixed or negative feelings towards the interdisciplinary approach:

> Integrated art is O.K. sometimes we do fun things and somthings are boring.
>
> It's boring. States of matters was stupid.
>
> I don't like anything about integrated art!

To place these comments into perspective, the same respondents' comments were compared with their attitudes towards school. Respectively, the same students also responded unfavorably or had mixed attitudes towards school:

> Sometimes you have a great day, and sometimes you have the worst day of your life.

> It can be boring sometimes fun.

> I would describe school as long and boring!

I wondered if these students would like the student directed approach better? Data from the PostQ (N=21) reflected that students did like the student directed approach and the results are discussed further in the last section of this chapter (pp.186-202).

A limitation of questionnaire surfaced when students commented about the "best" and the "worst" elements of Integrated Art (evidenced on the PostQ). Data analysis became complex because student responses may have indicated feelings towards Jackie's units of study. When comments referred to "States of Matter" or "Bats," were students indicating the interdisciplinary session activities, or were students referring to their unit of study, -- the day-to-day activities I was not part of? I began to wonder how the questionnaire could separate attitudes towards the classroom unit of study from the interdisciplinary projects. One solution would be to have students provide comments about the integrated projects at the end of each session.

From my point of view, the most revealing perspective of the Integrated Art Program was obtained from four participants who responded on the PreQ to the question: What don't you like about Integrated Art?:

When you take a lot and we don't get to do a lot.

We took too much time discussing what to do.

We have to sit down and wait till the teacher talks.

I don't like when we have to talk a lot.

"Teacher Talk" was also reflected in one student's description of the Integrated Art Program: "Integrated Art is when [the art teacher] comes upstairs to our class on Thursday mornings. She talks about our projects." Teacher talk represented giving directions or describing projects and did not refer to lengthy lectures by Jackie or me. I might also speculate that the issue of "talking a lot" also reflected group brainstorming sessions. During Integrated Art activities (and in Jackie's classroom) throughout the year, there were many group discussions. Data revealed that some students would rather be active in projects rather than talk about them. During Phase Three, Session 5 when I stated to the class: "This is the last day of teacher talk. Now, you get to make all the decisions." Students enthusiastically and spontaneously returned: "Yes!" (a few students also added affirmative arm gestures). They asked: "What do I write?". . ."Can we start now?" Noteworthy here is that Phase Three was designed to eliminate exactly what these students commented on, too much teacher talk. Would their perspective change after utilizing a student directed approach? As mentioned above, the PostQ revealed that students did like the different approach. Only one student responded to the statement: the worst thing about Integrated Art is "when we have to log in and [the art teacher] has to explain." Although this comment is from only one student, it feeds my thoughts regarding my role in classroom discussion. Also important to point out here is that the ten week program only allowed three sessions (one was a double period) when students worked independently without teacher direction.

Teachers' Role

This section of Chapter IV addresses the second question of this study: What is the effect of the collaborating teachers' role on the learning environment in an interdisciplinary approach? This section describes in detail Jackie and my experiences over the fourteen month period. I have included some data from other participants (teachers and students) to corroborate the patterns which emerged from analysis.

The teaching roles in this setting effected the learning environment in several ways. The first effect was influenced by who made the decisions including: which learning environment activities took place in; which approach was utilized; what curriculum area and topic were chosen; and what activities were chosen. The collaborating teachers' roles could be separated into four styles: leader, assistant, co-leader, and facilitator. Two dominant functions of these roles to emerge were companionship and feedback. Another effect concerned the learning environment itself, its location and which teacher was directing the activity. The following sections describe each effect.

Role Styles

Throughout the development of this program, my role was integral to a total of nineteen teams, which developed with classroom teachers and students over a fourteen month period. Because I was part of all teams and I wanted the program to develop from the classroom teachers' needs, my role was to be supportive of their interests. As teachers volunteered to participate, I was receptive to any and all ideas, and as described earlier, seven different approach styles emerged. During Phase One, all teams happened to experience a teacher directed approach. One exception included the grade five team who experienced a teacher-student directed approach during their

Revolutionary War Unit. The teacher directed approach placed the teacher in a director's role (as described in Chapter II, see Appendix B, Role of the Teacher -Characteristics, p.222). Collaborating teachers were not consciously making a choice about their role except for Phase Three when I became the lead teacher. As a result of analysis of fieldnotes, I was able to define the collaborating teachers' role styles in this setting.

When the collaborating teachers made all of the decisions, they were experiencing a director's role. The collaborating teachers could split the role into a lead teacher and assistant. The lead teacher would control the topic, curriculum area, activity, and location. The assistant teacher was not a passive bystander, but instead offered ideas, comments, and help to students during sessions. The teacher director's role could also be shared as a co-leader position, with different elements being decided by teachers. For example, the classroom teacher would decide the topic and curriculum area, and the art teacher would decide what art project would match the curriculum topic. The location was determined by the nature of the activity.

Collaborating teachers from Phase One experienced co-leader roles in planning the integrated activities in all style categories experienced in this setting, except #5 -Classroom Activity. During program sessions, collaborating teachers would also co-lead the activity. For example, the classroom teacher would begin the session with a discussion of content, then I would follow with directions on the project. Both teachers equally assisted students during the activity. Only once during Phase One, did a fourth grade classroom teacher lead the art activity (she planned) and I worked with students on a writing project (cinquains).

The collaborating teachers during Phase Two also experienced co-leader roles. The grade five teams decided the topic and I planned the activity. The time of our session determined the curriculum subject. Most locations were in the classroom, and a few occurred in the art room. In the words of one of the

grade five team teachers as she reflected on our sessions at the end of Phase Two:

> You were the lead. I felt my support was minimal. I would like to be able to do more.
>
> [R] : Did I control it?
>
> No, I appreciate all that you did. My only regret is that I didn't work with you the year before. It was easy to do. You made it very easy. You came up with ideas. I came up with the kids. What could be simpler. (6/96)

The two Image-Making teams also experienced a co-leader role. The classroom teachers decided the style and I planned the paper-making sessions. During the writing/collage sessions, the collaborating teachers played equal roles in assisting students with the process.

During Phase One and Two, Jackie chose activities which represented style category #5, Classroom Activity. This style category placed the classroom teacher in a lead role and myself as an assistant. Jackie made all decisions for our sessions and I assisted during the sessions. I was allowing the program to develop from Jackie's needs and interests. When I saw an opportunity to create a project which would enhance her unit, I offered ideas. This placed me into a lead role for a session. Three times during Phase Two, we changed roles. One time was during a science session when I took the lead role and demonstrated how to observe and draw shapes. The second change happened when we co-led students in the planning of bat presentations. The most significant change occurred during Phase Three.

When Phase Three began, Jackie and I switched roles. I moved into the lead role when I began facilitating The Brain-Based Program. This reversed Jackie's role in two ways. First, instead of Jackie choosing the topic for integration, she became an assistant helping students through each session. Then, in the latter part of this phase, both of us moved into facilitators' roles

(see Appendix B, Role of the Teacher - Characteristics). We were facilitators during Sessions 6, 7, and 8 when students made all the decisions. Jackie commented on the switch:

> There were times during the program I didn't know where my role was. I didn't know what I should be doing. I wanted to help, but I didn't know. I didn't want to step over boundaries as far as...I think sometimes I do too much for them. I tell too much. I didn't want to step over the boundary. So, where do I go? What do I do? At times I was unsure of my role, unsure of how to assist kids and I wanted to. I wanted to be in there. I had no problem with your leading the discussion. I was very comfortable with that. That's where I felt like I learned. That where I felt like, I was always very interested and motivated, but after, when it was individual project time, when it was time for them to go off [work independently], I didn't know where I fit in. I didn't know how to help, basically. (7/96)

Jackie's new role was as unfamiliar to her as I was in my role leading The Brain-Based Program. As characteristic in student directed learning, Jackie and I entrusted students with self-direction about how they spent their time (Charbonneau and Reider, 1995). These grade four students were also unfamiliar with their role. The vignette, which began this chapter, illustrated students in this role. Students seemed to be comfortable as they controlled their behavior and their activity. The teachers did not have to direct or keep students on task with their activity.

When our roles changed in the student directed approach from being directors to being facilitators, Jackie and I noticed one aspect of our role that we were uncomfortable with, even though we were in separate locations. During session 7, I was in the art room assisting students and Jackie was in the library with a group of students conducting research. Each of us

discovered that our facilitator's role had moved into a "doer" role. Jackie commented on this session:

> When I took a group to the library, [Theresa] went to the card catalog to look up 'whales'. She came back and said there was nothing on whales. I went back with her and found ten books . . . I didn't know if I should be doing that for her. (7/96)

My "doer" role happened during that session when a student wanted her diorama box cut to create an interactive game. During videotape transcribing, I witnessed myself working, solving how to cut the bottom of the box, and the student watching me. This student watched me for approximately five minutes solving her idea. Both teachers felt uneasy in the "doer" role. Jackie stated earlier: "I think sometimes I do too much for them. I tell too much." We noticed that these two students were relying on us to accomplish their task. Both of us recognized a separation line between being a facilitator and being a doer. Jackie continued speaking about Theresa's whale project:

> . . . then she was writing page by page. There wasn't any focus to her researching. There wasn't any. 'What are you looking for about whales?', I thought, 'Gee, do I ask her?' (7/96)

In the literature, Glasgow (1997) stated that a student directed approach may create insecure feelings and, in this setting, both of us experienced them. I also think that Jackie's concern was influenced by being a participant in this study. In The Brain-Based Program, she didn't know if the students should truly work independently, or whether she could intervene and help guide students to finding knowledge. In our first attempt at the student directed approach, we

did not have a working definition of a facilitator's role. The approach was new to both of us and we only experienced the facilitator's role in three sessions.

Role Functions

When I coded data from interviews, fieldnotes, and my researcher's journal, I looked for characteristics of a teacher's role. The five functions of peer coaching (NAEA, 1996): companionship, feedback, analysis, adaptation, and support assisted in defining our teaching roles as collaborators. During analysis, I found data reflecting each peer coaching function. For example, Jackie and I adapted lessons to meet the needs of the students. We critically analyzed the student directed approach before, during, and after Phase Three. We supported one another during sessions by interjecting comments, ideas, and suggestions. But, the two most dominent functions to emerge, which effected our roles in the learning environment, were companionship and feedback. Continually throughout the program's development, Jackie and I discussed the successes and failures of our sessions thus building companionship. We accomplished this through objective, non-evaluative feedback. Above all else, we supported one another when we felt up and when we felt down.

Companionship

As the program developed, Jackie and my companionship grew. As noted in the literature review, Caine and Caine (1997) stated: "The key to successfully transforming education lies in transforming ourselves" (1997, 11). Two key characteristics include having a willingness to give and volunteering to participate in implementing change. These characteristics are part of intrapersonal skills and those skills affect a collaborative relationship. Before

teachers can open their doors to a collaborating relationship building companionship, they must first be comfortable with their own teaching style. Jackie reflected on her intrapersonal thinking:

> At first, I said: 'You were looking for people'. I said to myself: 'I need this help. But am I going to let my ego get in the way? Someone is going to be there while I am teaching. Someone is going to see me teach.' But then I had to reassure myself, damn it, I'm a good teacher. So what if someone sees me. And, I'm going to make mistakes, but whoever is seeing me has also made mistakes. And if they can't accept it, then oh well.
>
> [R]: Do you think it is years of experience that develops a comfort level of reaching out for help?
>
> You know, I'm not even sure it's years of experience as much as you have to have an awareness that it's okay that you're not an expert everywhere. I think some people get themselves in a rut: 'I've been teaching for twenty years. I should know how to do everything.'. . .This is me and I accept that. I think it also comes with age. You care less and less what other people think and more and more what makes you comfortable. (2/97)

When I asked Jackie to reflect on how she chose a style of implementation, she responded:

> I think different people attack it different ways. But I think for me, when we started, I was..(pause)..what do I plan? I didn't know you too well then. I thought, geez, I certainly didn't want to have a lesson where I'm standing there teaching and you're standing there watching. I knew I didn't want that. I would be incredibly nervous. It would have been a waste of your time. So I knew that it had to be a hands-on kind of thing. . .I thought about what areas do I need help more in?. . .I kept thinking. At first, I was thinking math. Math is where I need the most help, but then when we started talking and planning, it [our sessions] seemed to fit in better with unit studies. The science, the social studies. It seemed that really took off better, for me anyway. (2/97)

When the program first began in March 1995, the definition of Jackie and my teaching roles was unclear. I knew that I felt a little uncomfortable entering classrooms not knowing what to expect, but I didn't know that Jackie shared the same feeling. Jackie commented on comfort level during several of our interviews:

> My comfort level in having you come in has changed. At first I was nervous. At first I was unsure of what piece in the puzzle you were. But now, as I start to think of things, and actually it has been this way for a while, I automatically think of you as a component that can be utilized. (5/95)

> But the comfort level does change though. I think at the start, you stand up in front of the class and think: 'Who should be doing what? How should this be going on?' But now I feel as though, we're getting to the point and I think it will grow, as we start planning more time doing that, teaching together. I felt great comfort when you were doing that seed thing with us because you had all this information that you brought in. It was almost like, whew, the floor is covered. You have knowledge to bring in and I have knowledge to bring in and it's almost a relief. (6/95)

> I don't think I could work with just anyone because the comfort level wouldn't be there. (2/97)

Jackie's comments reflect that comfort level grew as time went on, yet not all teachers possess this comfort level and could not work as a collaborative team. The coming together of teachers in a collaborative experience is influenced by deeply held beliefs (Caine and Caine, 1997). If these beliefs do not match, then comfort level and collaboration will not grow. Comfort levels have to be genuine.

Jackie's comment reflected another issue cited in the literature: lifelong learning. During the lesson Jackie was referring to here (the seed thing), I added to her science plant unit because I have a personal interest in nature

and gardening. My background knowledge added to her lesson in more than a visual way. During our last interview, Jackie and I were discussing how we learned from each other as we remembered that science lesson. Jackie reminisced:

> You know, maybe that was the turning point for me. That might have been the turning point. Because I remember, I vividly remember, us standing there talking to the kids about it. And we would both interject and give comments and feedback. I felt like we were all sitting down and talking about, intelligently, yes, we were all learning then. I think that was the turning point. (2/97)

Not only was our comfort level growing, but also we were modeling learning. Her students witnessed the interaction of two adults who were engaged in the process of learning. The literature reflected the interdisciplinary approach as an opportunity for students to see teachers sharing ideas and modeling questioning strategies. Because I was learning about curriculum topics that I was unfamiliar with, I asked questions. Jackie responded to us modeling learning:

> You had already set up an atmosphere where you ask me a question and I didn't know the answer and I feel okay with that. (6/95)
>
> I don't think that happens with everyone. At times people will ask you a question and you have to come up with something. At times I feel nervous about it, I really do. But when you ask me a question and I don't know the answer to it, I feel O.K. (2/97)

Jackie commented further on our collaborating teaching approach:

> You know, you did something when we were doing the bean thing, no it was the flower, that made things so simplistic for me. It was wonderful. When you did the basic shapes on the board, I never thought of it like that.

> I never thought. And when you did it, I almost felt like, 'Hey wow, I can do this!' I never thought about art in that way. I believe I can do some basic stuff, but I don't look at myself as an artist and I don't look at myself as being very capable in that area. But when you did that, I thought: 'Wow, that makes it so simple.' It really isn't simple, but it does make it a little bit more simple. It really made sense to me. It did. It put me in artist shoes. I thought: 'I bet artist look for things and try to visual what those shapes are and then try to go ahead and draw it from there.' I had never looked at it before like that. I never thought of it before like that. I think as time goes on and we work together more, I think I'll be learning more from you and I want that. (6/95)

Our lifelong learning benefit was reciprocal, I was gaining as much as from this experience as Jackie was. In Whamsley's (1994) terms, we were "bumping up one's knowledge of a topic" (pp.24-25). With many of the teams throughout this program's development, I was challenged with creating new lessons to integrate with the classroom curriculum (as in the hexagon honeycomb lesson and math sessions described earlier). This interdisciplinary experience aroused my creativity. After Phase Three when I asked Jackie what she thought about the program, she responded:

> I felt like I learned a lot, which was good for me.
>
> [R]: Do you mean the "brain stuff?"
>
> That, and the teaching style. I felt like I learned a lot. I really...(pause)...It got me thinking about my approach to choice. It got me thinking about reflection and I need more planning. You are very organized, you really are. I really like organization. Any kind of way to organize things, then I want it. So I learned a lot of organization things that were good for me, that I saw helping me in other areas as well.
>
> [R]: Do you mean the mind mapping? Thinking it out?
>
> Yes! Yes! I think I do more whole class mind maps. Let's all talk about it. I do very little: 'You sit down and think for yourself. ' So I mean, it opened my

> eyes to a lot of different ways I could use that in my own classroom. And I thought that activity was helpful for me and helpful for them. . . I don't know, you're very organized. You went through folders. Your comments to them. I thought it was helpful to me to see someone else doing that. And almost, some of what you did, validates some of what I do. (7/96)

As demonstrated here, our developing companionship effected personal growth.

Jackie commented on her development at the end of Phase One:

> I see your input as giving me a better base of expectation. Before, I would accept the stick figure and say: 'Oh, you tried. That's nice.'
>
> [R]: But you send writing drafts *back to the drawing board*.
>
> Yes, but the drawings. I look at myself and I think that I'm not good, so I can understand if you [the student] don't feel comfortable. But now it's like,
>
> I don't think I'm quite to where you are, comfortable as you guiding them through, but I feel more comfortable than before. (6/95)

When I asked Jackie if she noticed growth in her students' work, she responded

> Yes, I definitely saw some. I think back to the electricity quilt and I think of [Mike's] drawing of the computer. He wouldn't have done that shading and I wouldn't have suggest it. I wouldn't have thought of it at all and it definitely improved it. Now that you're involved, it gives another dimension.

Data from the student questionnaires (PreQ and PostQ, see Appendices D, Survey Questionnaires, p.238) also revealed that some students noticed the teacher collaboration:

> I like how there is more than one teacher in the room and they give you suggestions that you can take or leave in the air.
>
> We got to do a show performance and we did a good job because of [Jackie] and [the art teacher].

Throughout the development of this program, Jackie and I were gaining a better sense of role expectations, becoming more comfortable in the process, and learning along with our students. The following excerpt from my researcher's journal further illustrates our growing companionship:

> Phase One : 6/11/95
>
> It is the last week of school and I was coming out of the library this morning heading back to my office. As I went through the corridor's swinging doors I met Jackie who was bringing her class to the gym. After exchanging greetings, Jackie exclaimed that she had an idea for next year. "I've been thinking about designing a year long theme on growing next year. I want to call my class "The Growing Classroom!" I immediately identified with her theme as we had previously talked about the science plant unit. I knew of her interest and excitement in this unit. I responded: "That's a great idea! I'll have to think about some *growing* project ideas." We both laughed. As we parted, feelings of happiness and excitement remained for me. By the tone of Jackie's voice and expression on her face, I knew the feeling was mutual. (Researcher's Journal, 6/95)

Just a few words, in a few seconds, in the hallway before we separated would allow both of us time to incubate ideas before we would meet again in the fall to collaborate more project ideas. She would utilize her creative teaching style and I my creative artist style. Our unique ideas and creativity would combine and have an effect on the activities we planned in the learning environment.

Feedback

The second dominent teacher's role pattern was feedback. Through our companionship discussions of successes and failures, we gave each other objective, non-evaluative feedback. In March 1996, when I explained The Brain-Based Program to Jackie, I told her I was nervous. "I wonder if students will be interested in the brain activities and the student directed approach?" She responded:

> Think about it this way. How many times do they get asked: 'What do you want? What's important to you?' When the teacher says you have to, ya. But when the teacher says: 'What do you want to do? Tell me what you want. What is interesting to you?' It's different. I think they will be motivated. (3/95)

Jackie remembered a time when feedback was helpful to her:

> I remember one time thinking that I've got to pick up the kids in five minutes but I had a couple of minutes to run down to your room. I remember going down about the map. I had something to show you.. (pause)..the sign? The name? I remember how we talked about it. Actually you helped. I was do so down on that sign, the name. I was so down on the name [of the town]. Actually you did help me to move pass that. I was thinking that we had done all that work and now we have a crummy name.
>
> [R]: Crummy to whom, the teachers? The kids loved it!
>
> Crummy to me. It wasn't crummy to them. Exactly. That's what helped me to let it go. That says a lot more. That's just an isolated situation, but it applies to a lot. You have to let go and let them do what feels right to them, even if it doesn't feel right to you. I think that in talking with you and working through it with you really helped me as a teacher and as a person. I can't always be the controlling one. (2/97)

These feedback examples give meaning to our growth in companionship. I was able to share my nervousness and Jackie was able to express her personal

disappointment in a choice her students had made during the Community Unit. She wanted to direct her students towards a different name for their city, but through her students' group brainstorming process and a town election, "Movie Town" won very easily.

Another example of feedback happened during Phase Three when students were completing their Project Plans for their interdisciplinary project. I was confused as to why some students experienced difficulty with this task. I felt as though the first four sessions of The Brain-Based Program weren't helpful to students when making decisions. At lunch after Session 5, I shared my doubts with Jackie. She responded: "Some kids need to talk it out more." Jackie's feedback helped to alleviate my doubts. I knew from the literature review that students differ in their abilities. Some students experienced no difficulty with the task, while a few struggled with their choices. Those students needed more guidance as defined in Tomlinson's (1995) Differentiated Classroom model.

Jackie and I often discussed what happened at sessions during lunch, interviews, and whenever we had a moment. We spent time clarifying how we wanted the student directed approach to be modified. Our conversations reflected our own "Internal Locus of Evaluation" as cited by Rogers and Freiberg (1994) and "Active Processing" as cited by Caine and Caine (1997). We were going through stages of introspection, questioning, and implementing change. We were deciding what was working and not working. One example occurred at the end of the student directed approach. A teaching dilemma arose when students completed their project plans. Our dilemma was: should personal interests, hobbies, and special subjects such as art and gym be included on the Subject List? Or, should all choices on the list relate directly to subjects within the classroom setting? A description of our discussion of students' choices follows later in this chapter (pp.195-198).

The companionship and feedback patterns were corroborated by teacher participants from Phase One and Phase Two. The companionship pattern was reflected in these respondents comments on the survey when asked what they like about the program (6/95):

> I was able to do things in my classroom I never would have though of doing without the input of an artist and art teacher.
>
> - having a peer to "bounce" ideas off of and develop more fully.
>
> - sharing with a respected and respectful colleague. Teacher/student ratio is better.
>
> With your help and suggestions, I was able to expand my horizons!

Some participants responded to intrapersonal growth:

> This experience forced me to think things through more thoroughly and look into areas that I normally wouldn't emphasize as much.
>
> I think the best thing is we bring our experiences together to teach the lesson. I ended up learning some things along with the students.
>
> I found that it changed the way I look at the students - they were able to demonstrate skills I was previously unaware they had!

Growth also evidenced in student participants after Phase One, Image-Making sessions. When I asked Sarah whether this process encouraged more brainstorming with the students, she replied:

> Well, definitely. During the next to last session, where the children were working and had no teacher directly with them at the table, what I saw, which was wonderful to see, they were using language to

> describe not only what they had on their paper but also the stories they would tell. They were doing it with each other and not to a teacher. So the very cooperative nature of the whole project was very evident to me. . .They came to the table, which they often do for writing process anyway, but very often they'd isolate themselves even at the table, by gearing into their work and not sharing it with anyone. Whereas, when you laid out the portfolio pieces, everybody was looking at everybody else's and they commented on what they saw. They either agreed or disagreed and share ideas and thoughts which actually began to act as a brainstorming session for each of them. So without being teacher directed, they were helping each other to think of different thoughts that they could then put on paper. (6/95)

Sarah noticed her students were interacting more with one another. She continued:

> They were very much interested in what another person was going to say about it, not just what they had to say, which is a big step for those four younger ones because they are so into themselves. Being seven years old, that's still very self centered in development. But I saw a drastic change in the way they communicated between each other. And the metalinguistics aspect of it too, that they were using language to talk about language. When they looked at their art pieces they would say: 'I see red bubbles and the red bubbles make me think of words that describe..(pause).' And so then they began to use adjectives in their written work which they may not have done without that visual stimuli. (6/95)

The integrated experience had measured up to Sarah's expectations and she saw its potential for developing language with her group. Sarah commented:

> Well it certainly was everything I had hoped it would be. And I certainly know now things that I might do differently to improve it. I guess basically, I struggled

> with: 'Should I include younger and older kids together?', and I guess I did both. . .But I think if I were to do it again, I would try to keep them all together no matter what the age, no matter what the language level because I can see that the cooperative learning that occurred was very healthy and I think I should have capitalized on that a little bit more. (6/95)

Three aspects, which interested Sarah the most, were the mixed-age grouping of the first graders with the third graders, the increased brainstorming, and the cooperative interaction among students. Olshansky's (1994) description of her research does not make any reference to developing cooperation skills among students. This could be a possible area for research.

Sarah also experienced personal growth as she stated her value of the approach:

> I found it to be very positive in terms of learning, in terms of raising the student's understanding of what art is as well as supporting the language development, which I initially started the whole thing for. So I definitely think it's a very important component of the language program. And even if you were not to participate as freely as you've been the last two years, that I would attempt to do it on my own. (6/96)

I noticed Sarah's personal growth one day in the spring of 1996 when I passed by her room. Her new bulletin board in the hallway displayed math word problems and her students had used the Image-Making process to illustrate those problems. The viewer had to lift parts of their collage illustrations to uncover the word problem's answer. The bulletin board demonstrated a personal leap for Sarah. She took the process of Image-Making from a language arts' point of view and moved it to another curriculum area, math. Sarah responded to this leap:

> Well, word problems are sometimes very difficult for any child, but obviously for children with language difficulties. They are even more difficult and I always struggle when I am introducing that and working through that process with: 'What can I do that is creative, new and different, but is still practicing the same skill?' And immediately I thought of the Image-Making when I was relating to word problems because we would often draw pictures of things and then make up stories of the pictures that we had. . . This was one time that they were very eager to write the word problem first and do the pictures after. . . They caught onto that they could use the visual image to help them arrive at the right answer. (6/96)

Image-Making with two teams demonstrated that personal growth developed differently. The grade one Image-Making Team did not experience the same growth as Sarah's group did. During the exit interview at the end of Phase Two, the grade one teacher reflected on our experience:

> It was hard for them. Some would take the whole piece of paper and glue it down, instead of looking for shapes and cutting a shape from the paper like Eric Carle. . . Part of the problem was me managing. I had trouble managing a whole lot of kids doing Image-Making at the same time. Next year maybe I'll try it table by table . . . Maybe students could sign up for one day in the week, because I do so many things. Paper was everywhere. Some kids went to the corner to get away. The whole management thing made me crazy. You saw how much time it took just to sit with one student. (6/96)

She was not satisfied with the process and felt she was responsible. I also was not satisfied and felt responsible. Her session was scheduled on a biweekly basis. A few of the weeks, which should have been for Image-Making, I used for art projects. Her students were preparing for a "Reading is Fundamental Poster Contest" in November and preparing for our annual art show in

December and January. We both started Image-Making with no expected outcomes. The first grade teacher remarked:

> This was a learning year for me in trying different approaches. Maybe students could sign up? Choose one day to do portfolios.

This teacher was struggling to find another way to make the process work. Why had Image-Making worked so well with Sarah and not with this group? I think one element reflected the brain-based principle of past experiences. These first graders were novice at the collage technique, creating collage pictures was new to them. Although, they seemed to like making the paper (as evidenced in comments and body language during sessions), they were not skilled in what to do with the paper. In Phase Two, three of Sarah's students were doing Image-Making for their second time. Sarah's other two students were kindergartners and did experience trouble cutting shapes. However, another element is the ratio of teacher and students. Sarah's group had only five students and three adults (two teachers and an aide.) The first grade class had twenty-one students and two teachers. A few times there were more adults in the first grade class including an aide, a parent, and one or two college students. However, each student had at least twelve sheets of textured papers in their portfolios. The multiplication of numbers of papers scattered about the classroom, times the number of students in the first grade class, was overwhelming. Personally, I cannot work where there is clutter, and this first grade teacher noticed the same concern with some of her students: "Some kids went to the corner to get away". Image-Making with Sarah's small group did not make working with the portfolio papers "crazy." Although, I did have to step over and around many layers of paper when in her classroom during sessions.

As stated by this first grade teacher, "The whole management thing made me crazy," was also experienced by me during the paper making sessions. Although there were two teachers, one parent, and two college students, the four work stations became a learning environment of confusion. First, only a few students could make paper at each station at one time, while the remainder of students displayed expressionistic movement in body and voice. Students were excited about the process. The second area of confusion resulted from the copious amounts of wet work and finding space to allow them to dry. I simplified the second paper making session by establishing only two work stations and assigning students an activity while they waited for their turn at the paper-making tables.

Another element effecting our disappointment reflected an issue raised in the literature review in relation to overcrowding the curriculum. These grade one students read, wrote, drew illustrations, and shared their work in their classroom every day. Image-Making was added to their multifaceted writing program and was not integrated into it. Sarah integrated Image-Making into her writing program as a focus. The first grade teacher was struggling to find a solution to improve the process:

> What if we tried a slow introduction? Not the whole class, but three or four students at a time before starting another group. What would be the best way if we continue?
>
> [R]: Do we want to continue? Does this piece fit into your class? Can we rethink what we can do together?
>
> I want my kids to read. It's important to me.
>
> [R]: We could set up a class box of paper, not individual portfolios. That might work. Or next year, try a theme immersion approach?

We spent more than one hour discussing our disappointment with the process and how we could modify our approach. Her "Internal Locus of Evaluation" and our "Active Processing" helped to develop team companionship and personal growth. The first grade teacher remarked:

> So when we reflect on it, it's O. K. So, it was a learning experience for us as well. Where do we go from here?. . . Everything that we learn just adds to who we are. I just know that [our school] will change for the better. My strength is language and reading. My strength is not art or music.

This program and our companionship and feedback would bring a visual component to her classroom. We just needed more time to develop our unique style. When I left her room after our discussion, she thanked me for making her stretch her teaching style.

One additional element which may effect the growth of a program is reflected in brain-based learning principles. Sarah commented: I had inner drive based on experience." (6/96) Past experiences led Sarah to want to try this approach. Sarah also mentioned a colleague in a different school tried the approach and was not successful with the management of the process either. Inner drive along with experience helped to make this learning experience more enjoyable for Sarah.

Learning Environment

Another effect of the teachers' role on the learning environment concerns the learning environment itself. Three factors emerged during analysis of the teachers' role: the flexibility of having two teachers accessing more than one learning environment during sessions, the location of the environment itself, and shared activity time.

The first factor, flexibility of more than one learning environment, emerged several times throughout the program. For example, when the second grade was working on their memory tiles, my time with the group ended and I needed to get to another class. The second grade class could remain in the learning environment (the clay studio) to finish and clean up. When Sarah's group made their paper for Image-Making, again, my schedule required me to be in another location, but Sarah's group could stay in the art room and finish.

Flexibility in environments also meant that collaborating teachers could work with smaller groups of students. For example, with Jackie's class, throughout the program I took small groups to the library or to the art room, and Jackie worked with a group in her classroom. During Phase Three, Jackie took a group to the library to conduct research, and I stayed in the art room to work with students. Jackie reflected on the flexibility of two environments:

> The day you took those kids to do the diorama. I looked around my classroom and I had ten kids in my classroom. It was beautiful. I got to work one on one with more kids. That was really nice. It was a peaceful time. I usually feel like I have to get to so and so. I feel like I'm torn in so many directions. On that particular day, even the kids noticed it was calm and mellow. Everybody got what they needed. Kids were more focused and directed because I had more time to move around and more time to deal with each person. (7/96)

Collaborating teachers and students were working on the same curriculum projects, but the details of their projects dictated which environment would be more suitable for production. The learning environment was effected by the smaller ratio of teachers to students. This effect was also cited in the literature and by Jackie, as a benefit of the interdisciplinary learning approach.

The second learning environment factor effecting the collaborating teachers' role surfaced at the end of Phase Three. The location for sessions varied during Phase Two between the art room the collaborating teachers'

classrooms, the library, and outside on and off school grounds. During Phase Three, only the art room was used during program sessions. It was during the students' project presentations in the art room that Jackie and I noticed the presentations did not reflect academic content. For example, a student named Reanna, chose a diorama (arts) and Reading Club (classroom curriculum). Jackie commented on Reanna's presentation:

> They were reading as a reading group or club book. There is a lot, a lot of academic value to that book. As a matter of fact that is a very difficult book to read. They read it without problem. They understood it. There was an appreciation of the novel, I didn't see that in her project. What did she tell you about *Jacob Have I Loved*? Nothing. There's so much there, but she didn't use that. They just wanted to show their art project. (7/96)

Jackie and I noticed during project presentations that students treated the student directed approach as an art project and not as a classroom project. Jackie noticed the students talked to me and expressed art knowledge. Does the environment in which the lesson takes place make a difference? Does the teacher who presents the project affect student's end product? Jackie continued to discuss her observation:

> I feel like some had it right there and I even asked: 'Did you want to share the _____?' I thought it was really interesting because they weren't presenting a complete project. They were presenting one aspect of it, probably their favorite part of it. You know, they love that clay. But that's what they wanted to talk about. That's all they wanted to talk about. They didn't want to talk about..(pause)..except [Teddy]. He did the best job presenting the content along with the art, but at least he made an attempt to make it [the presentation] art and content. I wouldn't have had a problem with [Max's] presentation if some kind of academic went with it. I didn't see any kind. What I saw was that he made, out of clay, a guitar. He told what he already

> knew. He was letting us know. I knew he knew it. Showing us a beautiful clay project that he obviously spent time on. But that's where time and effort, just that clay project and not anything else. So he got two art periods as opposed to an integrated art. That fine, but how much classroom time can I give to two art periods?
>
> [R]: So the question becomes, how can we draw the content into the presentation?
>
> Yes. Exactly.

When students are in the art room, their emphasis seemed to be on the art project. This was substantiated by two students comments in the PostQ when they mentioned the worst part of Integrated Art was when they had to write. Over my years of experience, when I ask students to respond in writing to an art appreciation lesson, I am usually met with groans and questions such as, "When are we going to do art?" Karen Ernst's (1994) research provided strategies for integrating the writing process in art room, yet I am still met with resistance in my art room when I try to employ her method. In Phase One, when I brought art prints into the classroom environment for writing, no one asked "When are we going to do art?" In their classroom environment, students expected to do writing, even though, I was presenting the creative writing assignment. Also throughout my years of experience, I have often noticed that the quality of artwork on display in classrooms does not reflect the same quality students seem to put into projects in the art room. Is this a phenomenon? Is it the environment, or the teacher who presents the project, or both? As this phenomenon was noticed at the end of this study, more research would be needed to investigate these questions further.

The third learning environment factor which seemed to have an effect is a shared activity time and I call it a "simultaneous moment." A simultaneous moment is when both collaborating teachers and students share ideas when presenting and working on integrated activities. A traditional method of

classroom teachers and art specialists working on an interdisciplinary projects sometimes result in an amount of time passing before students make connections. It may be hours; it may be days. For example, a classroom teacher would cover topics in their classroom and varying amounts of time would pass before students could respond with the specialist, even if it was lining up and walking the corridor to the specialist's room. This example happened in Phase One when the kindergarten teacher asked me to coordinate a project with her unit on Japan. We approached the same topic at different times in different learning environments. This program brought teams together to share the same topic at the same time in the same location. The result was everybody being an integral part of the classroom group interaction. Not only did I hear what was being said by the teacher, but also what was being said by the students and I could contribute to the discussion. Our perceptions of the topic happened simultaneously as a group. In the different location method, that understanding is only imagined or told second hand by the classroom teacher or students.

Student Factors

The focus of this section is to provide some insight into this study's third focus question: What factors affect students' choices when deciding topics and interdisciplinary connections for projects? Interdisciplinary connections made by student participants were analyzed through questionnaires (PreQ and PostQ, Project Plans, Mind Maps, process papers and projects). The data showed patterns of brain-based elements and principles including: connections to past experiences, emotions, novelty, movement, downshifting, challenge, color, and choice. Surprises in this study included the unintentional brain-based learning principles evidenced through analysis. Those elements included: use of color patterns in mind maps, the brain's attraction to color during two

program sessions, and individual expressionistic styles of movement (as described in Chapter V, p.216-218). Although these elements are interesting to me, their discussion does not answer the third focus question. However, their presence provides an opportunity for further research.

In this section, students' interdisciplinary choices are described first. Then the factors, which emerged as affecting student choices, are described. Those factors included prior experiences, emotional connection, motor involvement, and comfort level. The last part in this section describes which approach: teacher directed, teacher-student directed, or student directed, students favored and why.

Interdisciplinary Connections

Students' Project Plans and projects provided concrete answers indicating what students chose for their interdisciplinary connections: the topic, the curriculum area, and the arts method. As each student is unique, so too were their connections. During analysis, I compared and contrasted student's choices using multiple sources (Mind Maps, PreQ, PostQ) to gain an understanding of their interest in their choices and connections.

Seventeen students chose topics related to school. The topics included: (1) math, (3) morning meeting, (2) reading clubs, (4) gym, (4) art, and (3) science. Seven students chose personal interests or hobbies topics including: guitar, turtles, monsters, skateboards, Puerto Rican flag, whales, and abominable snowman. Students' projects represented twenty-three 3-dimensional (3D) methods and one 2-dimensional (2D) method. The 2D project was a drawing of monsters. The 3D projects included: (4) dioramas, (6) wood sculptures, (1) origami, (4) games, and (13) clay sculptures. Some students utilized more than one medium in their project. For example, clay sculptures

were used in the dioramas, drawing became part of their game, and some topics were portrayed in both wood and clay.

Prior Experience

The most prominent factor affecting student choices was a connection to past experiences. Half of the students cited direct connections to previous school projects: "I got both [ideas] from school because we were doing fractions and just finished origami"... "I chose a diorama because I did one for state projects and I love Reading Clubs"... "Book I read." Students created wood sculptures last year as part of the third grade art program. Only two students attempted new experiences, one wanted to learn about whales and the other wanted to try a mosaic.

The student who created a mosaic demonstrated the brain-based element of novelty when he heard me use the word during brainstorming ideas for arts projects. This word, new to these grade four students, raised this boys' curiosity and he immediately asked what a mosaic was. To answer his question, I made a connection to a large mural-size mosaic on display in the library. He responded that he was going to do that even though he had no experience with its technique. He had, however, worked with clay before.

Emotional Connection

Another factor affecting students' choices reflected an emotional connection. Of course this is an obvious factor, why would someone choose a project if they didn't like it? What this factor does help to illustrate is a brain-based learning element. When participants responded to the question on the PostQ: "Why did you choose that topic and why did you choose that arts method?", the majority of students reflected attitudes towards liking or loving

their choices. Their responses included: "Because it was much fun from what we did"...."It's cool"...."I love turtles"...."Because I think Morning Meeting is fun".... "I chose this topic because the thing in the library was cool".... "I like gym".... "I like guitar and I play one." Only three students used logic or reasoning: "Just by thinking", "because we should decide the topic first", "I got my idea for being quriest [curious]." Two students made choices based on peripheral influences: one was the mosaic and the other student stated: "I got my idea by looking around the room." Most students had made choices emotionally and not rationally. Five students did not answer the question. This raised a limitation of questionnaires (not being able to question respondents further), but also raised an issue about students needing more experience in being reflective. Did students complete their Project Plans too quickly making emotional choices as opposed to more rational, informed choices? Choices may not have been processed using their neocortex abilities. In other words, choices were uninformed. As Jackie and I ruminated about the program, we decided that reflection should become more integral in future sessions. Would this assist students in making more informed choices in the future?

Another limitation of the questionnaire arose when students responded with short answers: "because I love turtles." What do you love about turtles? How did you come to love turtles? Jackie and I noticed that students need opportunities to "stretch" their thinking. Short sentences with emotional words (like, love) are not as meaningful as reflected thoughts. Jackie and I employed our "Internal Locus of Evaluation" and "Active Processing" to modify the student directed approach for the following school year. We agreed that we would establish a criteria list for students to use to work on their projects and allow time for students to prepare for their presentations. We also decided to keep their process papers in envelopes to eliminate pieces falling out. Jackie would set up an area in her classroom so that students would have a place to

keep their projects. We also decided that the student directed approach would take place in her learning environment and we would share the lead role when presenting the approach.

Motor Involvement

Motor involvement became a dominant factor affecting student choices when students chose manipulative materials in three dimensions to express their connections, as only one student chose to draw a picture. A student commented: "I could picture a diorama in my head and knew it would express my idea." Another student's comment, "because I thought it would be fun if I finished it and the class could play it," reflected another aspect of motor involvement, being able to use the project when she finished.

When I compared student topic choices to favorite subjects (as illustrated on mind maps), I noticed that the top five favorite subjects included gym (#1), art (#2), reading club (#3), math (#4), and recess (#5). The favorite subjects cited on the PreQ revealed similar topics: Math (#1), art (#2), reading (#3), gym (#4), and science (#5). Jackie's students described these subject on their mind maps:

Math: Cool, fun activities, math games

Gym : cool, fun, I love gym, fun you learn things
kickball, soccer, basketball, running, friends on teams

Science : creations, reasoning, experiments, terrariums
bats, States of Matters, (no attitudes cited)

Reading : cool, relaxing, fun, Reading Clubs, read aloud
able to read at your own pace, Writing Workshop

Art : having a good time, great, fun activities, cool, its rad - I like it,
pictures, sculpture, using different materials, mixing

Student descriptions of these subjects illustrated enjoyment and movement or manipulation of materials. I decided to investigate these subjects from a teacher's point of view.

One spring morning in 1996 during playground duty, I informally spoke with the gym teacher: "Students in all grade levels are always mentioning gym as one of their favorite subjects. Why do you think students love gym?" He responded that students love to play games. They like to be active. He also supposed that students like the sportsmanship of games. Displaying sportsmanship reflects choosing to participate and choosing to be a team player.

The school subject, recess, obviously reflects movement as well as choice, as many teachers do not impose activities during that free time. I could answer the question in art because activities in my art room always offer manipulation of topic, style, and/or media. Sometimes students have choice of all three elements, sometimes I may choose the medium and they choose the topic.

One example of this emerging pattern was noticed by me during a regular art class with a fifth grade class. This class was part of the Integrated Math sessions during Phase Two. In the spring of 1996, before this class came to art, I was speaking with the graduate-assistant librarian who was commenting about the unruly behavior of this class in the library. Given the reputation of this class (as discussed by other specialists in this setting), I was concerned with group behavior and the assignment I had planned (a community art project for the college - making life-size children as a display welcoming the new president of the college). Yet, I presented the lesson with same excitement and anticipation as I do all others. The students broke into groups and created their project. After clean up time and before their teacher arrived, I had to comment to students about their behavior - it was cooperative and productive! I wondered why these students, who had a negative

reputation, behaved in art. So I asked: "How come when you go to other specials, you cause trouble, yet, when you come to the art room, you don't?" Immediately, without hesitation, the most notorious trouble-maker (known by many for the past five years) exploded instantly: "Because we get to work with our hands!" His statement crystallized an important component of art activities. Students are active in the art process and enjoy manipulating media.

When one of Jackie's students described school he also alluded to movement:

> I describe school as a game but you learn stuff at it in a fun way. Like in math, we can play games with what we are studying and in art we get to do neat things like three dimesional boxes.

Jackie described manipulatives in these subjects:

> In math, I always start with a hands-on. I always work concrete to abstract. . .The science program is more hands-on than anything else I teach. They learn by doing. It's all experiments. It is all hands-on, experiments kinds of activities. . .I *love* science. I don't feel as though I have a lot of knowledge in the area, but I have fun with it. We do a lot. There are always experiments going on. At any time of day they can work in the science center. . .In reading, the groups choose the book they are going to work on. . . They share their knowledge with others through discussion and book projects. These projects are a way of advertising and also help to culminate earlier experiences. . .In writing, the kids choose the topics they are going to write about. . . .We examine other author's style and craft. My students use many genres of various authors to help create their own text. For example, poems, picture books, novels. Students also use illustrations to enhance published pieces or to spark ideas. Lastly, kids might read their text aloud, performing or re-enacting for a small group. This helps the piece come alive for the group. The author's peer can then ask questions or make comments. (7/96)

Analysis of motor involvement also uncovered a theme of choice. Recess, art, and classroom subjects in Jackie's room reflected students' choice in activities.

One motor involvement aspect which emerged during analysis, is what I call the "Clay Phenomenon." When half of the students chose clay as their art medium, it raised a question for me. What is it about clay that is so enjoyable? Is it because it is manipulative? One of the students in this study also had this same thought. On one of her process papers she indicated: "One thing I want to know about is why some people like clay so much even though I don't know why I like it." A factor which may have influenced students' choice of clay could be a peripheral influence. Did students chose clay because they were in the art room?

The clay phenomenon was not only noticed in this study, but also in my teaching art for eighteen years both to children and adults. I suspect it may have to do with clay projects not being flat the way words and drawings can be flat. The sculptural image can speak without sound. It speaks through the detail and shape of the visual image in three-dimensions. As an artist, I see the process involved to get to the product and can view a sculpture in content without hearing words. A classroom teacher, not trained in the arts, may not see the content, but wants to hear it or see it written. Obviously, having the skills to talk it out is important to develop, but for a visual learner, may not always be needed to see the content. This distinction of the visual learner was pointed out in the literature review by Janet Olsen: "Who understands more about a tree, the child who can draw it in great detail or the child who can speak about it in great detail?" (in Mammen, 1993, 4)

Comfort Level

Another factor to emerge during analysis which may affect students' choices reflected comfort level - making easy connections compared to

challenging ones. Did students chose topics that were familiar to them and not use the experience as a challenge? Although I designed the first four sessions of Phase Three to help students make informed choices, some students made choices that were uninformed. For example, as soon as students completed their Project Plan, they wanted to begin without giving much thought to content knowledge. Julie chose the topic, turtle, and arts method, clay. She then asked for clay when I questioned: "What type of turtle?" She was relying on her generic version of a turtle, instead of looking at the student directed approach as an opportunity to investigate scientific facts on her topic.

The teachers encouraged students to think about their idea first through mind maps, research books, and/or writing to answer the questions: "What you know and what you would like to find out?" The students' process papers revealed that 23% utilized visual methods (drawing and mind maps), 27% were written (lists and paragraphs), 5% used both visual and written, 13% utilized research before writing topic content in paragraphs, and 32% did not utilize any process papers at all. The split between types of process papers helps to support interdisciplinary learning reflecting the multiple modes of communication (visual and verbal learners). But it also showed that one third of the students just created projects without thinking about them. Two thoughts arose for me. One, I wondered whether process papers, over time, would show a pattern as to which method students prefer to use? When students indicated on the "Brain Stuff" survey, their thoughts about the mind maps, the class was divided as well. Are the mind maps preferred by dominant visual learners and the verbal learners could do without the method? Further research is needed to answer this question. The other thought was raised when I read Karen Ernst's (1994) study, "Picturing Learning". She encouraged students to think about their projects before they began, while they were in the process of creating ideas, and when they were finished. Would the Ernst method assist students in making more challenging choices?

Another concern arose for me, should the Subject List contain personal interests, art, gym, morning meeting, etc. or should the list only contain math, science, social studies, and reading? During an interview, Jackie concurred: "That's what I have been debating myself." (7/96) Jackie explained her perspective:

> See part of me..(pause)..with [Max], he spends so much of his free time, so much, obviously, so much of his free time, researching guitars, looking at guitars, playing guitars, do this with guitars. Part of me thought, geez, should he be doing that? I don't know. It's an interest to him.
>
> [R]: He chose something easy for him, something he is comfortable with.
>
> Yes!. . .I saw the arts, the movement, music, drawing, I saw all of those things as a way of learning about and presenting, for a lack of a better word, the academics - the reading, the writing, the math. So I don't see it as you chose art and you don't choose math. To integrate it you have to do both. Some of those kids didn't do that. Where was [Max's] science, math, reading, writing? I don't know, where was any of that?. . .That's where I have a hard time. That's where I have a hard time. I could be way off. When they spend that kind of time, that kind of energy on their hobbies, I see that as something they also do, because they choose to, outside of school. So I almost see as if they are not giving, like [Max], he would always choose guitars and skateboards.

From my point of view, if students choose topics of interest, they might become more vested in the learning process. Jackie responded: "You're right, but how does that integrate into what I do?" That created a dilemma.

In the opinion of this researcher, the following supports the view that topics should remain open to all student's personal interests. Max was one of the students, who at the beginning of this program, shared openly with the

class: "I don't like anything about school." Yet, he was also the first one to complete his interdisciplinary art project, a Jay-Stang guitar with a speaker. The sculpture did not concern Jackie, it was the lack of finding new knowledge and connecting that knowledge to a curriculum subject in her classroom. After the program presentations when I went through students' folders, I found Max's process papers, which included a detailed mind map of different types of guitars. He did not share these papers during his project presentation. From my perspective, I learned from Max. From Jackie's perspective, this was known information. As part of our "Internal Locus of Evaluation" and "Active Processing", we resolved this dilemma. Jackie suggested a modification to our approach:

> They can do their hobby, but why can't they present topic through Writing Workshop? Writing Workshop is the school topic they choose. If you like guitars, I want you to write about it. But I want you to write about guitars, not tell me what you already know.
>
> [R] : You have to find something new. What did you learn? What's new?
>
> Right. That's what I'm interested in. I guess I really don't have a problem with their looking at hobbies and that kind of stuff, but how can we bring hobbies back into the classroom?. . .I would like to see, the math, the science. I would like to see themselves challenged in all academic areas. I have no problem with hobbies but I want to see challenging things too. I want to see them, ya it's O.K. for them to be frustrated, it's O.K. for them to have to work.
> (7/96)

This was our first attempt at a student directed approach and we had decided to open choices to all areas where students may have had interests whether at school or at home.

Jackie and I decided that more preplanning needed to be conducted by students before beginning projects. We decided that we wanted students to make more informed choices. We began discussing and organizing ideas for the next school year. Jackie commented:

> Students should make several choices and after a while, 'Ahh, this one hits me the most'. It may get them thinking more about it. Like [Lisa and Reanna's] skit. They spent time thinking about the 3D movement. They thought about how to sing it, how to play it, act it.

Students in Phase Three did not have an opportunity to think it out. They were asked to complete their project plans using the subject list and the arts map as a guide during one session. For their presentations, students had no time to prepare. The end of the year cramped time to finish projects, although, students were given time in Jackie's room before project presentations. During our last session Jackie spoke to her class:

> Why when I went through your folders and created two piles the other day, I asked, 'So and So, are you finished?' Maybe five of you said no. Everyone else said finished. When we sat down and you presented your projects, one after another, I heard you say: ' I didn't have time.' I was confused when you sat down and said that. I was disappointed. I spent time, folder after folder asking you and only five were in the 'No' pile. (6/96)

In July 1996, when I met with Jackie, she elaborated on her disappointment:

> I was very disappointed with what they presented. Partially because I thought it was a wonderful way for them to do what they wanted to do. You opened so many doors for them and I felt like they slammed them back in your face. I felt like they didn't work. They were waiting for you to carry them around. They were lazy. They really were lazy. (7/96)

The last few weeks of school may have influenced the effort students used to complete their projects and their interest may have been lacking with summer thoughts only a few days away.

Although some students may have made uninformed choices, and projects were not completed to the teachers' satisfaction, and some students did not show academic knowledge during presentations, students were challenged by their projects. Most students experienced difficulties with the media they were working with. During the presentations when students were asked what didn't work they responded:

> What did not work was sometime I did not wrap the figures tight enough so the clay dried up. And I still had to add on so I really had to score and slip.

> They are just people and I was trying to make out of cardboard and it didn't work. I tried to make a table.. (pause)..hard to make a table. I tried cardboard. I tried clay, but it didn't work. What didn't work, the clay dried out. It was a little hard. But I think the clay was worth it because it was easier to make the people.

> Hard to draw these (pointing to figure drawings). The girls were easy. I had this checklist to be sure everyone was done. I'm finished all except for [Max.] First I tried to make and put them on the stands I had and it didn't work. Then she [the art teacher] showed me how to put these...(placing a figure on a stand)...Look she's standing! (laughs). To know which stand belongs to which person, I put their name on it (smiling).

> I tried to take square wood pieces for the sides, but it wouldn't stay. It would go over this part (pointing to the body of his wood sculpture). I figured out a way to put these pieces so it was flat towards the end. (6/96)

Every student who worked with clay experienced technical difficulties, except for the two students who completed their project in one session. As noted in students' comments during their project presentation, some solved their difficulties on their own or with suggestions from teachers. Although some topic choices may have seemed easy, I believe these students were challenged with problem solving. The students who worked with clay now have a better understanding of the knowledge needed to keep a work in progress over several sessions. I feel as though these students' experience with clay was memorable in context, and they will not forget it. Typically in past art classes, all clay projects are completed in one session so the media's technical difficulties were unknown to these students. This opportunity challenged students and illustrated another brain-based principle.

Student's Favored Approach

The question, which interdisciplinary approach do students favor and why, could be answered after Phase Three. The first question on the PostQ gave the concrete answer and the results are presented in Figure 5. Students' Favored Approach. In this study, student participants were divided between the student directed and the teacher-student directed as their favored interdisciplinary learning approach.

The most significant factor for liking the student directed approach was "choosing projects." All students indicated choice as a reason for selecting the student directed approach (as indicated on the "Brain Stuff" survey). Students described choosing projects: "Love it 'cause I got to pick what I want to do, not the teacher."..."We got to choose our own proj. That's cool"..."It was better"...."Totally fun"...."I loved it". Only three students did not like choosing projects. "I disliked it because there were too many choices"...."It's very hard to

1 - chose Teacher Directed:

I liked the teacher choice because it's easy.

9 - chose Teacher-Student Directed:

Bat performances because we got to show people about what we learned.

Bat performances were the best because some of us got to work with our friends.

I like bats performance the best because it was you get a topic and its your choice.

11 - chose Student Directed:

Student choice because you got to choose your own project.

Your choice because we choices were good.

Because I get to do what I want to do.

Student project because we picked it ourselves.

* Three students did not respond to this question

Figure 5. Students' Favored Approach

choose projests"...."I did not like it." Two thirds of the students were satisfied with their choices and approximately one third would change their choices next time. However, students being satisfied and teachers being satisfied with the projects present different views. The few students who did not like the approach demonstrated Tomlinson's (1995) Differentiated Approach that some students are not ready for independent learning and the approach takes time and experience to develop.

In the teacher-student directed approach, two students mentioned choice as a reason and five others liked the bat topic and performances. During the bat unit, students chose projects and worked in groups demonstrating bat information through a performance (as described earlier). Two students mentioned group involvement in the Bat Unit for choosing this approach.

One year after the completion of Phase Three, I chose to interview nine students from Jackie's class. I chose these students by criteria including my observation of their participation during sessions and the effort put into their interdisciplinary projects. Most memorable one year after this program to five students when I asked: "What do you remember about Integrated Art?", were the bat performances. The other four students remembered: "picking projects"...."I remember we had choices"...."It was fun - I made a guitar"... "I made a sculpture of a whale" (5/97). When I asked which approach they favored, one cited the teacher directed approach, one indicated a student directed approach, and the remaining seven students mentioned the teacher-student directed approach, the Bat Unit. Here are a few of their comments:

> We showed what we knew.
>
> My performance was O.K. It was flawed?
> [R]: Flawed? How?
> Well I knew my part, I wrote the rap. But the other boys didn't learn their parts.
>
> We both chose. We got to work together, put ideas together.

The bat performances provided students with an opportunity to use their knowledge and the experience made it memorable in context. Their parents were invited to the performance. Is that a factor? Jacobs (1989) suggested to involve parents to help them understand the interdisciplinary approach. I

wonder whether motor involvement in performing is the factor or the presence of parental support, or students having the opportunity to share their "new found" information? Further research would be needed to answer these questions.

The next section, Chapter V Conclusions and Recommendations, provides conclusions I have drawn from data analysis and recommendations for further research.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The purpose of this research study was to examine and describe the development of an interdisciplinary program in an elementary school setting to foster a deeper understanding of this learning approach. My interest as a researcher was to examine the approach from the collaborating teachers' and students' points of view and to uncover the contributions and limitations of the approach. When the program began in March 1995, I sought no direct outcomes in my dual role as an art teacher-researcher. I allowed the program to develop naturally from the interests, beliefs, and concerns of participants. Only when I began to question who should choose the curriculum topics and related arts projects, did I facilitate a student-directed approach. As a researcher, I observed the complex phenomenon of the interdisciplinary approach in various contexts over a fourteen month period and gathered data from multiple sources to corroborate findings. This study supported principles and theories of brain-based learning and learning through the arts. This study also demonstrated a teaching strategy and is a story that other colleagues may relate to because this picture of learning was drawn from a real-life learning context.

Three questions in this study provided a narrowing focus. In this chapter each question is presented and followed by the conclusions I have drawn from data analysis. In the last section, I have made recommendations for further research.

One conclusion I have drawn from the first focus question: How did the interdisciplinary program develop over a fourteen month period? What were the various styles of implementing interdisciplinary learning that developed in

this setting?, is that every interdisciplinary program develops uniquely. As stated earlier by Graillert (1991), "Each classroom is unique in how its environment is established and how curriculum is delivered" (p.261). In this study, I was an integral member of eighteen interdisciplinary teams. The teams' integrated experiences led to seven different styles of implementation which developed from the interests and needs of classroom teachers. Although seven styles developed, a style implemented by one team developed differently from another team as demonstrated by the Image-Making teams. Therefore, I conclude that the combination of collaborating teachers in an interdisciplinary team develops a unique approach to this style of learning depending on the interests, expertise, and collaboration of its members.

This conclusion, grounded in the theories and principles of brain-based learning, emphasizes that every person is unique in their own way because of past experiences. When teachers and students collaborate as a team, they bring their prior learning experiences and expertise to the learning environment. Although there are many models available that integrate curriculum subjects and learning: (Fogarty,1991; Fogarty and Stoehr, 1995; Kovalik, in Ross and Olsen, 1995; Olshansky, 1994; Tomlinson, 1995; Hopfenberg and Levin, et al., 1993; Walmsley, 1994; Reggio Emelia Approach in Forman, et al. 1993; Manning and Manning, 1994; Krogh, 1990; Lazear, 1994; and Cordeiro, 1992), collaborating teachers must adapt models to fit their particular needs. Some suggestions and ideas from such programs may be beneficial and others may be irrelevant or nonapplicable. While the skills of inventing or adapting programs are comfortable to me as an art teacher because our curriculum subject does not rely heavily on prepackaged models, classroom teachers may find discomfort because they are used to school departments assigning curriculum books from which to plan activities.

A second example of uniqueness is further defined by the development of each collaborating team within a program. Strategies collaborating

teachers use, which may work for one group during the school year, may not prove to be as beneficial the following year with new student members. For example, Jackie and I continued the student directed approach in the fall of 1996 following the conclusion of this study's Phase Three. We discovered that we needed to employ different strategies to motivate and monitor students' projects. The new group of students seemed to need more teacher direction, especially when making decisions for individual contracts and staying on task to complete their projects. We also found the responsibility of managing twenty-two students who were developing detailed individual contracts cumbersome, as cited in the literature (Tomlinson, 1995; Glasgow, 1997). Two teachers could not consult with the many students who needed our attention at the same time. After the first attempt at a student directed approach with this group, we decided to return to a teacher directed approach. I conclude that interdisciplinary teams should constantly assess the needs and interests of its members and make adjustments to their program, thus practicing Rogers' and Freiberg's (1994) "Internal Locus Of Evaluation" and Caine and Caine's (1997) "Active Processing."

A common concern cited in the literature when developing interdisciplinary programs is related to time: time to plan and time to schedule sessions. This concern was corroborated by staff in this setting: "I am all for it but it is another learning experience that one has to find the time to work on."(10/95) The biweekly schedule of Phase One was not agreeable to teachers (loss of planning time) and students (loss of weekly art classes and the art room). During Phase Two, when the weekly art schedule and the art room were reinstated, teachers still cited planning as a significant factor for not participating in the program. However, one unique feature of this program brought planning into the learning environment when team members experienced a teacher-student directed approach. The advantage of this approach was involving students in the decision process for their learning

activities. Jackie and I did not plan big units of study that required hours of planning. As Jacobs (1989) reported in her book, one interdisciplinary unit took teachers over 164 hours of planning. I wonder how much of that unit included the interests of students? In this program, my visual perspective enhanced Jackie's everyday curriculum.

Another unique feature to this study was that the researcher did not leave when the study was completed. Research findings were put immediately into practice and the development of the interdisciplinary program in this setting continues to mature. The attack on my art room by the administration on March 2, 1995 provided a catalyst for change. Some teachers in this school were willing to try a collaborative approach implementing an interdisciplinary approach to learning. Two and a half years after the beginning of this program, a third grade teacher has expressed interest in joining the approach: "We are being told to base our teaching on the Ginn Reading Series. I would like to try working with the interdisciplinary approach in the art room." I believe this teacher is seeking a more creative way to implement the school department's top down approach to learning, in addition to, gaining familiarity of the program through colleagues' conversations. One of the concerns hindering development of an interdisciplinary program, as cited in Brooks' (1991) research was a top-down, non-volunteer program. In the setting of this study, teachers initiated the program and worked at its development. The result was a volunteer, bottom-up approach to development. Participants had a vested interest in developing this program.

In my opinion, as education reform takes its place in the 1990's, creative opportunities need to be developed, implemented, and revised repeatedly in learning environments. I conclude that each developing program is a unique adventure, a journey that never ends. This process is as unique as weaving a web, growing and creating patterns over time. Each team can uniquely travel the road at their pace in their own direction.

The second focus question: What is the effect of the collaborating teachers' role on the learning environment in an interdisciplinary approach?, has led me to the conclusion that program development is a growing experience both intrapersonally and interpersonally. When designing and developing programs, as Brandt (1991) stated, collaborating teachers should start small and slowly build not trying to incorporate everything all at once (p.24). Program development is always in a state of flux and dynamical, as described by Caine and Caine (1997). Interpersonal skill is a key element in development of a program and represented by support. Without support from the administration and faculty, development of this program would not have been possible. When the faculty applauded my presentations at faculty meetings, and nonparticipating teachers returned surveys, and teachers volunteered to participate in the program, I knew support existed in this setting to develop a program.

Intrapersonal skill is another key element of the teachers' role effecting the learning environment reflected in the flexibility and adaptability of the art specialist and the classroom teachers in their collaborative roles. The teachers in this setting experienced leader, assistant, co-leader, and facilitator roles. Teachers seemed willing to move freely between the types, although at times, they reported, the roles felt uncomfortable. Team members gave immediate feedback and were agreeable to modify and change their approach. These experiences developed companionship as demonstrated in these teachers' comments: "I like having someone else to work with." "I like having a peer to 'bounce' ideas off of and to develop more fully." "I am open to new ideas." Without honest rapport, development of this program would not have been possible. At the end of Phase Three, Jackie sent me a thank you card which said:

> "Thankful" just isn't the word for how I feel about all you've done for me. . . "Lucky to have you for a friend" is more like it.

In the card she thanked me for "the guidance, collegiality, and friendship. . .I have truly enjoyed our time together and look forward to next year's program." Our companionship flourishes as we continue to develop our approach to this type of learning.

The effect of our collaboration evidenced in maturing comfort levels as teachers and students experienced humor, support, and open, honest discussions. Participants were risk-takers learning new techniques and information. We displayed a willingness to give and we shared resources. We experienced challenge, lifelong learning, and viewed topics from different perspectives. We experienced personal growth as well as collaborative growth. The developing collaborative relationship among teachers not only influenced the scope of activities available for students, but also it influenced personal teaching strategies and style. Collaborating teachers who developed an interdisciplinary program in this setting were, as described by Caine and Caine (1997), self organizing around a set of beliefs.

Teacher collaboration in this study was also beneficial for students, as they witnessed teachers engaged in the learning process. This program highlighted lifelong learning and modeled it for students. As one teacher commented: "I feel I'm creative, however, two creative minds are better than one." Collaborating teachers viewed students' work from different perspectives. Team effort helps to draw out all the important components in students' products.

Education at the end of this millennium is strongly being effected by many outside factors. Jackie commented:

> The more I think about things and the more we progress in education, the more work that falls on us as classroom teachers, unless we are going to utilize the services that are there. To work in isolation just makes your job so much bigger.

> There is so much more to do. To work as a team, then you share the workload and it's an easier job. I think as we progress in education, we are going to have to work more as a team, because I can't see the classroom teacher doing everything. It would be impossible. (2/97)

This concern was also cited by another teacher in this setting:

> When can we all start to communicate to build a better tomorrow? (6/95)

These teachers' comments help to validate Jacobs' (1989) belief that interdisciplinary programs are important because of the growing body of knowledge. She claimed that educators need to rethink ways we select areas of study because school curriculums are already bursting (p.4). Today the vast information available at the touch of fingertips makes teaching content complex. With technology, connections can be made faster than the speed of light on a global basis (Caine and Caine, 1997). Collaboration may help teachers to share the complexity of choosing relevant curriculum topics and to view the learning process from multiple perspectives.

Another conclusion from the second focus question is that the learning environment, either the art room or the classroom, may effect student's projects. In this study, after Phase One, collaborating teachers had their own learning environments, which provided flexibility of time and location. Teams started projects in one environment, and although my art schedule required me to leave, the class could remain in the environment to continue working uninterrupted. Multiple environments also provided flexibility for teachers and students to access different locations for the benefit of facilitating activities. For example, in this study a teacher could remain in one environment while the other teacher could take a group elsewhere (library, art room, clay studio, or elsewhere in the building). This lower teacher to student ratio may also effect

students' projects. Access to different environments is supported by brain-based learning in peripheral influences and use of a wide range of resources.

One issue, which emerged during analysis in this study, presented the possible influence of the learning environment itself effecting student projects. This study seemed to show that the grade four students in the student directed approach viewed their projects as an art assignment. This observation raised a question for Jackie and me: Should the student directed approach be conducted in the art room or the classroom? After this study, in the fall of 1996, Jackie and I changed environments using her classroom instead of the art room. The resulting choices made by students (demonstrated by their projects) reflected a classroom influence, especially from past experiences in their third grade classroom. In February 1997, Jackie and I reflected on this group's attempt at the student directed approach:

> I do think it has something to do with the room. I really do. That's why I was so adamant about let's put it [the program] into my room. Now that I see the product, I think it really needs to be split more. . .Why not switch around?
>
> [R]: This year in your classroom, many of your students made triaramas. They did not look like the type of art projects that I would teach. They were very flat looking.
>
> But that came from experience. That's what they learned last year in the third grade God and Goddess Unit. It meant a lot to them so they remembered it.

Another effect and in my opinion, a benefit which arose in this setting, involved the collaboration of teachers and students within one learning environment resulting in a "simultaneous moment." Team members were in the same location and experienced the activity at the same time. Some

interdisciplinary programs experience common topics and related activities at separate times in separate locations. In this setting, projects were experienced together as a team. We had opportunities to share our "new found information."

My integral role in all teams effected the classroom learning environments in this setting in two ways. First, my role brought a visual perspective into the classroom learning environment. Some staff members in this setting admitted in the surveys that in their classrooms, there was more emphasis towards verbal activities. One teacher commented: "Sadly, I place more on the verbal. I'd like to and keep trying to become more visual." A multiple intelligence inventory of four teachers from Phase Two (See Appendices G, MI Inventory, p. 248) indicated that their visual/spatial intelligence was not primary, as is mine. My artistic involvement in this program brought a visual perspective into the classroom learning environment. Jackie found our collaboration to be beneficial to her teaching style. Not only did she learn new information, but also she reflected on her pedagogical style and made changes.

The second way my integral role effected the classroom learning environments emerged as I connected with different teams throughout the program's development. I was able to obtain a global view of the school's curriculum. I knew what grade levels were studying and what curriculum units were being studied. I could make connections across grade levels and share my resources. The following vignette, which happened the last week of school during Phase One illustrates my connection:

Researcher's Journal - 6/7/95

> Yesterday after school, I noticed an iridescent green insect in my garden. Its beautiful color caught my attention. I captured it and brought it to school. I knew [Donna's] grade five was studying insects. When

> I entered their classroom, students rushed over to see the specimen. [Jim] went to get the field guide. He identified it as a green leafhopper. He read aloud the description to the class. I asked if I could take the green leafhopper to a second grade class. They also were studying insects. When I got to their class, I shared my "new found knowledge." The class kept the bug to view closely and later returned it to the grade five. The insect was released outside at lunchtime.

I also shared artists' prints and posters of butterflies when this second grade class began their insect unit. The effect of my integral role, as cited as an important element in the Reggio Emelia School, is that the art specialist is trained in a field of study and is a person who can share expertise and resources with an entire school body (Forman, et al, 1993). As a consultant or resource, the art specialist can help develop creative potential not only with the students, but also with the teachers.

This program began to show potential for linking learning skills across disciplines. This element surfaced when I went into a classroom with art prints and asked students to write. Students flocked to the table to combine art appreciation with the writing process. The idea of helping students make connections across the curriculum is a main focus in education reform. As I continue to work with classroom teachers, I will be sharing with them creative ways to enhance their curriculum topics. I also will be working with students encouraging them to be more aware of the visual component in their lessons. Art can and should be an integral part of all curriculum topics. As evidenced when I walked into classrooms with supplies in hand and I received hugs, smiles, and cheerful hellos, or when students arrived to the art room with smiles on their faces and they eagerly asked: "What are we doing today?", or when student participants described "Integrated Art" favorably, I have concluded that kids love art. The more time educators integrate this enjoyable experience into the everyday curriculum, the more enjoyable school

experiences will be for students. Then, learning experiences, as grounded in brain-based learning, become more multidimensional, multisensory, and meaningful in context.

The conclusion I have drawn from the third focus question of this study: What factors affect students' choices when deciding topics and interdisciplinary connections for projects?, is that students should have a voice in the process of learning and learning experiences should involve movement and manipulation of materials. The data revealed that students favored situations in which they felt empowered by making choices. During the program's development, I began to wonder who should choose the topics, connections, and projects in an interdisciplinary approach, teachers or students? Data analysis in this study leaves that question unresolved. Jackie and I consciously moved from a teacher directed approach towards a student directed approach. Data revealed that only one student favored the teacher directed approach and the remaining students were split between a student directed approach and a teacher-student directed approach. Whether students were in full control of activities in the student directed approach or whether they chose a performance for demonstrating knowledge of a teacher chosen topic in the teacher-student directed approach, they indicated a preference to be included in the decision.

Another factor to affect students' choices related to past experiences. When ninety percent of the interdisciplinary connections in the student directed approach connected to past experiences, I wondered if students should always choose their own topics? How would a student know if he or she was interested in a subject unless an opportunity arose for exploration? However, determining what experiences interest all learners remains an educational dilemma. If educators rely on students leading their own path in a student directed approach, even though it may be of interest to them, some topics may never be explored. I wonder about the balance of achieving the best learning

experience by providing choice and giving direction. I conclude that students should be involved in the learning activity decisions, then opportunities for interests and choice can be incorporated into the learning process. The challenge to teachers is to provide opportunities for students to explore topics that they might not have an opportunity to explore.

In my opinion and in support of a teacher-student directed approach, I feel that a topic should be explored in multiple ways by a group. When Jackie's class investigated a unit of study, the topic was shared among many different perspectives, opposed to a student who investigated a topic on their own in the student directed approach. Jackie's group also performed their knowledge in multiple ways by choosing an arts method. The experience, when practicing their performance, or watching others perform, helped to reinforce their knowledge of the subject. For example, two students commented about the unit on the PostQ (6/96):

> I like making bats or draw bats. Bats can see in the dark. Bat help you by eating bugs.
>
> Bats are really cool. Once I youse to think that bats suck your blood but now I know that bats are not harmful to humans.

In the post program interviews, eight out of nine students remembered and favored the teacher-student approach utilized by Jackie and me in her bat unit. I conclude that the favored approach may be due to the group involvement by helping the experience to be more memorable in context, in addition to, the experience being manipulative and three dimensional.

As I reflect on the development of this interdisciplinary program, I have come to the conclusion that interdisciplinary teams, together as a community, learn by sharing interests. The continuum of who makes the decisions should

move freely between teacher directed and student directed approaches based on the interests and abilities of the group involved.

Recommendations for Further Research

In this setting, the temporary loss of an art room provided a catalyst for change and thus an interdisciplinary program involving the arts was begun. At the time of the change, I was able to employ my research abilities to document and analyze the program's development. My role as change agent instigated the establishment of an interdisciplinary program, but it was the unique combination of my involvement with classroom teachers that resulted in the variety of approaches. My role was to be flexible and offer my expertise based on teachers' needs and interests. As in the Reggio Emelia Approach, the "expert" visited classrooms on daily basis and became an integral member of the group helping students and teachers obtain, process, and express knowledge in multiple ways. I recommend research to focus on the mentoring relationships developed by the art teacher and classroom teachers. Possible research questions to be investigated may include: How are the arts experiences and skills applicable to other areas of learning? What effect do the integrated art experiences have on a classroom teacher's pedagogical decisions? How does the developing mentoring relationship effect decisions?

Another area I recommend for further research includes a follow-up study to explore the long term developing relationships of collaborating teachers. In this study I profiled one team even though eighteen teams participated in one or two phases of development. A comparison study could be conducted to contrast the degree of companionship developed among collaborating teams. Research questions may include: What factors influence teacher's decisions when choosing integrated projects? How do the

collaborating teachers' roles become established and how do they change over time? How do these factors compare between teams?

Another area, which requires more empirical research, includes interdisciplinary programs that combine the school's art specialist with classroom teachers. Many interdisciplinary research studies in the literature involved outside arts sources, such as artists from the community. Qualitative research which helps to understand the complexity of involvement and implementation among classroom teachers and the art teacher may help to resolve some apprehensions of schools to become involved with the approach. Possible research questions may include: How does the art teacher interact with each classroom teacher? Are there differences in the types of relationships developed between teams? What factors effect the art teacher's decisions when deciding integrated art projects? A comparison study could be conducted by viewing programs that utilize arts from outside sources with programs developed by art teachers.

One of the most intriguing aspect of student choices to radiate out of this study is what I called the "Clay Phenomenon." More research is needed to help answer one of the fourth grade students' question: "One thing I want to know about is why some people like clay so much even though I don't know why I like it." Further research into this phenomenon would help educators to understand why this medium is favored by so many students and adults. What are the properties of clay that participants enjoy? Do learning modalities influence the affective properties of clay? For example, are kinesthetic and visual learners more prone to using clay to express ideas than verbal learners?

Another area which captured my attention during analysis is what I call expressionist movement and modes of travel. When I created fieldnotes for the first videotaped session of Phase Three, I witnessed these areas of movement. The following vignette from my fieldnotes describes my observation:

Before Jackie's class arrived, I arranged the art room chairs into a horseshoe shape around the meeting area. On the display board was a large yellow mural-size paper and placed in front of it was a box of colorful markers. In the center of the mural, I drew a brain. After students saw and commented about the Jello brain, I gave them several post-it note papers and asked them to write down any facts they knew about the brain. The group then began to share their facts and place their post-its onto the mural creating our first Brain Map. Students grouped similar facts and drew shapes around each cluster. As students offered ideas, they walked to the map to add their fact.

Manuel was sitting in the back of the horseshoe at a table. When he offered his fact, he looked to his left, and then to the right and saw no obvious openings to walk to the map. On the left of the group, there was a row of tables. He crawled under the tables and around the chairs to reach the map. He crawled back to his seat the same way. Joey saw Manuel do this, so he tried the mode of travel as well and placed his fact on the map. Manuel offered another fact and used his same mode of travel. When Joey added another fact, he did not repeat this route. He chose to walk up the center of the horseshoe. By the end of the session, Manuel had used his mode of travel six times.

Manuel's mode of travel from one area to another caught my attention. This was not an unsafe mode of travel, such as running in the classroom. Manuel solved his problem (how to get his fact on the map) in a kinesthetic way. He seemed to enjoy the up and down, around and about, way to get from one place to another. Joey tried it, but did not find it suitable and instead returned to a more normal mode. For the following nine sessions, I watched students travel across the art room. Each week (and day during regular art classes), I noticed many other kinesthetic examples of students' modes of travel. The vignette at the beginning of Chapter IV (p.100) also describes several modes of travel. Few students just walked; they strolled, bounced, hopped, and skipped when moving from one location to another. During Session 7 when Tom went to get

some wood pieces at the blue counter, his mode of travel modeled a zombie: legs stiff, shifting weight back and forth with stiff out-stretched arms swinging, and most notable, was the bobbing of his head. On his return trip, he continued his zombie walk until he stopped to ask Amy what project she was doing. When he finished talking with her, he returned to a normal walking pattern back to his table.

I also witnessed expressionistic movement when students were sitting at tables and not moving from one location to another. This vignette from my fieldnotes captured expressionist movement:

Phase Three : Session 3

> Today students created mind maps representing their favorite subjects at school. This was a quiet experience as students chose topics from the Subject List. Mozart music played softly in the background. About ten minutes into the session, Jason puts his arms down by his side and moved his upper body *serpent-like* to the music. Then he puts his arms back on the table to add another subject to his mind map. Meanwhile, at a different table, Carl is role playing shooting baskets from his seat intermittently with working on his mind map. His mind map illustrated the theme of sports. At the end of class when students were lining up to leave the art room, Carl *shoots a basket* and Max *catches the rebound* and *makes a shot* as well. Of course, there were no basketballs or hoops in the art room.

These illustrations of students' expressionistic movements and modes of travel raise several possible research questions. Does a student's expressionistic style of movement reflect their learning modality? Is there a connection between artistic style and their style of movement? Do their styles create a pattern? How are their expressionistic modes effected by the learning environment? How do teachers encourage or

discourage expressionist movement? More research is needed to answer these questions.

Further questions for research include: What is the effect of the learning environment on student's projects? Does the learning environment make a difference in project outcomes? Does the teacher who presents the interdisciplinary project influence students' end product? In this study and over my years of experience when I have visited classroom environments, I have noticed that art projects completed in the art room differ from art projects presented by classroom teachers. I have wondered why students avoid putting a lot of "art effort" into classroom environment projects. I have also wondered why students avoid expressing themselves in written form in the art room? Whenever I ask students to write or we spend time in art appreciation conversation, students always ask: "When are we going to do art?" Is it the manipulation of art materials that students are desiring or is it a mind set that needs to change? How could researchers investigate this phenomenon? It is difficult to change mind sets and behaviors that are comfortable, even for students. A research project may track student entries in journals to find the factors that influence expected behaviors in environments.

Lastly, I recommend that more teacher as researcher studies should be conducted, especially with visual-dominant participants. In this study, I was an art teacher and a researcher. Both require skills which use left and right brain processes. As an art teacher, my strengths are visually oriented. The whole research process brought to my mind a metaphor of a swimming pool. The data represents water. As researcher, I dug a hole and set a frame to be filled with data. I kept testing the water as it filled, but did not really dive in until the end of Phase Three. I was submerged and alternated between treading water, keeping my head up, and drowning, sinking below the surface not knowing which way was up! Then a few waves broke the surface and I began to float among the wave patterns developing. The patterns, movement,

uniqueness, and choice, became my life preservers and helped me to look around. When I began kicking my feet (the writing process), I began swimming among the vast amount of data. I was in control once again, although I often let go of the preservers to sink among the data several times. During a sabbatical leave from teaching art, I spent seven months full time swimming among the data (analyzing and writing) to perfect my swimming style. This dissertation is my water ballet.

In contrast to my visual abilities, the format of a dissertation is verbal. Many times I wished for a visual way to express my thoughts. In my mind, I see colorful, three-dimensional, maybe even holographic images, and in the writing process, I experienced difficulty in expressing these images into words. I prefer to demonstrate, manipulate, and paint pictures of ideas when explaining. Over the past year, I have spent more time analyzing and writing and less time being creative. Dennison and Dennison's (1989) research demonstrated cross lateral activity developing both sides of the brain. As I finish this writing process, several circumstances have arisen when I am conscious of my left, verbal, analytical processes being more pronounced than my right, creative, intuitive side. Also, I am left handed and I have noticed that I am doing some things right handed, and it is comfortable! Is it a phenomenon that I have significantly increased my left brain capabilities and my right hand performances? Could this be documented and researched? I wonder.

APPENDIX A

NINETEEN SENSES

Nineteen Senses
processed in the cerebral cortex every minute
(Ross and Olsen, 1995, p. I-10)

SENSES	KIND OF INPUT
sight	visible light
hearing	vibrations in the air
touch	tactile contact
taste	chemical molecular
smell	olfactory molecular
balance	kinesthetic geotropic
vestibular	repetitious movement
temperature	molecular motion
pain	nociception
eidetic imagery	neuroelectrical image retention
magnetic	ferromagnetic orientation
infrared	long electromagnetic waves
ultraviolet	short electromagnetic waves
ionic	airborne ionic charge
vomeronasal	pheromonic sensing
proximal	physical closeness
electrical	surface charge
barometric	atmospheric pressure
geogravimetric	sensing mass differences

APPENDIX B

ROLE OF THE TEACHER - CHARACTERISTICS

ROLE OF THE TEACHER IN THE LEARNING ENVIRONMENT CHARACTERISTICS
(as gleaned from a review of the literature)

TEACHER-DIRECTED (**TD**)

Teacher's Role : **Director**

- provider/dispenser of knowledge
- authoritarian decision maker
- planner of activities
- sets time table for learning activities
- text books are standard, supplemented with resources
- uses standard tests for assessment
- designs physical environment

Advantages	Disadvantages
standardization	individual uniqueness
traditional	individual abilities
universal	different pace of learners
customary	students in passive roles
sequential	students not challenged to think for themselves
	students not responsible for their own learning

TEACHER-STUDENT DIRECTED (**TSD**)

Teacher's Role : **Leader**

- shares authority / decision making
- coaches students in learning process
- provides choice in meaningful activities
- organizes different learning opportunities
- flexible in time table for learning
- varies instructional approach
- co-investigative approach
- involves student's interests
- involves students in design of physical environment
- plans a variety of ways to express knowledge for evaluation and assessment
- uses resources in addition to text books

Advantages	Disadvatages
students have voice in learning	organization
shared authority	readiness levels of students
choices	management of activities

ROLE OF THE TEACHER IN THE LEARNING ENVIRONMENT CHARACTERISTICS
as gleaned from a review of the literature (continued)

STUDENT-DIRECTED **(SD)**

Teacher's Role : **Facilitator**

- mentors and/or coaches students in learning process
- guides student decisions
- allows students to design physical environment
- allows students to choose topics of interest; activities
- assists students with learning goals / contracts
- provides opportunities to use resources
  text books become a resource
- becomes a learner

Advantages	Disadvantages
student metacognition	organization
students active	lack of training
not standardized	not sequential
may be technology assisted	finding resources
	intrapersonal skills
	change

ESSENTIAL INFLUENCES IN THE LEARNING ENVIRONMENT

- Teacher's Intrapersonal Skills
  self-confidence, experience, beliefs, values, expertise, flexibility, empathy, personality

- Teacher's Interpersonal Skills
  communication and collaboration with students, peers, and administration
  assisting students in developing skills, confidence, and self-esteem
  promotes cooperation of groups
  establishes a safe environment, physical and emotional
  establishes "Teacher Prestige"
  trust, rapport, respect with students

- Learning Profiles of students
  Multiple Intelligences, Learning Style Modalities (visual, auditory, kinesthetic, or combination of), personalities

- Grade/Age Level of Students

- Time
  Flexibility for planning, pacing of activities, implementing change

- Support
  from administration, parents, peers, and students

APPENDIX C

INVITATIONAL LETTERS

"Art's New Face"
An Interdisciplinary, Integrated Approach

Dear Teachers,

I am grateful for the opportunity to explore an interdisciplinary approach. Attached is a copy of my proposed schedule. Grades 3, 4, and 5 will have Art on A Week and Grades 1 and 2 will have Art on B Week. If there are any concerns or conflicts, please let me know soon. We will be implementing A week on Monday, March 27.

I would like to begin scheduling classes for the integrated approach as soon as possible. If you are interested in having me become a regular part of your curriculum, please fill out the attached form indicating subjects and times. You may choose single periods or double periods for an extended visit. Over this weekend, I will collate all the information and try to include as many classrooms as I can. There are a few openings where integration could happen on a weekly basis. I will add my planning time after I know what your interests are. I would like to experience all subjects so that the evaluation in June can be comprehensive. In addition, *all* teachers can access this opportunity whether you have a homeroom or a mixed group of students.

Your scheduled "Art Class" will occur in a variety of places. So far my options are: the Clay Studio, the Library, the Cafeteria, Outside, and your classrooms. The lessons I plan will determine which space I use. I will try to let you know a few days in advance. This is new to me so I will need time to work out the "kinks". I am sure after a few weeks I will find places that are comfortable for me and our students.
A reminder to teachers who have Art this Thursday: Art will be in the cafeteria with a substitute. Also, I will be having art in the Cafeteria on Friday. Please bring your classes to the cafeteria.

Change is difficult. As excited as I am about offering this paradigm shift, I am nervous about the unknown. I want to keep the communication lines open. If, at any time, you would like to voice a concern or compliment, please, please, please be honest and open. I too will try to look at the program from a non-biased view in 12 weeks. Success will only happen if we work collaboratively on this project. Thank you for your support.

Sincerely,

Laurie DeRosa

"ART'S NEW FACE"
Interdisciplinary, Integrated Request Form

Teacher:______________________________

Grade:____________ Room:____________

Interested Curriculum Subjects for Integration:

☐ I would like to schedule a time for integration.

	CURRICULUM SUBJECT	DAY	TIME	A /B Week
Choice 1:	____________________	____________	__________	_____Week
Choice 2:	____________________	____________	__________	_____Week
Choice 3:	____________________	____________	__________	_____Week

* *

☐ I would like to choose times for integration on an "as needed" basis.

* *

Please return to L. DeRosa as soon as possible and before Friday, 2:00 p.m. for scheduling consideration.

"ART'S NEW FACE"

Interdisciplinary, Integrated Program

PROGRAM CHANGE ANNOUNCEMENT

Dear Staff,

As an educator, it is my first priority to offer to students the best educational opportunities available. An interdisciplinary, integrated program is one of those opportunities. A review of the research literature this summer has congealed my intuitive beliefs that an interdisciplinary curriculum is advantageous to all types of learners - including teachers. The Education Reform initiatives also confirm my beliefs for interdisciplinary learning as this type of curriculum is recommended. However, no program can truly grow and be successful without the cooperation and commitment from its members.

Unfortunately, this program, as it is presently designed, causes potential contractual problems with state teachers. Also, reflecting back to the last staff meeting in June, it seems that some city teachers are not comfortable with the format as well. I personally do not want a positive program opportunity to be cast under dark clouds. Instead, I would rather ease into this program under more positive and harmonious conditions. Therefore, I have asked the administration if I could offer an "*amended version*" of the program. With their consent, the following changes have been made:

- An A/B week interdisciplinary art program is OPTIONAL for all classroom teachers. If you do not want to participate, your art class will be scheduled on a weekly basis.

- If you choose to participate in the program, your art class will be "A" week and your interdisciplinary time will be "B" week (exception are the PreK and K art classes)

- A few interdisciplinary times are available to ALL staff members. These times can be used in addition to your scheduled art classes or can be utilized by staff who do not have regularly scheduled art classes.

During the upcoming school year, I plan to continue developing the idea of an interdisciplinary art program. I will be looking for feedback from participating members, as well as, non-participating members. Ideally, additional staff and/or graduate assistants could assist in further implementation.

I thank you for your cooperation and support. Honest and open communication is essential for growth. Please feel free to talk to me about your feelings on this matter.

Thank you.

Laura DeRosa

"ART'S NEW FACE"

Interdisciplinary, Integrated Program

1. Scheduling Request Forms:

Attached is a copy of the 1995-1996 Scheduling Request Form and Art Class Schedule. If you are interested in participating in this program, please choose times and interdisciplinary,integrated activity type. Return the form before Friday, September 1st for scheduling consideration. After September 1st, requests will be assigned on a first come, first serve basis.

2. Voluntary Informational Meeting:

Wednesday, August 30, 1995
Art Room : A-1
1:00 - 2:00 P.M.

I will discuss the various types of interdisciplinary,integration activities to help you make informed choices for your classroom. Questions about the program will be answered. If you are unable to attend this meeting and have questions or concerns, please see me.

3. * * PROFESSIONAL DEVELOPMENT OPPORTUNITY * *

EARN P.D.P. POINTS !!!

I would like to plan "Study Group Sessions" on a monthly basis to discuss and share the successes, failures, concerns, and ideas we are experiencing as this interdisciplinary, integrated program develops. The Voluntary Informational Meeting on August 30th and any following meetings can be used to earn Professional Development Points. Participants must attend 4 sessions before any P.D.P. points may be given. Meetings will be held once a month for 1 hour (more if the group decides up to a total of 12 P.D.P. points.) Dates and times to be decided once the group is formed..

* *

Thank you once again for your cooperation. I am looking forward to a year filled with opportunity and professional growth. Please see me if you have any concerns or comments about this program. The program's success depends on honest feedback and open communication.

Laurie DeRosa

"ART'S NEW FACE"

Interdisciplinary, Integrated Request Form

Check box of interested interdisciplinary, integration type:

1. ☐ Planning Meeting With Teachers Only
(Brainstorm ideas / discussion sessions)

2. ☐ Group Planning Sessions
(Classroom teacher, art specialist and students plan and create projects)

3. ☐ Preplanned Activity : Part of On-going Unit lesson
(Classroom teacher informs art specialist of unit topic and art lesson is preplanned)

4. ☐ Preplanned Activity : One time lesson
(Classroom Teacher informs art specialist of topic in advance and art lesson is preplanned)

5. ☐ Classroom Activity
(Classroom teacher plans lesson and art specialist is project assistant helping groups of students: No preplanning necessary)

6. ☐ Creative Writing/Art Appreciation Activity
(Art specialist arrives to classroom with Art Prints. Creative Writing Assignments are worked on.)

7. ☐ "Image-Making" Creative Writing Activity
(Students create portfolios of textured-papers and creative writing assignments. * Designed after B.Olshansky's Integrated Art/Writing Process)

8. ☐ Activity on an As-Needed Basis
(Not scheduled on weekly basis: Teacher asks for ideas and assistance when needed. Art project is planned and scheduled)

Teacher:_____ Grade:_____ Room:_____

CURRICULUM SUBJECT	DAY	TIME	A /B Week ***
Choice 1:_____	_____	_____	_____Week
Choice 2:_____	_____	_____	_____Week
Choice 3:_____	_____	_____	_____Week

*** You may sign up for either or both weeks (*if available*). Please note special scheduling times on Wednesdays for weekly sessions (5 available times).

* *

Please return to L. DeRosa as soon as possible for scheduling consideration.

A WEEK / B WEEK

"Art's New Face" : An Interdisciplinary, Integrated Approach

SCHEDULE

TIMES/PERIOD	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8:10 - 8:55	AA (4)	PA (4) EA	JC (4)	Bilingual	Team
8:55 - 9:40	Planning (K)	JW (K) (PK) 1/2 hr SB	9:00 - 9:30 B week (K)	PLANNING	DR(K) 1/2 hr SR(K)
9:40 - 10:25	GB (3)	JS (3) JS	9:30 - 10:00 A+B week	KR (3) KR	MB (3) MB
10:25 - 11:10	RA (2)	BM (2)	10:00 - 10:30 A+B week	BC (2) BC	LK (2) LK
11:10 - 11:45	L	U	10:30 - 11:00 "A"	C	H
11:45 - 12:15 (1/2 hour)	JW (PK) SB (PK)	"A" "B"	11:00 - 11:30 "A" "B"	"A" "B"	DR(K) SR(K)
12:15 - 1:00	MH (1)	KS (1) KS	LH (1) LH	JM (1) JM	Pottery Pottery
1:00 - 1:45	JG (5)	DT (5) DT	AF (1) AF	LJ (5) LJ	Pottery Planning

APPENDIX D

SURVEY QUESTIONNAIRES

"ART'S NEW FACE"
An Interdisciplinary Approach to Learning
Survey Questionnaire

Dear Teachers,

During the June 5th faculty meeting, we will be discussing the Interdisciplinary Art Program. To help facilitate the discussion, I am requesting that you consider the following questions and respond before Friday, June 2nd. Please be HONEST with your answers. Use the back of the paper or additional paper if you need to. You may remain anonymous or sign your return. I will collate all the information for the faculty meeting. Our discussion will include the possibility of continuing to explore this approach during the next school year.

Remember: Please be HONEST and remain anonymous if you choose.
Return to L.DeRosa before Friday, June 2nd. ***Thank you for your time.***

1. What are your thoughts on an interdisciplinary approach to learning?

2. Do you place more emphasis on the "verbal" or the "visual" activities in your existing curriculum?

3. How would you describe your creative abilities?

4. Have you read the Dept. of Education's "Five Year Plan" ?

5. Have you read the Curriculum Framework Common Chapters?

6. Have you read any of the Curriculum Framework Content Chapters?
   Which one(s)?

7. Have you been involved in any of the Framework Study Group discussions?
   Which one(s)?

8. I chose not to participate in the interdisciplinary art program because:

9. What questions do you have about an interdisciplinary approach to learning?

"ART'S NEW FACE"
An Interdisciplinary Approach to Learning
Survey Questionnaire

Dear Teachers,

During the June 5th faculty meeting, we will be discussing the Interdisciplinary Art Program. To help facilitate the discussion, I am requesting that you consider the following questions and respond before Friday, June 2nd. Please be HONEST with your answers. Use the back of the paper or additional paper if you need to. I realize that a 12 week program with 6 or fewer interdisciplinary meetings is a short amount of time. However, please consider each question and answer as best you can. You may remain anonymous or sign your return. I will collate all the information for the faculty meeting. Our discussion will include the possibility of continuing to explore this approach during the next school year.

Remember: Please be HONEST and remain anonymous if you choose.
Return to L.DeRosa before Friday, June 2nd. ***Thank you for your time.***

1. What are your thoughts about an interdisciplinary approach to learning?

2. What did you like about the interdisciplinary experience?

3. What didn't you like about the interdisciplinary program?

4. What ideas and suggestions do you have for improving this program?

"ART'S NEW FACE"
An Interdisciplinary Approach to Learning
Survey Questionnaire

5. Did you notice any changes in yourself or your students as a result of this experience? Please describe:

6. Do you place more emphasis on the "verbal" or the "visual" activities in your existing curriculum?

7. How would you describe your creative abilities?

8. Have you read the Dept. of Education's "Five Year Plan"?

9. Have you read the Curriculum Framework Common Chapters?

10. Have you read any of the Curriculum Framework Content Chapters? Which one(s)?

11. Have you been involved in any of the Framework Study Group discussions? Which one(s)?

12. What questions do you have about an interdisciplinary approach to learning?

An Interdisciplinary Approach to Learning
Voluntary Questionnaire

Please be HONEST

Please check one: ____Classroom Teacher ___Non Classroom Teacher

1. I chose not to participate in the interdisciplinary art program this year because:

2. Would you be interested in participating in discussion sessions to explore the interdisciplinary concept and identify common curriculum topics, themes, and learning objectives?

3. Are you familiar with "Brain-based Learning"?
   Would you be interested in learning more about the concept and its relationship to interdisciplinary learning?

4. What questions do you have about the interdisciplinary approach?

Integrated Art Student Survey

Please do not put your name on this survey
Please answer the following questions honestly.
Your answers will help to reshape this program in the future.

1. How would you describe our integrated art program?

2. Describe one of the integrated art projects we experienced:

   Adopting a Tree
   Bats
   Movie Town
   States of Matter

3. How would you describe school?

4. What are your best subjects in school?

5. What do you like to do at home?

6. What is a map?

7. What do you like about integrated art time?

8. What don't you like about integrated art time?

"BRAIN STUFF"

Draw the face that best describes your feelings towards each part of our integrated art sessions and write a few words that describe that feeling.

What do I like? 		
	Draw Feeling	Write Words
Water		
Music		
Weekly Brain Facts		
Mind Maps		
Brain Exercises		
Time Log		
Choosing Projects		
Brain Hat		
Jello Brain		
Post-it Notes		

Student Survey - Integrated Art

1. This year we experienced three types of integrated art:

   - Teacher Choice : The teachers chose the topic and art project
     (Adopt a Tree - Life Books - Movie Town - States of Matter)

   - Teacher and Student Choice : The teachers chose the topic and the students chose the projects
     (Bat Performances)

   - Student Choice : The students chose the topic and art project
     (Your choice)

   Which type did you like best? Why?

2. In your Integrated Art Project Plan, which part did you choose first?
   (check one)
   - the topic idea_____ **or** - the art project idea_____

3. Why did you choose that topic? Where did you get your idea?

4. Why did you choose that art project?

5. The best thing about Integrated art is _____

6. The worst thing about integrated art is _____

7. If I had to do my integrated project over, next time I would:
   (circle one)
   - keep my idea
   - change my idea to _____

8. The following are questions I have about Integrated Art: (use back if needed)

APPENDIX E

THE BRAIN-BASED PROGRAM

CALENDER OF EVENTS

THE BRAIN BASED PROGRAM
CALENDER OF EVENTS

April - June 1996

April 11 Baseline Teacher Interview
Half hour interview to reflect on the Integrated Art Program to-date and introduce Jackie to the upcoming events in Brain-based learning project. Requested her input and suggestions.

April 24 Baseline Student Survey - PreQ
Students asked to respond anonomously to a survey about our Integrated Art program before a different approach began.

April 25 Session 1 "Meet Your Brain" Mind Map
Group brainstorming session to create mind map of the brain. Students begin a mind map of their own choice.
Ate Jello Brain.
BBL Fact : The brain has over 100 billion brain cells (neurons).

May 2 Session 2 "Choice Map"
Project time for students to complete Choice Maps
BBL Fact : The brain grows dendrite connections.

May 16 Session 3 "Me Map"
Group discussion of school subjects and hobbies in Jackie's room creates a list. The list helps students create personal "Me Maps" including subjects of choice.
BBL Fact : The brain loves music and color.

May 23 Session 4 "Arts Map"
Group brainstorming session to create an Arts project map.
BBL Fact : The brain has a left and right side

May 30 Session 5 "Making Connections" - Create Project Plans
Discussion of how to make connections between individual "Me Mind Maps and "Arts Mind Map" to create a project idea.
Introduction to Contract Plans and project folders.
BBL Fact : Every brain is unique. No two brains are alike.
Brain Exercises : Lazy 8's and Brain Buttons

THE BRAIN BASED INTERDISCIPLINARY PROGRAM
CALENDER OF EVENTS (continued)

April - June 1996

June 6 Session 6 "Project Time" (double period - 1 1/2 hour)
Reviewed how to fill out Contract Plans
Individual projects begin.
BBL Fact : The brain needs oxygen and water

June 13 Session 7 "Project Time"
Students work on projects.

June 19 Session 8 "MI PIE" - "Project Time"
Group discussion of Multiple Intelligences (MI)
Student MI survey and project time
BBL Fact : "We are smart seven different ways"

June 20 Session 9 "MI PIE Graphs" and "Project Share"
(Double period : 1 1/2 hours)
Students create a grapic pie chart from MI survey results.
Students share projects.

June 21 Session 10 "Student Exit Surveys" - "Brain Stuff" and PostQ
"Feedback Discussion" and "Celebration"
Students responded to Exit Survey.
Group discussion - sat in meeting circle: I shared what I liked and what I didn't like and students gave comments and suggestions, Students try to guess Jackie's MI Pie strengths. We celebrate by eating a jello brain.

July 2 Exit Teacher Interview
Four hour interview (2 hours formal / 2 hours informal)
Discussion of Choice, shared preliminary data, collaborated and made modifications for for implementation of program in the fall 1996.

APPENDIX F

PROJECT PLANS

"Me Map"

<u>School Topics</u>

Science

Social Studies

Math

Health

Art

Music

Gym

Library

Writing Workshop

Guidance

Reading Clubs

After School Activities (Peer Mediation)

Extra Curricular Activities (Chorus)

Recess

Computer

Read Aloud

Morning Meeting

Integrated Art

Choice Time

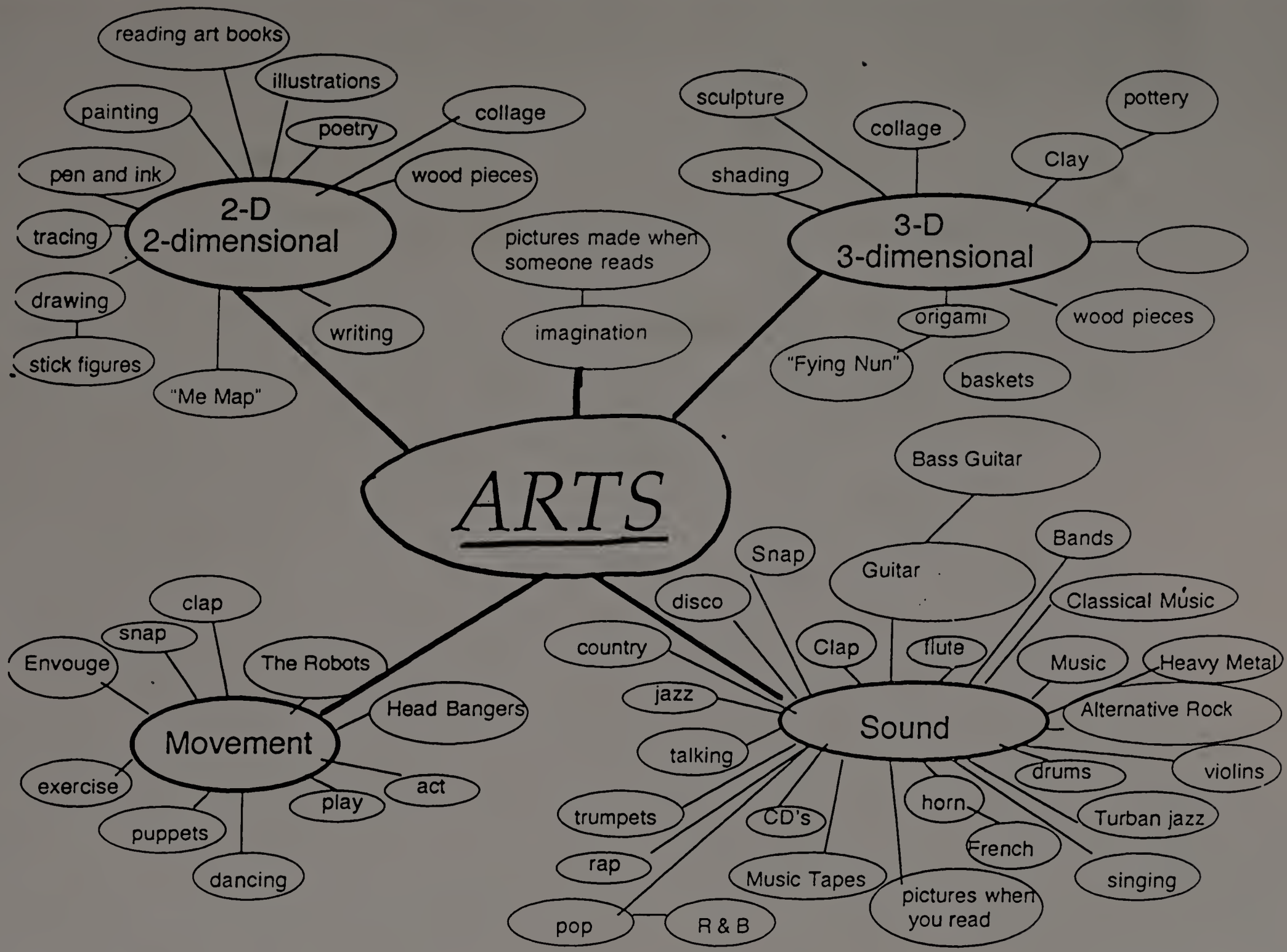
Jobs

<u>Home Topics</u>

Play

Hobbies

Homework


ARTS
2-D
2-dimensional
reading art books
illustrations
painting
poetry
collage
pen and ink
wood pieces
tracing
drawing
writing
stick figures
"Me Map"
pictures made when someone reads
imagination
3-D
3-dimensional
sculpture
collage
pottery
shading
Clay
origami
wood pieces
"Fying Nun"
baskets
Movement
clap
snap
Envouge
The Robots
Head Bangers
exercise
act
play
puppets
dancing
Sound
Bass Guitar
Bands
Snap
Guitar
disco
Classical Music
country
Clap
flute
Music
Heavy Metal
jazz
Alternative Rock
talking
drums
violins
trumpets
CD's
horn
Turban jazz
French
rap
Music Tapes
pictures when you read
singing
pop
R & B

NAME_____

Integrated Art Project

1. CHOOSE:

TOPIC

ARTS METHOD

2. Plan project idea:

3. What materials do you need:

4. I plan to share my project with:

_____ my teachers

_____ my class

_____ a learning buddy

APPENDIX G

MULTIPLE INTELLIGENCE SURVEYS

Ron Fitzgera.

MULTIPLE INTELLIGENCES TEST

Place a check before those statements that really describe you:

PART V

_____ When I close my eyes I can easily see "pictures" of things in my mind.

_____ I like to doodle, draw, or paint.

_____ I like books that have lots of pictures or drawings.

_____ I like to take pictures with a camera or camcorder.

_____ I enjoy doing jigsaw puzzles.

_____ I learn much more from a film or videotape than from a lecture.

◯ = TOTAL V

PART K

_____ I like building or doing things, being very active.

_____ I enjoy physical activity including athletics and/or "gym" classes.

_____ I often get good ideas when I am walking or jogging.

_____ I enjoy outdoor activity and/or dancing.

_____ When I talk, I tend to use hand gestures.

_____ I learn something much better if I have a chance to practice doing it.

◯ = TOTAL K

PART I (E)

_____ I like team sports (volleyball or softball) better than individual sports (swimming or track).

_____ I like to be very sensitive to the feelings and concerns of others.

_____ I enjoy teaching or helping others.

_____ I participate in lots of social activities (being with friends, parties, etc.).

_____ I have three or more close friends.

_____ In a class, I prefer to learn in or with a group.

◯ = TOTAL I (E)

PART I (A)

_____ I like individual sports better than team sports.

_____ I enjoy working alone on a task or hobby.

_____ I am rather independent and strong-willed.

_____ I like to spend time improving my personal skills and perceptions.

_____ I have clear goals for myself in life.

_____ In a class, I prefer to learn or study alone.

◯ = TOTAL I (A)

PART W-A

_____ I love reading books.

_____ I do well on word games like Scrabble.

_____ I am proud of some of my writing.

_____ I tend to think with words before I write or speak.

_____ I can learn well from a lecture or audio cassette.

_____ I enjoy English and/or social studies more than science or math.

( ) = TOTAL W-A

PART L

_____ I enjoy analyzing problems in a logical way.

_____ I can often do math in my head without writing down numbers.

_____ I love learning new information on the exact steps on how something works.

_____ I enjoy the logic of solving "brain-teasers".

_____ I like to learn by experimenting with things.

_____ I enjoy science and/or math more than English or social studies.

( ) = TOTAL L

PART M

_____ I truly enjoy music and can hum many tunes.

_____ I listen to music frequently.

_____ I can easily keep time to the beat of a musical selection.

_____ I collect music (CDs, tapes, etc.).

_____ I can sing or play an instrument.

_____ While studying, I like to listen to some music or to tap or sing myself.

( ) = TOTAL M

NAME _____ CLASS _____

MULTIPLE INTELLIGENCES TEACHING-LEARNING

Part V = Visual

1. Learning and using mind mapping*
2. Using a computer graphics program
3. Preparing visual aids
4. Studying art or photography
5. Watching or producing films or videotapes*
6. Using charts, photos, drawings*
7. Making 3-D models
8. Practicing visual skills on a computer

Part K = Kinesthetic

1. Participating in sports
2. Taking dancing lessons
3. Exercising
4. Taking a course that requires physical activity (many trades)*
5. Pursuing a hands-on hobby
6. Playing charades
7. Using (non-disturbing) physical movement while studying*
8. Learning sign language, pantomime, or acting
9. Taking field trips*

PART I (E) = Interpersonal

1. Joining groups
2. Working on teams*
3. Serving as a team leader
4. Teaching others*
5. Studying others or about others (multi-cultural programs)
6. Listening and talking to others (on a bus, etc.)
7. Learning brainstorming *
8. Hosting a party

PART I (A) = Intrapersonal

1. Analyzing your "styles" or "intelligences" (tests)*
2. Pursuing an individual project or study program*
3. Preparing an autobiography
4. Reading self-help books*
5. Setting and pursuing personal improvement goals
6. Studying psychology
7. Mediating
8. Listening to motivational speakers

PART W-A = Auditory-Linguistic (words)

1. Reading*
2. Using and/or recording audio tapes
3. Speaking or debating*
4. Storytelling
5. Memorizing poetry
6. Playing word games
7. Using a word processor
8. Learning speed reading
9. Writing (impressions, reports, etc.)*
10. Developing and expanding your vocabulary list

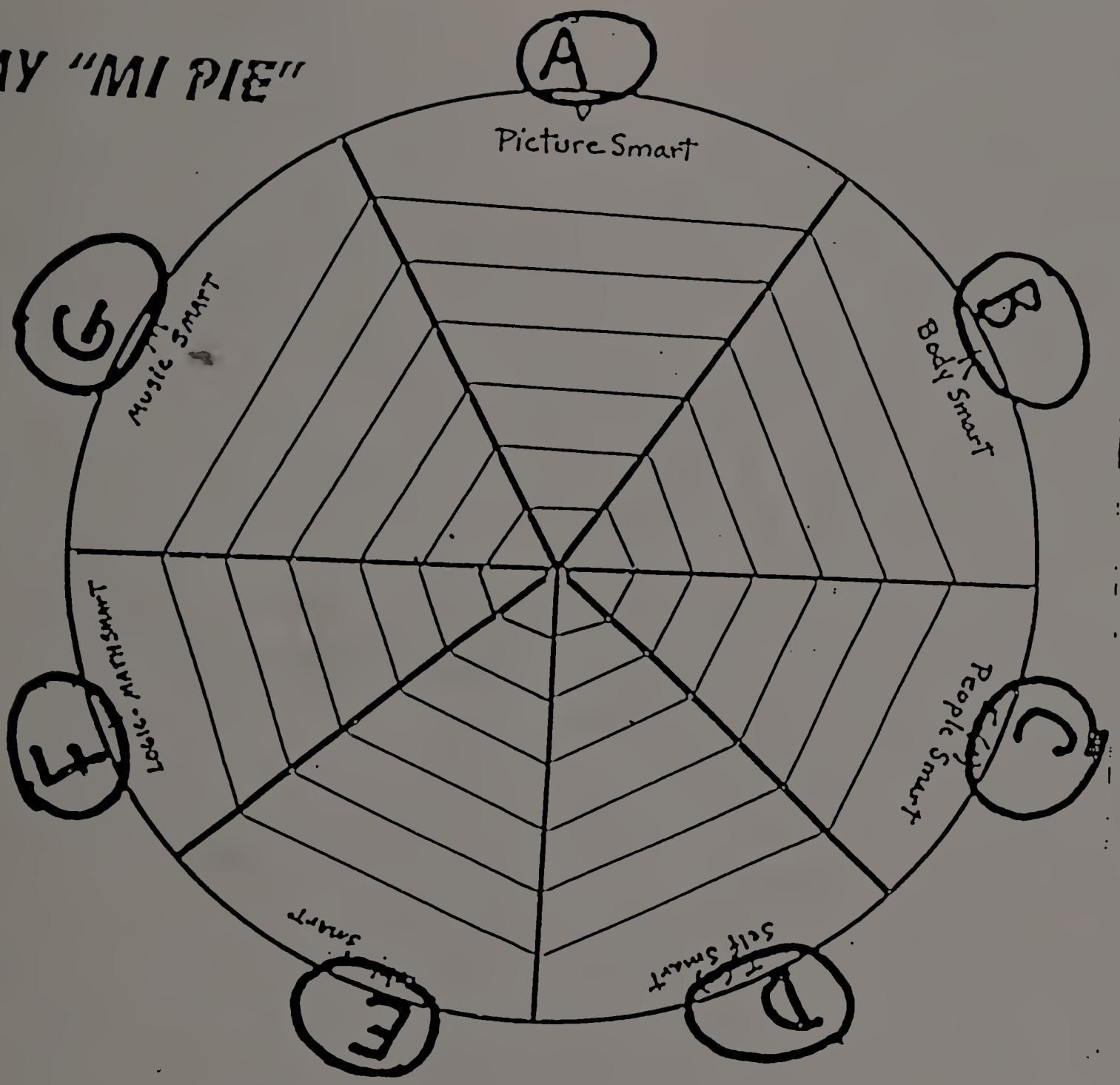
PART L = Logical-Analytical

1. Reading science magazines
2. Learning a computer language
3. Discussing or debating*
4. Studying mathematics and/or science
5. Using science kits for lab-based learning*
6. Listing the steps needed to solve a problem
7. Playing logic games
8. Designing procedures for others to follow*

PART M = Musical

1. Singing
2. Attending concerts
3. Taking music lessons
4. Composing your own tunes
5. Using background music when studying*
6. Studying electronic composition
7. Keeping time to a beat (quietly when it could disturb others)*
8 Taking an accelerated learning course on a foreign language

MY "MI PIE"


A
Picture Smart
B
Body Smart
C
People Smart
D
Self Smart
E
Nature Smart
F
Logic-Math Smart
G
Music Smart

BIBLIOGRAPHY

Abbey, D.S. 1976. Designing Interdisciplinary Studies Programs. A Project Search Development: The Humanities Series. (ERIC Document Reproduction Service No. ED 133 311).

Ackerman, D.B. 1989. Intellectual and Practical Criteria for Successful Curriculum Integration. In Interdisciplinary Curriculum: Design and Implementation, H. Jacobs, ed. ASCD, VA. : Edward Brothers, Inc.: 25-38.

Airasian, P.W. and M.E. Walsh. 1997. "Constructivist Cautions". Phi Delta Kappan. 78 (6), 444-449.

Alejandro, A. 1994. Like Happy Dreams - Integrating Visual Arts, Writing, and Reading. Language Arts. 71 (1): 12 - 21.

Armstrong, T. 1994. Multiple Intelligences in the Classroom. VA : ASCD.

_____. 1987. In Their Own Way : Discovering and Encouraging Your Child's Personal Learning Style. CA : Jeremy P. Tarcher, Inc.

Arnheim, R. 1969. Visual Thinking. CA : University of California.

Barnes, H. 1991. Learning that Grows with the Learner: An Introduction to Waldorf Education. Educational Leadership. 49 (2): 52 - 54.

Bensen, H. and E. Stuart. 1992. The Wellness Book: The Comprehensive Guide to Maintaining Health and Treating Stress Related Illness. New York : Simon and Schuster.

Bogdan, R. C., & Biklen, S.K. 1992. Qualitative Research for Education: An Introduction to Theory and Methods . Boston: Allyn and Bacon.

Borg, W.R. and M.D. Gall. 1989. Educational Research: An Introduction. Fifth Edition. White Plains, New York: Longman.

Brandt, R. 1991. On Interdisciplinary Curriculum: A Conversation with Heidi Hayes Jacobs. Educational Leadership. 49 (2): 24 - 26.

Brewer, C. and D. Campbell. 1991. Rhythms of Learning: Creative Tools for Developing Lifelong Skills. Arizona : Zephyr Press.

Brigham, D.L. 1978. Art and Learning: Partners in Educational Process. Studies in Art Education : A Journal of Issues and Research. 19 (3): 25 - 32.

Brooks, K. 1991. Implementation of an Art in Education Program in an Elementary Setting: A Case Study of a Curricula Innovation. Dissertation at Columbia University Teachers College. Made available by University Microfilms International # ACC 9121166.

Brooks, J.G. and M.G. Brooks. 1993. In Search of Understanding: The Case for Constructivist Classrooms. Virginia : Association for Supervision and Curriculum Development.

Brophy, J., and J. Alleman. 1991. A Caveat: Curriculum Integration Isn't Always a Good Idea. Educational Leadership. 49 (2): 66.

Buzan, T. and B. Buzan. 1994. The Mind Map Book : How to Use Radiant Thinking to Maximize Your Brain's Untapped Potential. New York : A Dutton Book.

Buzan, T. and T. Dixon. 1978. The Evolving Brain. New York: Holt, Rinehard and Winston.

Caine, R.N., and G. Caine. 1997. Education on the Edge of Possibility. VA : Association for Supervision and Curriculum Development.

_____. 1994. Making Connections: Teaching and the Human Brain. MA : Addison Wesley.

Caine, G. and R.N. Caine and S. Crowell. 1994. Mindshifts : A Brain-Based Process for Restructuring Schools and Renewing Education. AZ : Zephyr Press.

Catteral, J.S. 1995. Different Ways of Knowing: 1991 -1994 National Longitudinal Study Final Report. In Schools, Communities, and the Arts : A Research Compendium. Welsh, N. & Greene, A. and et al. Morrison Institute for Public Policy School of Public Affairs. Arizona State University: 16-18.

Cecil, N.L. & Lauritzen, P. 1994. Literacy and the Arts for the Integrated Classroom: Alternative Ways of Knowing. New York : Longman.

Charbonneau, M.P. and B. E. Reider. 1995. The Integrated Elementary Classroom: A Developmental Model of Education for the 21st Century. MA : Allyn and Bacon.

Clark, G. 1985. Integrated Art Education. Art Education. 38 (6): 4.

Cohen, E.P. and R.S. Gainer. 1995. Art: Another Language for Learning. [3rd ed.]. Forward by Robert Coles. Portsmouth, N.H. : Heinemann.

Colasanti, A.M. and E.J. Follo. 1992. Effectiveness of Thematic Teaching in Curriculum Design and Implementation in a Third Grade Classroom, including a Planning Process Model using the Michigan Model Core Curriculum. (ERIC Document Reproduction Service NO. ED 355 189).

Cordeiro, P. 1992. Whole Learning: Whole Language and Content in the Upper Elementary Grades. New York : Owen.

Corwin, S.K. and R.R. Perlin. 1995. A Videodisc Resorce for Interdisciplinary Learning: American Art from the National Gallery of Art. Art Education. 48 (3): 17-24.

Cruickshank, D.R. 1990. Research That Informs Teachers and Teacher Educators. Indiana : Phi Delta Kappa Educational Foundation.

Dennison P.E. and G.E. Dennison. 1989. Brain Gym : Teacher's Edition Revised. CA : Edu-Kinesthetics, Inc.

Dewey, J. 1934. Art as Experience. New York : Capricorn Books.

Diamond, M. 1996. The Brain : Use it or Lose it. Mindshift Connection. 1.(1) : Arizona : Zephyr Press Publication.

Discovery Channel. 1994. Evolution and Perception. The Brain : Our Universe Within. Vol. 1. Maryland : Discovery Enterprises Group.

Drake, S.M. 1993. Planning Integrated Curriculum : The Call to Adventure. VA : ASCD.

Dryden, G. and J. Vos. 1994. The Learning Revolution. CA : Jalmar Press.

Dunn, R. and K. Dunn. 1992. Teaching Elementary Students through their Individual Learning Styles : Practical APproaches for Grades 3-6. MA : Allyn and Bacon.

Eisenhart, M. and H. Borko. 1993. Designing Classroom Research: Themes, Issues, and Struggles. Needham, MA: Allyn and Bacon.

Eisner, E.W. 1980. The Role of the Arts in the Invention of Man. NY University Education Quarterly. XI (3): 2 - 7.

_____. 1991. What Really Counts in Schools. Educational Leadership. 48 (5): 10 - 17.

_____. 1992a. The Misunderstood Role of the Arts in Human Development. Phi Delta Kappan. 73 (8): 591 - 595.

_____. 1992b. Educational Reform and the Ecology of Schooling. Teachers College Record. 93 (4): 610-627.

_____. 1994. The Educational Imagination: On the Design and Evaluation of School Programs. New York : MacMillan.

Ernst, K. 1992 Nov. Picturing Learning : Teacher Research in Words and Images. Dissertation : The Graduate School of the Union Institute.

_____. 1994. Picturing Learning : Artists and Writers in the Classroom. NH : Heinemann.

Flynn, R. M., and G.A. Carr. 1994. Exploring Classroom Literature Through Drama: A Specialist and a Teacher Collaborate. Language Arts. 71 (1): 38 - 42.

Fogarty, R. 1991. The Mindful School : How to Integrate the Curricula. Illinois : IRI/Skylight Training and Publishing, Inc.

Fogarty, R. and J. Stoehr. 1995. Integrating Curricula with Multiple Intelligences: Teams, Themes, and Threads. foreword by H. Gardner. IL : IRI/ Skylight Publishing, Inc.

Forman, G. et al. 1993. The City in the Snow: Applying the Multisymbolic Approach in Massachusetts. In The Hundred Languages of Children: The Reggio Emilia Approach to Early Childhood Education, ed. C. Edwards, New Jersey : Ablex: 233 - 250.

Fowler, C. 1988. Arts and Education Handbook: A Guide to Productive Collaborations. ed. Jonathan Katz. Washington D.C.: Nationial Assembly of State Arts Agencies.

Freyberger, R.M. 1985. Integration: Friend or Foe of Art Education. Art Education. 38 (6): 6-9.

Fulbright, H. M. 1994. The Arts at the Heart of Learning. Speech for the Arts and Humanities Awards Cememony, Nov. 10. Arkansas.

Gardner, H. 1985. Frames of Mind: The Theory of Multiple Intelligences. New York: Basic Books.

_____. 1990. Multiple Intelligences : Implications for Art and Creativity. Artistic Intelligences Implications for Education. W.Moody, ed., New York : Teachers College Press.

_____. 1997. We have different kinds of minds : That's What Makes Education Challenging and Interesting. MTA Today. 27 (8), Jun. 11

Glasgow, N.A. 1997. New Curriculum for New Times. California : Corwin Press.

Glasser, W. 1997. A New Look at School Failure and School Success. Phi Delta Kappan. 78, (8), 596-602.

Goldonowicz, J. 1985. Art and Other Subjects. Art Education. 38 (6): 17.

Goleman, D. 1995. Emotional Intelligence. New York : Bantam Books.

Good, T.L. and J.E. Brophy. 1987. Looking in Classrooms. fourth edition. NY : Harper and Row Publishers.

Goodlad, J. 1983. A Place Called School : Perspectives for the Future. New York : McGraw Hill.

Grady, J.B. 1994. Interdisciplinary Curriculum: A Fusion of Reform Ideas. Mid-Continent Regional Education Lab, Aurora Co. (Eric Document Reproduction Service No. ED 375 980).

Graillert, M. 1991. Working from the Inside Out : A Practical Approach to Expression. Harvard Educational Review. 61 (3): 260 - 269.

Gregory, D.C. 1995. Art Education Reform and Interactive Integrated Media. Art Education. 48 (3): 6-16.

Guggenheim Museum Project .1974. Guggenheim Museum Children's Program: Learning to Read Through the Arts. (ERIC Document Reproduction Service No. ED 108 149).

Hannaford, C. 1995. Smart Moves. VA : Great Ocean Publishers.

Hart, L.A. 1983. Human Brain and Human Learning. NY : Longman Inc.

Heath, S.B. 1985. Ways with Words: Language, Life and Work in Communities and Classrooms. Cambridge, NY:Cambridge University Press.

Hopfenberg, W.S. and H.M. Levin, et al. 1993. The Accelerated Schools Resource Guide. San Fransicso CA: Jossey-Bass Inc. Publishers.

Howard, P.J. 1994. The Owner's Manuel for the Brain : Everyday applications from mind-brain research. TX : Leornian Press.

Hubbard R.S. and B.M. Power. 1993. The Art of Classroom Inquiry: A Handbook for Teacher-Researchers. Portsmouth, NH : Heinemann Educational Books, Inc.

Ingram, J.B. 1979. Curriculum Integration and Life-long Education: A Contribution to the Improvement of School Curricula. Oxford, England : Pergamon Press.

Jacobs, H. H. (Ed.). 1989. Interdisciplinary Curriculum: Design and Implementation, Alexandria, VA. : Association for Supervision and Curriculum Development.

Jensen, E. 1995. "Champions for Children: How to develop strategies for improved learning in the classroom and help your staff understand research on learning". NH Conference sponsored by the NH School Administrators Asso. September 28, 1995. Laconia, NH.

_____. 1994. The Learning Brain. CA : Turning Point.

_____. 1995. Learning Styles in the 90's. Audiotape. CA : Turning Point.

_____. 1995. Brain-Based Learning and Teaching. CA : Turning Point.

_____. 1997. "Brain-Compatible Teaching". MA Conference sponsored by the Brain-Based Teaching Network. June 3, 1997. Boxborough, MA.

Kindler, A.M. 1987. A Review of Rationales for Integrated Arts Programs. Studies in Art Education : A Journal of Issues and Research. 29 (1): 52 - 60.

Kline, P. (1988). The Everyday Genius : Restoring Children's Natural Joy of Learning - And Yours Too. VA : Great Ocean Publishers.

Krogh, S. 1990. The Integrated Early Childhood Curriculum. New York: McGraw Hill.

Kronish, M. and J. Abelmann. 1989. Elementary. Focus on Fine Arts. (ERIC Document Reproduction Service No. ED 314 352).

Lansing, K.M. 1986. Art and the Child: Are They Compatible?. Studies in Art Education : A Journal of Issues and Research. 28 (1): 11 - 15.

Lazear, D. 1994. Seven Pathways of Learning: Teaching Students and Parents about Multiple Intelligences. foreword by Arthur L. Costa. Az : Zephyr Press.

Leland, C.H., and J.C. Harste. 1994. Multiple Ways of Knowing: Curriculum in a New Key. Language Arts. 71 (5): 337 - 344.

Lincoln, Y.S. and E.G. Guba. 1985. Naturalistic Inquiry. California: Sage Publication.

Lipson, M.Y. et al. 1993. Integration and Thematic Teaching: Integration to Improve Teaching and Learning. Language Arts. 70 (4): 252 - 263.

MacGregor, R.N. 1993. Collaborative Partnerships. Art Education. 46 (4): 4 - 5.

Mammen, L. (Ed.) 1993. Writing and the Arts: An Interview with Janet Olson. Writing Teacher. V1 (5): 3 - 8.

Manning, M., G. Manning, and R. Long. 1994. Theme Immersion : Inquiry Based Curriculum in Elementary and Middle Schools. New Hampshire : Heinemann.

Mansfield, B. 1989. Students' Perceptions of an Integrated Unit: A Case Study. The Social Studies. 80 (4): 135 - 140.

Marshall, S. 1963. An Experiment in Education. Cambridge,England : University Press.

Marshall, C. and G. Rossman. 1989. Designing Qualitative Research. California: Sage Publications, Inc.

McCarthy, B. 1980. The 4MAT System : Teaching to Learning Styles with Right/Left Mode Techniques. Barrington, Illinois : Excel.

McGrath, E.J. 1978. Interdisciplinary Studies : An Integration of Knowledge and Experience. Change. 10 (7): 6 - 9.

McGuire, G.N. 1984, May. How Arts Instruction Affects Reading and Language: Theory and Research. The Reading Teacher 37(9): 835 - 839.

McLaughlin, J. 1990. Building a Case for Arts Education: An Annotated Bibliography of Major Research. Kentucky: Kentucky Alliance for Arts Education.

McMurray, C.A. 1920. Teaching by Projects: A Basis for Purposeful Study. New York : MacMillian Co.

McRae, S.M. 1992, March. "But Hardly Ever Dragons: Observations of a Child-Centered Arts Environment". Masters Thesis. Queen's University, Kingston Ontario, Canada.

Meyer, M. 1990. Joining Forces: Integrating the Arts. School Arts. 89 (8): 46 - 49.

Miller, G.E. 1988. The Meaning of General Education: The Emergence of a Curriculum Paradigm. New York : Teachers College Press.

Mitchell, A.R. 1993. Interdisciplinary Instruction in Reading Comprehension and Written Communication: A Guide for an Innovative Curriculum. Illinois: Charles C. Thomas.

Monroe, S.M. 1993. Doors and WIndows of my Mind: Thresholds of Visual Thinking. (ERIC Document Reproduction Service No. ED 360 213).

Moore, B.H. and H. Caldwell. 1995. Drama and Drawing for Narrative Writing in Primary Grades. In Schools, Communities, and the Arts : A Research Compendium.,Welsh, N. & Greene, A. et al., Morrison Institute for Public Policy School of Public Affairs. Arizona State University: 46-47.

NAEA. 1994. National Standards for Arts Education : Dance, Music, Theatre,Visual Arts : What Every Young American Should Know and be able to do in the Arts. VA.

NAEA Advisory.1996. Peer Coaching : An Effective Staff Development Model. Spring. Virginia : The National Art Education Association.

NETWORK of Performing and Visual Arts Schools. 1993. Monograph of 112 Models for Education in the Arts. np.

New York City Office of Educational Research. 1995. Chapter 1 Developer/Demonstration Program: Learning to Read Through the Arts, 1992-1993. In Schools, Communities, and the Arts : A Research Compendium.,Welsh, N. & Greene, A. et al., Morrison Institute for Public Policy School of Public Affairs. Arizona State University: 21-23.

O'Brien, B.C. 1977. Learning to Read Through the Arts and Humanities: A Reading Program - an Art Program. (ERIC Document Reproduction Service No.. ED 144 029).

Oddleifson, E. 1992a. Schooling Transformed by the Arts: Educations for Understanding as our National Idea. An address to the MAEA Conference, Boston, MA.

_____. 1992b. The Case for the Arts. In Context. No. 27: 46 - 47.

_____. 1994. What Do We Want Our Schools to Do? Phi Delta Kappan. 75 (6): 446-52.

_____. 1995a. Boston Public Schools as Arts-Integrated Learning Organizations: Developing a Culture of High Standards for All. An Address to the Council of Elementary Principals Meeting, May 18. Boston, MA.

_____. 1995b. Appendix. Boston Public Schools as Arts-Integrated Learning Organizations: Developing a Culture of High Standards for All. An Address to the Council of Elementary Principals Meeting, May 18. Boston, MA.

_____. 1995c. Changing Course - Education Reform through Community Dialogue. An Address to the Texas Education and the Arts Conference : Partnership 2000. Feb. 23.

Olshansky, B. 1994. Making Writing a Work of Art: Image-Making within the Writing Process. Language Arts. 71 (5): 350-356.

Oyler, C. 1996. Making Room for Students : Sharing Teacher Authority in Room 104. New York : Teachers College Press.

Peeno, L.N. 1993. Art Education is School Reform. ed. A.N. Johnson. NAEA Advisory. VA.

Rabitti, G. 1994. An Integrated Art Approach in a Preschool. In Reflections on the Reggio Emilia Approach. eds. L. G. Katz and B. Cesarone. Illinois: Eric: 61 -80.

Raywid, M. 1993. Finding Time for Collaboration. Educational Leadership. 51 (1): 30 - 34.

Read, H. 1974. Education Through Art [1948]. New York : Pantheon Books.

Rockefeller, D. Jr. ed. 1977. Coming to Our Senses: the significance of the arts for American education. New York : McGraw Hill.

Rogers, C and H.J. Freiberg. 1994. Freedom to Learn. third edition. NY : Merrill, an imprint of Macmillan College Publishing Company.

Ross, A. and K. Olsen. 1995. The Way We Were... The Way We CAN BE : A Vision for the Middle School Through Integrated Thematic Instruction. 3rd edition. WA : Books for Educators, Inc.

Samples, B., B. Hammond, and B. McCarthy. 1985. 4MAT and Science: Toward Wholeness in Science Education. Illinois: Excel.

Schiff, C. 1977. Initiating, Organizing, and Administering a Learning to Read through the Arts and Humanities Program in a School District and aSchool Building. (ERIC Document Reproduction Service No. ED 144 030.

Schiller, M. 1995. Reggio Emilia: A Focus on Emergent Curriculum and Art. Art Education. 48 (3): 45-50.

Schumacher, S. 1981. Richmond County Public School's Arts Program : An Evaluation of the Impact of the Arts Program in the Curriculum, Students, Teachers, and Community. (ERIC Document Reproduction Service No. ED 209 303).

Smith, R.A. 1983. The Arts In General Education Ideology: Some Critical Observations. Studies in Art Education: A Journal of Issues in Research. 36 (4): 34 - 38.

Steiner, S.F. 1993. Preparing Prospective Elementary Teachers to Teach: Geographical Features with an Integrated Approach: Teacher's Notebook. Journal of Geography. 92 (5): 231 - 233.

Stephens, D. 1994. Learning That Art Means. Language Arts. 71 (1): 34 - 37.

Strickland, D.S., and L. M. Morrow. 1990. Integrating the Emergent Literacy Curriculum with Themes: Emerging Readers and Writers. The Reading Teacher. 43 (8): 604 - 605.

Sullivan, G. 1993. Art-Based Art Education: Learning That Is Meaningful, Authentic, Critical, and Pluralist. Studies in Art Education: A Journal of Issues in Research. 35 (1): 5 - 21.

Sylwester, R. 1995. A Celebration of Neurons : An Educator's Guide to the Human Brain. VA : ASCD.

Tomlinson, C.A. 1995. How to Differentiate Instruction in Mixed-Ablity Classrooms. Virginia : Association for Supervision and Curriculum Development.

Toward Civilization: A Report on Arts Education. 1988 Washington, D.C. : National Endowments for the Arts.

Vars. G.F. 1991. Integrated Curriculum in Historical Perspective. Educational Leadership. 49 (2) : 14-15.

Vecchi, V. 1993. The Role of the Alelierista: An Interview with Lella Gandini. In The Hundred Languages of Children: The Reggio Emilia Approach to Early Childhood Education, ed.C. Edwards, New Jersey : Ablex: 119 - 127.

Walmsley, S.A. 1994. Children Exploring their World: Theme Teaching in Elementary School. Portsmouth, New Hampshire : Heinemann.

Weigand, H. 1985. From Science Into Art. Art Education. 38 (6): 18-21.

Weinstock, R. 1981. Arts in the Curriculum. (ERIC Document Reproduction Service No. ED 206 529).

Welsh, N. & Greene, A. et al. 1995. Schools, Communities, and the Arts : A Research Compendium. Morrison Institute for Public Policy School of Public Affairs. Arizona State University.

Werner, J. 1981. Using Art in an Integrated Primary Curriculum. (ERIC Document Reproductive Service No. ED 246 000).

Winslow, L.L. 1939. The Integrated School Art Program. NY: McGraw Hill.

Witherell, C. and N. Noddings eds. 1991. Stories Lives Tell : Narrative and Dialogue in Education. Forward by Maxine Greene. New York: Teachers College Press.

Wolfe, P. 1986. Translating Brain Research into Classroom Practice. Live Seminars on Tape. VA: Association for Supervision and Curriculum Development.

Yin, R.K. 1994. Case Study Research : Design and Methods. 2nd ed., California : Sage Publication.

York, P.M. and E.J. Follo. 1993. Engagement rates during thematic and traditional Instruction. Oakland University. (Eric Document Reprodution Service No. ED 363 412).