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DISCOVER DANCE CD-ROM FOR DANCE EDUCATION:
DIGITAL IMPROVISATION AND INTERACTIVE MULTIMEDIA

DISSERTATION

Presented in Partial Fulfillment of the requirement for the Degree of Doctor of Philosophy in the Graduate School of The Ohio State University

By

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*****

The Ohio State University
2000

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Michael Parsons
Advisor
Department of Art Education
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2000
ABSTRACT

This study examines the process of development and design of the Discover Dance CD-ROM for fifth graders to make and perform dances using computer-assisted instruction (CAI). The research looks at the complexity of components surrounding multimedia for dance education and sheds light on the issues surrounding the teaching and learning of dance using CAI.

Case study methodology was used to determine the effects of the Discover Dance CD-ROM on fifth graders' ability to make dances, perform dances, and inquire in the dance domain. Participants for this pilot study were 14 fifth-grade students attending a two-week summer dance and technology workshop at The Ohio State University led by the researcher. The students were instructed in dance using the Discover Dance CD-ROM and studio activities for a total of twenty hours, two hours a day for two weeks.

Data was collected from multiple sources including student journals, interviews, focus groups, and dance making. In the data collection, emphasis was placed on description and interpretation of the elements rather than measurement and predictions. The students were active co-researchers in this process.

The results of this study reveal information about the issues of learner diversity, knowledge construction, communication, and constructivist approaches to learning. The study focused on issues of CD-ROM development, interface design, interactivity, organization, and multimedia content as applied to the Discover Dance CD-ROM. The study identifies the advantages and obstacles of employing technology in the teaching of
dance to children, making specific reference to the Discover Dance CD-ROM and its impact on children’s dance making, dance sharing and dance inquiry.

Data reflected that when using the Discover Dance CD-ROM, students were constantly engaged, focused, and intent on learning. The workshop students and outside evaluators characterized the Discover Dance CD-ROM as a valuable resource for self-discovery, choreographic inspiration, understanding and clarifying difficult concepts, outlining and recording students’ thinking and encouraging their active investigation, self-reflection, and productive dance inquiry.

This work in multimedia technology for dance education is still in its early stages. Future research can draw from these results to help expand both the development of new media technologies and the integration of interactive CAI into teaching and learning in dance education.
Dedicated to my family
I would like to thank especially my advisor Dr. Michael Parsons for his guidance which led me to challenge my bias for dance as physical action and consolidate my professional thinking. I thank him for his patience, encouragement, and support that saw me through this lengthy process.

Dr. Patricia Stuhr, whose critical questioning brought clarification to my thinking and allowed me to venture into deep waters with confidence.

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I would also like to thank Dr. James Hutchens and the Department of Art Education at The Ohio State University for supporting my professional growth. I am grateful to Holly, Leslie, and Sevenda's smiling faces that greeted and helped me stay on track with procedures and paperwork.

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I am also appreciative of the support, space, and time offered by Dean Wills and Claudia Murphey, Chair of the dance department, and the entire Arizona State University Department of Dance faculty and administration.

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William: you have been a tremendous source of strength and perspective. And my
undying gratitude goes to my husband Lee Biberdorf: without you, none of this would
have been possible: your unconditional love, support, and devotion go beyond words.

Thank You.
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- Integrated Curriculum
- Labanotation/Motif Writing
- Cognition
- Interface Design
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CHAPTER 1

BACKGROUND

At the onset of the new millennium, American society is experiencing rapid and profound change, as information traveling at the speed of light transforms the way we live, communicate, form communities, and educate our children and ourselves. In short, we have become an information-rich culture.

National reform efforts like the U.S. Department of Education’s 1995 plan of action have challenged educators to “improve learning by creating interactive, high-performance learning environments” (U.S. Department of Education, 1995). The department’s plan is based on the potential for information technology such as multimedia and telecommunications that can improve learning. Since then, the U.S. Department of Education has required the integration of technology in all subjects, including dance. In the last few years, the majority of dance educators I have spoken to at conferences and workshops in the U.S. and abroad (over 500 teachers) have shown interest in including technology within their curriculum. At the same time, they have complained that they have few, if any, resources to assist them in creating quality dance experiences for their students.

As a dance educator in U.S. Public Schools for five years, I have become aware of the challenges of dance instruction in our schools, limited as it is by time, classroom
space, finances, administrative support, or teaching style, among other factors. The integration of instructional technologies can impact the type and kind of dance education delivered. But with what approach and to what purpose? Harrington (1991) cautions, "How technology is incorporated and used may significantly impact what education becomes" (p. 54).

In order to address the application and utilization of technology in the dance curriculum, attention must be given to the dynamic partnership formed by the student, teacher, and computer technology. Over the last four years, I have been investigating the use of computer technology in dance education and have developed an interactive, multimedia teaching tool for children, a CD-ROM called Discover Dance, to meet the needs of teachers and students. This CD-ROM was designed to supplement classroom instruction in dance with computer technology. It uses Laban Movement Analysis and Motif Writing to blend the physical experience of dance (choreography, improvisation, and performance) with computer technology (digital video, databases, Internet links, and printing capabilities) to enhance students' skills of dance inquiry, analysis, and choreography.

Especially in dance education, the development of media technologies has remained completely untapped; and hindered by the lack of meaningful evaluation of technology, educators struggle to meet equivalency requirements as they search for new paradigms in technology education. A definite need exists for meaningful discussion between technology developers, teachers, students, and researchers, and for formative evaluation of the emergent CAI. This CD-ROM fills a void in the field of K-5 dance education, where computer-assisted instruction (CAI) has been nonexistent to date. With
this CD-ROM, students and teachers can test CAI product design in the classroom to see how they match up to their specific curricular needs.

In this dissertation, chapter one provides an overview of my research and is divided into five parts. These include (a) a statement of the problem, (b) the purpose of the study, (c) the significance of the study, (d) the scope of the study, and (e) the definition of terms. The second chapter reviews literature on current practices in dance education and dance technology. It also includes an examination of Motif Writing and Laban Movement Analysis as applied to the teaching of children's dance education. The third chapter details the research, design, and development of the Discover Dance CD-ROM. The fourth chapter presents the research methods employed in testing the Discover Dance CD-ROM. The fifth chapter presents the analysis of data. The sixth chapter presents a summary of the study, conclusion, and recommendations.

**Statement of the Problem**

The development of media technologies has remained completely untapped in dance education. I have undertaken this research and development of the Discover Dance CD-ROM for children because computer-assisted instruction (CAI) is nonexistent to date in the field of K-5 dance education. In all fields of elementary education, there is a need for technological field-testing and research in "real" classroom environments where technology is used to enhance learning (Carlson, 1998). In order to improve existing methods for instruction, teachers, researchers, and technology developers can learn from one another how to best capitalize on CAI.
Numerous research initiatives propose educational technology as having the potential to meet the needs of our diverse population of students by (1) facilitating diverse teaching practices (Papert, 1980; Budin, 1991; Budin, 1997; Read, 1997; Sandholtz et al., 1997; McGee, 1999); (2) supporting individualized learning (Grey 1989; Mendrinos, 1997; Gore, 1997; Fisher-Stitt, 1994; Sandholtz et al., 1997); (3) fostering new methods of communication (Gore, 1997; Ryder & Hughes, 1997; Trentin, 1996; Margolies, 1991) and (4) providing powerful tools to transform teaching into vivid, student-centered interactive knowledge environments (Resta, 1993; Fisher-Stitt; 1994, Jonassen, 1996; Maletic; 1996, Sandholtz et al., 1997).

Current trends in education reflect the shift away from traditional, linear, highly structured "assembly line" pedagogy toward more active, student-centered, problem-based constructivist pedagogy (Budin, 1997). Constructivists argue that learning is an active process, in which students actively construct knowledge from their experiences in the world. The pedagogy suggests that students don't get ideas, they make ideas.

Instructional technology has been widely discussed as supporting constructivist teaching practices (Budin, 1997). Such researchers advise moving away from the notion of teachers as the leader, delivering instructions toward the concept of the teacher as a facilitator and coach, and using "flexible strategies for learning" (Budin, 1991, p. 16).

Mendrinos (1997) advocates interactive multimedia technology as supporting individualized learning structures. Widely discussed is the ability of CAI to support the diversity of learners and addressing the needs of multiple populations at the same time. Multimedia technology works to personalize the students' experience by allowing
students to progress at their own pace, providing immediate feedback and personalized instruction.

Instructional technology is fostering new methods of communication (Gore, 1997). Riel (1996) views the Internet and other mediated technologies as dynamic active places that promote meaningful discovery. The Internet is a powerful resource that encourages students to share ideas and acquire information. Computer-mediated communication serves as a great equalizer, allowing students access to anyone, no matter the racial, economic, or geographical distance. Online students are able to form communities as they learn from, share, and consult with one another in a purely digital realm.

Instructional technology and multimedia technologies provide powerful tools to transform teaching into vivid, student-centered, interactive knowledge environments. Further, Baltra (1987) suggests that computers are suitable for the development of "communicative fluency by integrating the four communicative abilities—listening, reading, speaking and writing" (p. 8). Repeatable and patient, CD-ROMs can be viewed at any time and can be adapted to the learning needs of each student. Therefore, interactive video-based CD-ROMS can be used as powerful tools in creating a contextually rich instructional environment for learning. Thus it becomes clear that instruction incorporating technology has the potential to support students in various types of learning that include problem solving, communication, and knowledge construction. Accordingly, these new methods, when thoughtfully applied in the dance education curriculum, may be capable of adding a new dimension to the teaching and learning of dance.
Purpose of the Study

The purpose of the study is to develop an interactive multimedia CD-ROM that would teach dance in support of the National Standards for Dance Education, provide a resource for dance education rich in multiculturalism, introduce the principles of Motif Writing and Laban Movement Analysis, and assess the effects of CAI. Case study methodology is used to explore the responses of the Discover Dance CD-ROM on fifth graders’ ability to make dances, perform dances, and inquire in the dance domain.

The reasons for developing and testing the Discover Dance CD-ROM for dance education comprise a number of practical goals. These include the desire to: enable students to see a broad picture of dance; encourage the use of dialogue, analysis, and documentation in dance education; create an effective tool for the teaching and learning of dance; and provide an illustration of CAI application in the dance class.

Research Questions

The following research questions will be addressed. Can a CD-ROM be created that will:

(1) support the National Standards for Dance Education?

(2) provide a resource for dance education rich in multiculturalism and the principles of Motif Writing and Laban Movement Analysis?

(3) enhance the students’ ability to inquire about dance, make dance, and share dance?
Significance of the Study

This study is significant because research of this kind does not exist to date. This study lays the groundwork for further inquiry. Recommendations for appropriate use and sequencing of instructional technology will bring credibility and advocacy for this kind of emerging innovative instruction. Findings from this research may lead to further development of new media in dance education. In addition, this study provides:

• Greatly needed multimedia resources to educate teachers and students in dance education;

• Field testing and vivid case study examples of dance multimedia used in school contexts;

• Dance educators with resources, strategies, and ideas for integrating multimedia technology within their curriculum;

• A recounting of the processes of development of a multimedia dance education CD-ROM;

• A multimedia CD-ROM for critical review and use in children's dance education curriculum.

Scope of the Study

This research study is limited to the teaching of dance, using the Discover Dance CD-ROM. The study will not evaluate the success of the Discover Dance CD-ROM and teaching methods with various groups at various times. A comparison of this method to other methods of instruction was not undertaken. The interests of the researcher focused
on the students’ abilities to create, share, and inquire about dance using the Discover Dance CD-ROM.

This research study is focused on the implementation of the Discover Dance CD-ROM within the fifth-grade dance education curriculum, emphasizing a constructivist approach to teaching and learning. Significance is placed on the process of dance making and dance documentation (notation, analysis, and journalizing) in the assumption that (1) the Discover Dance CD-ROM supports students' investigation toward their personal creative dance-making efforts, and (2) in experiencing the process of dance making, analysis, notation, and journalizing, students will apply these skills towards continued learning in dance and their employment in other subject areas.

This study does not intend to propose a specific model of teaching dance using the Discover Dance CD-ROM; rather, the course materials are presented to illustrate and demonstrate one application of the data. The number of students who participated in the Discover Dance workshop was rather small, with 14 students. Findings from the workshop were documented as examples of student participation in instructional method to illustrate the practical reality of teaching and learning through CAI.

The findings of the study were based on the observation, interview, and analysis of student choreography during the dance technology workshop. The study did not involve an attempt to evaluate student performance in dance outside the workshop experience. When relying on interviews and focus groups as a source of data collection, human error and oversight are always present. The type and order of individual and focus group interview questions was dependent on participation and interest of the students, which may limit the depth of the information obtained.
A method of instruction in such a complex area as dancing has numerous
dimensions that only become comprehensible and pertinent in movement. Therefore, this
instruction can only be described in a limited way. Due to the complexities of CAI as
applied to the teaching and learning of dance, this examination supplies only a glance
into a much broader strategy for instructional technology integration in dance education.
As I am not only the researcher and instructor but also the multimedia developer, this
study is highly dependent on my relationship with the students. This distinctive
relationship significantly shaped data collection and analysis.

**Definition of Terms**

**Dance-Content Specific**

To clarify the discussion, I will define some useful terminology.

**Dance**- is human behavior composed of purposeful, intentionally rhythmical, and
culturally influenced sequences of non-verbal body movements mostly other than those
performed in ordinary motor activities. The motion has an inherent aesthetic value and
symbolic potential (Hanna, 1991, p. 11).

**Contemporary methods for dance education**- focus on students’ development of
creativity, imagination, and individuality by making personal responses to a given
assignment in dance. Based on the National Dance Standards, contemporary methods of
dance education include instruction in the elements of dance, dance making, dance
sharing, and dance inquiry.

**Dance making**- or choreography is the action of exploring, selecting, and constructing
movement to express ideas. Dances can be created alone or with others. Dance making
involves both improvisation and set choreography in its process. It involves creating dance shapes, movements, phrases, studies, and complete dances. Important aspects of dance making: collaboration, cooperation, ongoing process, expressing thoughts and ideas in movement, improvisation or free dancing, setting choreography, motif, and exploring the elements of dance.

**Dance sharing**- occurs among people through dancing together in a group or by performing for others. Dance sharing can occur in numerous venues from formal concert stages to informal showing for classmates, communicating with others through dancing, responding to, and recording dance. Important aspects of dance sharing include dance recording, dance production, communicative aspects of dance, observation of others, describing others in dance, interpreting others in dance, evaluating others in dance, appreciating diversity of dancers.

**Dance inquiry**- is the action of posing questions, analyzing relationships, evaluating and identifying the meaning and significance of dance, and a student’s place in it. Asking questions, researching, and theorizing about dance as it is experienced and expressed in a variety of cultural, social, historical, and philosophical contexts. Important aspects of dance inquiry: it expresses culture, social organization, aesthetics, and social dance.

**Dance study**- is a sketch, an investigation resulting in an incomplete symbolic form. A dance study lacks fullness and depth to be entirely expressive in and of itself.

**Dance composition**- a child’s dance study becomes a dance composition when it is complete, and needs no further work or elaboration. It stands in and of itself as a concrete work of art.
Improvisation—differs from a dance study as it concentrates on the present moment and the dancer's physical response "in" the moment. Improvisation is also used in dance making as a method for inventing and investigating new movement material.

Set choreography—differs from improvisation, as it requires memorization of movement sequences and patterns.

Technology-related terms

Authoring package—A computer program for constructing (authoring) multimedia presentations.

Computer-assisted instruction (CAI)—The interaction of a learner with a computer in a direct instructional manner. Effective CAI should keep students actively engaged, encourage higher-order thought processes such as problem solving, and meet students' learning needs.

CD-ROM—Acronym for compact disc read-only memory. A CD-ROM is used for the storage and distribution of digital information intended for computer use.

Database—A large collection of computerized data, organized so that it can be retrieved rapidly.

Design—The process of creating instructional materials. In this case, a multimedia interactive environment (Discover Dance) that emphasizes the selection of component, formats, and media.

Development—The period (process) from the conception of the idea through to the final completion (implementation) of the product.
**Formative evaluation** - The continuous process of assessment, critique, and feedback during all of the stages of design and development of the product.

**Interactive** - A computer interface in which the user's responses and choices direct the computer's presentation.

**Interface** - Hardware or software that allows communication between two components, such as from computer to computer, computer to musical instrument, or user to computer.

**Internet** - A worldwide computer network connecting individuals, organizations, and other computer networks to information services and electronic mail.

**Integration of technology** - The use of appropriate technology in classrooms to access information and communicate knowledge.

**Multimedia technology** - A combination of text, graphics, video images, and audio resources in one interactive format.

**Quicktime** - An extension of Macintosh system software that provides facilities for managing time-based data such as movies and sound files.

**Scanner** - A device that optically senses text, graphics, photos, or other images and creates a picture of them in digital form on a computer.

**Teaching tool** - Use of technology as an integrated resource to accomplish teaching objectives as opposed to the use of technology as an end in itself.

**Technology** - Computers, software, multimedia application, CD-ROMs, modems, and video.
CHAPTER 2

LITERATURE REVIEW

The purpose of this review of literature is to examine the historical, conceptual, and instructional underpinnings of the Discover Dance CD-ROM. In this discussion, I will examine the following: the evolution of dance and technology, issues of technology implementation in the schools, and the theoretical base for development.

The Evolution of Dance in Technology

Historically, the role of artists has been to create, expand, invent, and define new technologies as they grow dissatisfied with the current tools available. In the last thirty years, many artists and choreographers have investigated methods of implementing computer technology. I will briefly discuss them below.

Early experiments in dance and technology considered indeterminacy and the place of computers in choreographic structure. Artists such as LeVasseur (1965), Beaman (1965), Cunningham (1968), and Tharp (1969) studied the role of the computer in generating random movement tasks that they developed into dance compositions. Then with the development of animation software and graphic interfacing, artists (Schiphorst, 1992; Manley, 1995) began investigating the possibilities of dance unbound by the physical body and the forces of gravity.
In the 1980s and 1990s, interactive environments and computerized performance spaces have become popular, guiding the performers in a 'sensory' experience, with their bodies activating various computerized sensors for sound, light, and images. Artists like Mitchell, (1992), Lovell and Mitchell (1995), Povall (1995), and Bromberg, Mitchell, and Rosenberg (1999) are re-examining dance performance using integrated media technology to create interactive, simultaneous, transcontinental, and virtual dance performances.

Interactive installations have led to virtual environments and VRML 'democratic' Internet performance spaces. Artists like Sharir and Gromala (1995), Schiphorst, Naugle, and Mah (1999), and Garland and Naugle (1999) amplify and extend the human body into real and virtual performance environments on the Internet. Redefining traditional performance venues, these artists advocate on-line collaborative performance that is democratic and collective, allowing anyone to participate.

Technology has been used in dance preservation, documentation, and education since the mid 1980s. Early projects, which were largely text-based, began on a single floppy disk, holding only 1.44 MB of information. Fortunately, the development of CD-ROMs holding 650 MB of information allowed developers to be able to present related graphic images, sounds, and most importantly, moving images within the documentation process (Fisher-Stitt, Warner, & Martin, 1992; Maletic & Sutherland, 1995; Ryman, 1995, 1999; Maletic & Smith, 1999).

Currently, there are CD-ROMs available and in development on important dance artists and their work, movement analysis, and various technical dance styles, as in ballet. Several of these are presented in detail.
Through the Internet, we can communicate with people from all over the world. Internet communication has become an effective medium for the exchange of knowledge and ideas about dance, as it opens the lines of dialogue, bringing contact between artist, student, and teacher. As Lisa Naugle (1998) points out, "technology can help build bridges between art forms, and it offers artists and educators expanded options for expressing ideas" (p. 15). Technology has influenced all aspects of the dance experience. In this section, I will discuss research and innovation in choreography, notation, documentation, and dance education with technology.

**Choreography and Digital Technology**

The earliest explorations in computer animation came from scientists, architects, and choreographers, who developed methods allowing computers a voice in the construction and performance of dance. Choreographers Merce Cunningham and Twyla Tharp are known for their technological investigations. In the late 1960s, they choreographed dances by experimenting with the concepts of indeterminacy and chance-generated compositional processes. Both choreographers found interesting ways to bring digital technology into their choreography.

In 1968, Cunningham wrote about the influence of chance methods and computer technology, stating that "the use of chance methods demanded some form of visual notation... a crude computer in hieroglyphics" (no page numbers). A year later, Tharp created the *History of Up and Down*. In this dance, she used a computer program to make selections from a list of movement elements. The selections (computer lists) offered unusual juxtapositions of movement which Tharp used as thematic material for the
choreography. Not only were the movement choices generated by the computer, but the stage lighting was also determined by the computer. Twenty-two years later, Cunningham further utilized the computer as a choreographic tool. In 1991, Cunningham created Trackers, the first dance choreographed with the assistance of LifeForms, a human animation software. In Trackers, one third of the movement was created using LifeForms on Cunningham’s SGI personal computer.

LifeForms, developed by Thomas Calvert, is a tool for creating and planning human movement in dance and choreography. Singular to Calvert’s design, LifeForms provides the user the ability to present a three-dimensional performer (with unique physical abilities) alongside the choreographic organization of creating movements, structuring motifs, and forming choreographic studies. Theda Schiphorst eloquently describes technology’s appeal for the choreographer. “In dance, where the creative idea is a movement idea, the goal is to be able to visualize and create movement on the body in an immediate and responsive way, so that the computer can become a visual idea generator” (p. 46).

Cunningham is known for innovation and exploration in dance making. He spoke of his appeal for movement imagined with the support of the computer: “One can make things with it [LifeForms], one doesn’t have to put things in [into their choreography that] one already knows ... one can make discoveries [!], and that interested me from the beginning.” In an interview with CNN, Cunningham spoke of the possible importance of computerized choreography: “I think this technology can, in this case, particularly ...open out a way of looking at dance and movement in a way that would be stimulating and
invigorating to the whole dance field eventually” (CNN, Arts and Technology report, March, 1991).

In dance education, LifeForms is widely recognized. On-line college-level courses have been developed for its instruction. Enthusiastic educators have found ways to adapt the software to meet the needs and interests of younger students, allowing upper Elementary and Middle school students, like Cunningham, make discoveries and express themselves with computer choreography (Manley, 1995; Unrau, 1996).

**Notation, Choreography, and Performance**

Recording dance notation onto paper is a time-consuming and arduous process. A single notation score may take over a year to complete, with revisions further extending the process. Technological developments in software have enhanced the writing and reproduction of dance notation. For instance, LabanWriter and LabanReader are software applications that have changed the quality and accessibility of Labanotation.

LabanWriter is a software program designed to record dance in Labanotation. It was developed by Lucy Venable and Scott Sutherland in 1990 at The Ohio State University. The LabanWriter program includes more than 700 symbols that indicate human movement such as direction, level, body part, type of movement, and duration. The software facilitates fast and consistent notation, allowing a notator (and student) ease in recording, editing, copying, and storing their work on a computer. As students learn Labanotation, they learn to record their ideas using LabanWriter.

A related notation application is called “LabanReader,” which was developed in 1998 by Sheila Marion and Will Smith at The Ohio State University. LabanReader is
intended as a tool to assist in teaching and learning Labanotation. Making notation more accessible for non-notators to use, LabanReader allows LabanWriter documents to be opened and to have the numerous notation symbols grouped together. For example, the supports, arms, or legs can be treated as a unit, or they can be removed or grayed out to allow the student to “more easily see patterns or columns of symbols” (Marion, 1999). This technique can allow a student reader to more rapidly translate the symbols from paper into actual physical movement.

LifeForms and LabanWriter have become the two most widely used software programs in dance notation and choreography. The developers, listening to requests from the field, are in the process of developing a translator to run between these two applications. The translator would allow Labanotation scores written with LabanWriter to be directly interpreted into three-dimensional human animation within Lifeforms. The reverse would also work, allowing LifeForms animation to be translated into LabanWriter Labanotation scores. The translation project between LabanWriter and LifeForms breaks new ground in dance, technology, and education by creating a compatible communicable interface.

The project designer intends to develop a method for documenting a larger portion of written notation, providing easy access to notated dances and “improving the dance field’s ability to create a lasting record of dance in the next century” (Fox 1999, IDAT program). It is my hope that the interface will inspire students to learn both choreography and notation simultaneously. Therefore, like musicians, students of dance will be able to create and record their dance studies in Labanotation, as they are recording and composing them in Lifeforms.
Documentation and Preservation

In the 1990s, the dance community experienced the loss of several of its prominent choreographers to AIDS. The dance community realized that its rich and diverse dance history was slipping away. This urgency to preserve dance history and to create integrated resources led dance researchers toward multimedia technology, and documentation and preservation efforts led the field of dance and technology. Two influential projects include York University in Canada “Shadow on the Prairie: An Interactive Multimedia Dance History Tutorial” and “The Ohio State University’s Multimedia Dance Prototype” (OSU-MDP).

“Shadow on the Prairie” is the first hypermedia program developed for dance. The project written in HyperCard software (no longer available) was developed from 1989 to 1992 by Norma Sue Fisher-Stitt, Mary Jane Warner, and Blake Martin. The project focused on the Gweneth Lloyd ballet *Shadow on the Prairie*, choreographed for the Royal Winnipeg Ballet in 1952. Shadow on the Prairie was the first multimedia project to incorporate Quicktime video along with text, graphics, and sound. Additionally, it not only provided the student with information on the history of the ballet, the choreographer, dancers, the music, sets, and costumes, but also presented the ballet in digitized video clips. This research encouraged others to examine the potential of technology as a new method for teaching and preserving dance history.

Shadow on the Prairie centered on students’ “active participation and decision-making ... through the learning process,” and was vastly different from traditional lecture forms found in dance history (Fisher-Stitt et al., 1992, p. 17). The HyperCard format allowed the student to gather information as a “process of discovery according to their
individual needs and interests" (Fisher-Stitt et al., 1992, p. 17). Advantages of this method were instructor convenience and student self-paced and self-directed learning. Shadow on the Prairie also offered the first teacher resource guide to accompany the CD-ROM. This guide furnishes inquiry questions and activities relating to dance history, dance analysis, and choreography. While available, Shadow on the Prairie movies cannot be played on the current version of QuickTime.

The Ohio State University Multimedia Dance Prototype (OSU-MDP) was the innovation of Vera Maletic and Scott Sutherland. In 1991 they conceived of an interactive multimedia dance documentation model. Within their non-linear multimedia framework, the MDP team were able to document the historic, aesthetic, and cultural importance of a choreographer or a choreographic work. Their model served two functions: (1) profiling a contemporary dance artist and (2) educating others about the field of dance.

First, the OSU-MDP team (Vera Maletic, Scott Sutherland, with Will Smith, Candace Feck, and Joukje Kolff) developed a CD-ROM on a significant dance artist, Victoria Uris. Second, out of the process of their research and development for the Uris CD-ROM, they produced a reusable multimedia “shell” for other artists to document their own choreography.

The Uris CD-ROM, completed in 1997, includes multilayered information on Victoria Uris’s choreographic tradition, cultural background, press clippings, interviews, and reviews of her work. The CD-ROM holds over 80 video excerpts. “Interactivity is the key mode of presentation” as students can navigate freely, “choosing the depth of information in which they are interested” (Maletic 1996, p. 14).
Further, the OSU-MDP model presents a branching-linking interface that offers the ability to interconnect multiple media sources. For example, the Labanotation score, musical score, and performance video are all linked to run simultaneously. While using the Multimedia CD-ROM, students can cross-reference information on a choreographic work with dance history, movement analysis, Labanotation score, and criticism.

While the OSU-MDP CD-ROM is clearly an exemplary model useful in a choreography, dance history class, or for archival documentation and preservation of a dance artist, the OSU-MDP project CD-ROM presents several concerns:

1. Overstimulation and saturation with the media choices can present the feeling of "getting lost" inside the program.
2. There is a lack of support media and teaching guides (electronic or printed) as resources for dance educators using the CD-ROM with their students.
3. There is insufficient research testing of the CD-ROM's influences on student learning.

Performance and Dance Technique

Several technology projects have focused on the skills and tools necessary for creating a dance, acquiring anatomical awareness, learning vocabulary, and studying skill sequences necessary for learning dance technique. These include Victoria Morgan's Ballet CD-ROM (1996); Ballet is Fun (1996) created by Ann Etgen and Bill Atkinson; Melanie Bales's Ballet Alignment (1998); The American Dance Legacy Institutes Repertory Etudes (1998); Kimberly St. Croix and Janice Plastino's Theraband Exercises for Dancers (1999), and more. Each of these interactive multimedia technologies
addresses dance concepts within a particular technique. In this discussion, of particular importance are the Ballet is Fun and Repertory Etudes Project.

The Ballet is Fun CD-ROM was created in 1996 by nationally known ballet dance teachers Ann Etgen and Bill Atkinson. The CD-ROM provides a detailed comprehensive archive of over 300 beautifully performed ballet steps. The contents are divided into lessons by type of movement action and technical expertise. Each step is represented by video and text. Description of terms are lengthy and written for high school or college students and are unsuitable for young children.

The objective of the Repertory Etudes project is commitment to presentation and preservation of important modern dance works. Under the guidance of the American Dance Legacy Institute (ADLI), the project seeks to "nurture the art of dance through education, access, and presentation (Strandberg, 1994). The ADLI Repertory Etudes project works with a chosen American modern dance pioneer to create a quintessential excerpt, which is learned by students and teachers. The excerpt or etude is then documented in a variety of ways and published in a format that includes text, choreographer's notes, CD-ROM, videotapes, music, dance notation scores, and support links through the Internet.

The Repertory Etudes project offers teacher education by guiding the instruction surrounding a seminal choreography work. The ADLI provides one week of teacher training with the choreographer, and then the teachers return home with resources to help guide student experiences. During this educational process, students dialogue with the choreographer over the Internet, research history related to the specific work, and "learn, refine, and perform" the etude (McGhee, 1999). I believe the innovation and strength of
the program is its fusion with accessible communication technologies through having the students communicate via e-mail with the artist.

The Repertory Etudes project presents several disadvantages. (1) The philosophy of dance education stresses product and the craft of learning, refining, and performing a modern dance etude correctly. This is out of place with current child-centered education reform in today’s public schools. (2) The project solely focuses on modern dance artists, as America’s cultural diversity in dance is not fully represented. (3) The current program design is restricted to middle and high school students within performing arts programs. It seems that the directors have lost sight of the fact that most dance education in the U.S. occurs in elementary schools.

With the exception of the Discover Dance CD-ROM, no instructional technology exists for the elementary school population. Discover Dance offers students a unique opportunity to meet students’ and teachers’ needs for technological integration, encourages more dynamic interaction between teacher, student, and dance, and ignites student interest in dance making, dance sharing, and dance appreciation.

In the next section, I will discuss issues and research in K-12 educational technology which directly impact the development and use of the Discover Dance CD-ROM.

**Implementation of Technology**

In the preface of Seymour Papert’s recent book “The Connected Family,” Nicholas Negroponte states, “Today’s kids bring a new culture to the family landscape. Children understand computers because they can control them. They love them because
they can make their own windows of interest. Remember sitting in class? If what a
teacher said was too simple, you lost interest. If it was too hard, you lost interest. And oh
how tiny that window was.” In my research and when conducting observations, I attempt
to identify an informational base where technology facilitates and enriches student
learning. I have thus identified several issues that are important when considering
technological integration in the dance curriculum. These include autonomy, access, and
community building equity, discovery learning, teacher-student discourse, and individual
learning styles.

**Autonomy**

While using instructional technology, students are ideally empowered with
choices, receive immediate feedback, and are motivated to learn (Mendrinos, 1997).
Instructional technology can thus address the needs of multiple populations at once,
thereby offering wide applications for those children who need special instruction, such
as those who are physically or mentally challenged. Instructional technology allows
students to progress at different rates, without pressure for completion based on time. For
those students who seek further information, instructional technology provides the ability
to revisit the material on their own. Computers, because they are manipulated by the
student, present a unique way of gaining the child’s attention and fostering new interest.
The advantages of multimedia educational tools include “patience on the computer;
tailored to one-on-one learning; instant feedback; [and] absence of other students that
could slow the learning” (Mendrinos, 1997, pp. 27-28).
Access

Technology in dance education can provide access beyond the traditional videotapes and books. In addition to the vast amounts of readily accessible information available through CD-ROM encyclopedias, technology has provided access to computer-mediated communication. Not only can students access information through Internet resources, but they can also utilize networking to work with other students (Jonassen, 1996). While CD-ROMs in dance are slow to production, telecommunication and the Internet hold immediate resources on choreography, history, and notation. However, much of the available content is not age-appropriate for K-8th graders.

Community Building

Computer-mediated communication can be a powerful tool for bringing teachers and students together as a community of learners. Trentin (1996) defines the Internet as "a powerful resource for accessing distributed information and interpersonal communication" (p. 98). He points out that telecommunications and the Internet have added inherent value, as students' written work becomes a motivation for communicating their ideas and experiences. "Students may propose an idea, support their position, argue their beliefs with a minimum of conflict and often with a degree of anonymity that allows a freer expression of their opinions" (p. 98).

Riel (1996) views the Internet as "a place where people can go to meet others with similar interests, build new settlements, share knowledge through teaching and learning, and form communities around common practices" (p. 10). Computer-mediated communication enhances socialization as it extends communication beyond face-to-face situations to interaction that is irrelevant to geographical distance (Margolies, 1991).

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Equity

Internet and computer-mediated communications through e-mail serve as great equalizers (Forcier, 1996). Since students can communicate with anyone who has access no matter the racial, socioeconomic, political, or geographic situations, computer-mediated communication is "a flexible and productive tool for the classroom teachers" and "provides an immediate means of obtaining and communicating information" (Ryder & Hughes, 1997, p. 53). The use of telecommunications through the Internet provides highways to the world. Among the strengths of asynchronous computer teleconferencing is that it is a student-centered medium that promotes active learning and "faceless intimacy" among students and encourages less aggressive students to participate. It requires more organization than face-to-face instruction, while reducing student isolation irrespective of location and encourages instructors to transform their teaching (1995, Eastern Oregon State College).

Access to a global dance community heightens students' perception of dance in their external environment and broadens their dance community. Web sites such as ArtsEdNet provide teachers and students with an extensive and growing interactive database on the performing arts. The Repertory Etudes Project is an important dance education project investigating the potential of computer-mediated communications using e-mail communication between high school students and professional choreographers. Eliminating the obstacles of geography, the Internet and e-mail encourage students to see beyond themselves and their immediate surroundings and enter dialogues with the wider world. With computer-mediated communications, dance students now have entrance and access to dance opportunities where there was none.
Through the Internet, the "outside world" can digitally enter the classroom. This multipurpose tool is important when working with students who may have limited previous experience with dance. Using e-mail, list-serves, and the World Wide Web, students can become familiar with and "get connected" to the wide range of dance in their own communities and the world. By reaching out to use the Internet, students can get to know individual artists from all over the world, strengthening the global community and informing students’ growing definition of dance education.

Riel (1996) points out that the traditional classroom is confining, in that it "isolates both students and teachers from the experiences that will help them understand the past, develop skills for building a future, and prepare for their role as citizens" (p. 14). Sadly, even with large government initiatives to bring computers into the schools, high-speed Internet access is simply cost prohibitive for many school districts. In 1999, the Milken Exchange on Education Technology published Transforming Learning through Technology, an in-depth plan of action, which indicates that between 1994 and 1998, the number of schools with connection to the Internet doubled. Other issues remain. The publication by the Milken Exchange continues to say that few teachers have classroom access to the Internet and concludes that "most classrooms do not have easy adequate access to the Internet" (Milken, 1999, p. 4).

**Discovery Learning**

Teaching and learning are dynamic and interactive processes. In this context, multimedia and computer-mediated communications provide opportunities to nurture students developing a knowledge base and problem solving and thinking skills with
motivation and movement. An expert in instructional technology, Mendrinos (1997) discusses the adeptness of multimedia:

Multimedia, whether on the Internet or on CD-ROM motivate and assist students of all ages to participate and benefit from parallel-thinking strategies. Students can click on highlighted text, images, sounds or graphics and branch and explore related information. The student is in control of the hypertext environment and he or she is empowered to make the linkages to expand and explore new knowledge paths. (p. 22)

Mendrinos (1997) further points out: “Electronic tools... do not present information as being fixed or stagnant. Information is fluid and easily manipulated” (p. 22).

**Student-Teacher Discourse**

An advantage of instructional technology in the dance classroom is the computer's ability to capture and store students’ thoughts and ideas on the hard drive and on paper. This affords both the student and teacher the opportunity to return and reflect on their work at a later time (Gore, 1997). In addition, students and teachers can employ technological tools to solve problems, communicate results, and receive feedback from peers and experts that in turn can enrich and extend their learning goals.

**Individual Learning Styles**

Multimedia education is collaboration between teacher, students, and technology to make learning meaningful. Multimedia can account for multiple learning styles represented in Howard Gardner’s (1983) research indicating that every child has all seven learning styles in different proportions. In reference to Gardner’s Multiple intelligences theory and its link to multimedia technology, dance educator and co-creator of Shadow on the Prairie, Norma Sue Fisher-Stitt (1994) states:
The multimedia lesson provides numerous entry points for the learner; text for the linguistically strong, sound or music for those whose strength lies in the musical domain, and visual content for those spatially oriented. (p. 4)

The course to rich dance technology is yet unknown. Resources are being created, but do these new materials match the existing facilities in our schools? In the next section, I will describe some important considerations when integrating technology within children’s dance education curriculum.

Current trends in education reflect a shift from traditional didactic pedagogy toward student-centered constructivist pedagogy (Budin et al., 1997). The constructivist theory of learning is a model that views learners as actively involved in the construction of their own representations of knowledge. According to this view, “learning is the process of building knowledge structures by connecting what is known to new information, ideas, and concepts and integrating them to form new understandings” (Read, 1997, p. 1). In it, students take initiative by asking questions, gathering information, solving meaningful problems, communicating with others, and constructing their own knowledge of the world (Budin, 1997). Constructivist theory maintains that learning is a developmental process, and the process for completing a piece of work is just as important as the product (Read, 1997).

**Challenges of Teaching and Learning Dance with Technology**

Investment in educational technology is increasing with widespread interest in its ability to facilitate teaching and learning. Yet many issues remain unclear and deserve careful examination. Issues of technological integration prevail, as it will take time for all states, districts, schools, and teachers to meet current educational standards for
technology. The first five challenges for technological integration (professional
development, quality software, hardware quality, lab access, and inequity) exist across
domains and will be dependent on developing resources, financial support, and training.
The last three are potential issues for technological integration (safety, passive learning,
and kinesthetic intelligence) that directly concern the dance educator.

**Professional Development**

Computer integration has been mandated on a National level at all age levels and
within all subjects. But teachers' readiness in operating computers is a concern. Most of
the teachers in today's classrooms have had little training in technology. Struggling with
a lack of professional development opportunities and resources, all educators are working
to find appropriate strategies for integration. Teachers' attitudes about computers and
about using computers in the classroom vary widely. Some teachers feel excited about
integrating computers into their teaching, while others feel intimidated (Hoot, 1994).
Often, this fear stems from lack of professional development opportunities in dance
education. At the present time, there is one program, "Making connections: Technology,
education, and dance" from the South Carolina Center for Dance Education, that is
working to fuse teacher training in both dance education and technology. New initiatives
include offering technology workshops at National dance conferences for teachers to
learn the tools of technology while earning CPU credits.

**Quality Software**

Another concern in using computers in dance education is whether computers can
fit in the teaching and learning of dance. Some researchers have found that using
instructional technology with children was developmentally appropriate. Other educators,
such as Elkind (1987), claim that computers need to be used as teaching tools, offering drill-and-practice activities, because a child's cognitive development cannot rely on some open-ended software programs.

According to the curriculum guidelines that the National Association for Education of Young Children (NAEYC) stipulated in 1991, the use of drill-and-practice software is inappropriate, because it limits young children's thinking. "Such programs exert centralized control over children's development and emphasize memorization, providing them with few opportunities to interact with people and objects around them" (Haugland & Wright, in press). The use of structured software (such as drill-and-practice), therefore, should be minimized.

Children are very likely to learn more when working with appropriate computer software. Wright & Shade (1994) state, "the effectiveness of computer learning depends critically on the quality of the software" (p. 33). It is the teacher's responsibility to select appropriate software to help children acquire knowledge effectively.

At the present time, Discover Dance is the only software designed for elementary school dance students. Discover Dance has received attention nationally and internationally as the first comprehensive product created for the specific needs of elementary school students and their teachers. Software and CD-ROMs like LifeForms (1991), LabanWriter (1993), OSU-MDP Victoria Uris (1997), The Ballet CD-ROM (1996), Shadow on the Prairie (1987), Interactive Multimedia Dance (1997), Time, Space and Body Movement (1999), Repertory Etudes (1999), and Making the Past Come Alive (1999) have been adapted by high school and middle school teachers, largely due to the inventiveness of dance educators working to meet state-mandated curriculum objectives.
In today’s technological market, some of these programs may be unable to meet and hold students’ attention. As our students have grown up with technology, they are sophisticated consumers and have high expectations of multimedia technology. Below is a list of dance-specific multimedia titles.

<table>
<thead>
<tr>
<th>Multimedia in dance education</th>
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<tr>
<td>TITLE</td>
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<tr>
<td>Lifeforms</td>
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<td>Discover Dance</td>
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<tr>
<td>LabanWriter</td>
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<td>LabanWriter 4.0</td>
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<tr>
<td>Shadow on the Prairie</td>
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<tr>
<td>Music for Dance</td>
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<tr>
<td>Ballet CD-ROM</td>
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<td>Ballet is Fun</td>
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<td>Ballet Alignment</td>
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<tr>
<td>LabanReader (version 1)</td>
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<td>LabanReader (version 2)</td>
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<tr>
<td>Interactive Multimedia Dance</td>
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<tr>
<td>Theraband Exercises for Dancers</td>
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<td>Time, Space and Body Movement</td>
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<tr>
<td>Victoria Uris OSU-MDP</td>
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<td>Repertory Etudes</td>
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Table #1 List of dance education multimedia titles

**Quality Hardware**

Outdated hardware and computer lab access hinder dance teachers’ ability to integrate technology into their curriculum. A strong incentive for computer use in dance
is the capability of interactive video and sound. Successful presentation of video and
sound require 'state of the art' computer hardware. Without quality hardware, digitized
dance video appears choppy and clipped, or it will not play at all. With the proliferation
of CD-ROM and Internet technologies, a need for better computers, fast Internet
conductivity, higher student-to-computer ratio has elementary and middle schools
working hard to meet the ever-escalating demands of industry. Adequate hardware is
necessary for integration within the dance curriculum.

Inequity

Perhaps the most pervasive discord in technology integration in education is
access inequity. Students and teachers across the nation find themselves divided into the
"information rich" and the "information poor." As technology promises to revolutionize
the way we work, learn, and live, statistics underscore our need to create policies for
equal access. A 1996 National survey reported:

Fewer than one in 3 households own a computer. Those living in rural areas
and central cities are least likely to be connected. Families with incomes over
50,000 are five times more likely to have access to computers and ten times
more likely to have access to on-line services. African American and Latino
school children are less likely to have access to computers, both at home and at
school, than other children. (Mendrinos, 1997, p. 36)

Issues of inequity are strikingly apparent. Maddaus (1994) pointed out:

Technology is not by itself socially unjust. It is however, inextricably
intertwined with the distribution of wealth, race, and gender relations. Since
technologies are a product of the existing structures of opportunities, and the
constraints in society, they are likely to extend, shape, rework and reproduce
this structure. (p. 1)

Information technology has divided our society not only into those with access and those
without access, but by how the computer functions in the learning. Watt (1982) presented
research on inequity teaching, reporting that affluent students were encouraged to “tell the computer what to do,” while the less affluent were encouraged to learn “to do what the computer tells you.”

The minimal software available and inability to purchase hardware contribute to the difficulty of technological integration. Additionally lacking are (1) lab access; (2) teacher training; and (3) administrative support, which continue to hinder the implementation of technology in dance classrooms.

**Lab Access**

Computer lab access remains limited and controversial. Teachers often compete for lab time. A disproportional designation for math and science computer lab allotment is a concern. These subjects often receive priority, making access difficult for dance personnel. Time is a requirement for teachers to integrate technology in meaningful ways. Dance personnel need support from school administrators to reserve substantial and consistent time in the computer lab or to equip their classrooms with a group of computers for students.

**Safety**

The inclusion of dance movement in the computer lab presents several safety concerns. While I advocate students’ movement explorations in the computer lab, it is important to discuss appropriate parameters for student exploration. First, teachers must advise that the skilled performers viewed in the video clips are trained to make the movements appear effortless. Second, some movements may surpass children’s physical skills and should be discouraged. Third, the computer lab, confined as it is by desks and chairs, allows for very limited (traditional) space for movement explorations. A
consequence of having to work in the lab may result in students’ modification of movement action, “crimping” their developing movement vocabulary. It is important that dance should not only exist in the lab, but also exist in a larger space where students can move freely. To date, no research exists on this topic, although I can report great success with students of all ages creating inventive dancing in the computer lab without accident. There is much to be investigated on this topic.

**Passive Learning**

Dance educators fear that instructional technology will result in an imbalance between physical and intellectual learning in dance. They equate technology with sitting, clicking, observing, and typing. They have an authentic concern that technology will remove the need for kinesthetic experience altogether. Additionally, it must be remembered that videotape does not represent dance, as it flattens the three-dimensional image into a two-dimensional image. According to choreographer Wendy Rodgers, reflecting on the dominant role of video in contemporary culture,

> Video is video and dance is dance, video uses the human body, but the sense of time and space are entirely different. In terms of creating a rich, physical, aesthetic life for people, it could do as much harm as good. Even with the best video in the world, you are still teaching people to watch TV. (Brooks, 1994, p. 50)

Dance must be experienced in students’ own bodies. Teachers are justly apprehensive that with technology, students may view digitized videos of dance and write reflective essays on dance without physically experiencing anything.

**Human Kinesthetic Digital Interaction**

Current educational research praises the value of kinesthetic intelligence (Gardner, 1993), believing that rich knowledge can be gained from the physical
embodiment of ideas and feelings. This metacognitive knowledge can then be transferred and applied to a wide variety of learning contexts. It is unknown how students learning dance may be changed from the integration of technology. In a society that is already distanced from active physical participation and that prefers television, will dance-technology in dance education create an audience or spectator sport? Will dance-technology in education further divide the dance student from their physical selves, causing them to lose contact with their bodies? Will dance-technology in education remove the joy of improvisatory expression of “thinking in the moment” for automaton-like dance structures? Or worse?

According to Reid (1986), the first approach to an art work cannot be ‘intellectual’ or ‘conceptual’: “We cannot come to know and understand works of art first from the top of the head, and then downwards. Experience, feeling, direct, particular, concrete, comes first; intellectual analysis, perhaps later” (p. 14). While dancing, physiological changes take place, and sensations of the body and its intelligence are expressed in time and space.

Students of dance learn what it is like to be “in the moment.” Researchers have described it as an integrated mind-body connection, allowing the dancer to be concentrating on available possibilities in space, and at the same time to be relaxed and able to meet and respond to opportunities as they come. Finding and maintaining this synchronous mental state is essential in all types of dance. There needs to be sufficient concentration, so that the mind and the body are synchronized and the mind is open to impulse and flow of movement of ideas from the body (Rugg, 1963). This cannot happen in a top-down “head first” manner. The moment of movement is united with the purpose
to create and express. What happens if we place the "top of the head" as the filter for the dance experience?

There is just concern that computer-assisted instruction will value a more ordered digital knowledge, thrusting the mind and body apart, or extinguishing the need for the body, altogether. In the next section, I will discuss dance education philosophy that forms the framework of Discover Dance.

Discover Dance CD-ROM

Dance education is defined by dance scholar Judith Gray (1989) as "the dynamic, interactive process of transmitting skills and knowledge in dance" (p. 5). As human beings, we live our lives through movement; therefore, it is natural for us to gather, assimilate, and express knowledge through movement. Dance is part of our human heritage. Judith Mirus (1994) discusses the merit for dance in education.

Some of the many skills and understandings to be fostered through dance experiences are imaginative thinking, exploring and discovering different possibilities in problem solving, recognizing connections, working both independently and cooperatively, creating responses which give form and meaning to experience, and appreciating the richness of human diversity. These skills and understandings will serve the student well in our changing and increasingly complex world. (p. 3)

Further, dance education is a way to think formally. It is awareness, control, and the ability to conceive intent in movement. Dance can have a deep and lasting effect on children's lives by helping them to formulate a physical understanding of themselves within their community and the world (Mirus, 1993; Schwartz, 1991; Keer. 1993).

"Children's own creating and viewing contribute to the habits of thinking and moving,
providing a sensory anchor against which they validate old and new ideas" (Hanna, 1999, p. 134). Dance brings students together to recognize, accept, and develop the uniqueness of each individual and to show their connection to the world culture.

The following contents are integrated in the curriculum and design of the CD-ROM. They include (1) dance making, dance sharing, and dance inquiry as proposed by The National Standards of Dance Education, (2) Multiculturalism in Dance Education, (3) Laban Movement Analysis (LMA) elements of dance and (4) Motif Writing (MW). MW and LMA have common ancestry and serve as cornerstones within the Discover Dance CD-ROM. In the next section, I will situate these concepts in dance education research and literature.

National Standards for Dance Education

With the passage of The Goals 2000: Educate America Act (1994), the arts are acknowledged as a core subject area and are therefore considered essential to a child's education. In support of this legislation, individual states, districts, and teachers have adopted standards for arts education. The National Standards for Dance Education: What Every Young American Should Know and Be Able to Do in the Arts (1994) is a broad blueprint for learning in all arts disciplines. It affirms that basic arts literacy is a result of public education in America. The standards state that through developing these capabilities, children can arrive at a broad-based, well-grounded understanding of the nature, value, and meaning of the arts as part of their own humanity.

The seven National Standard Content Standards for children in 5th-8th-grade dance are as follows:
(a) Identifying and demonstrating movement elements and skills in performing dance.
(b) Understanding choreographic principles, processes, and structures.
(c) Understanding dance as a way to create and communicate meaning.
(d) Applying and demonstrating critical and creative thinking skills in dance.
(e) Demonstrating and understanding dance in various cultures and historical periods.
(f) Making connections between dance and healthy living.
(g) Making connections between dance and other disciplines.

Educational dance programs in the U.S. often include experiences in dance movement vocabulary, dance making, dance performance, and dance appreciation. The written curriculum has maintained the integrity of the art by thoroughly covering all the different aspects of the dance experience. However, the practical curriculum often presents a gap between the planned learning activity and the actual classroom learning activity. Some aspects of the dance curriculum are favored, while others are neglected, as in the case of dance appreciation (Fortin, 1994).

Teachers often choose action-oriented skills of structured movement (i.e., ballet or other dance techniques, and even aerobic dance), or "formula type" dance making (i.e., line dancing and folk dancing) instead of conducting dance analysis and discussion. Multiple factors affect the dance teachers' reasons and subsequent lesson content which may include (1) a lack of comprehensive training in dance education leaving many teachers with a patchwork knowledge and understanding of the art form, (2) inadequate space available to dance, (3) insufficient time allotted to teach, or (4) lack of funding available for support media and guest artist workshops. For these stated reasons, teachers choose dance technique and dance making over dance appreciation and dance history (Fortin, 1994). Knowledge and experiences in (1) dance making, (2) dance sharing, (3) dance inquiry, and (4) dance movement vocabulary form the themes in contemporary dance education.
Dance Making

Dances can be created to celebrate a movement or to communicate a metaphor, emotion, story, or image into movement form. Most public schools in the United States that teach dance making evolve from investigating and practicing improvisational movement to creating dance studies, leading into creating dance compositions and set choreography. In the process of dance making, students explore, select, remember decisions, and refine movement possibilities. Dance making is inherently risk-oriented, encouraging students to physically draw meaning from their lived experiences or from any number of cultural traditions to make a dance that fulfills their expressive needs and purposes (Dimondstein, 1990).

Dance making is not a linear series of events or stages: rather, it requires students’ continuous exploration, searching for possibilities, ongoing imagination, and memorization of what they created before. In developing a dance, students continually adjust and adapt, making choices, altering them, developing variations, and repeating movement phrases. Dance making is “at once both thoughtful and physical, intuitive and rational, sensual and emotional, personal and cultural” (Mirus, 1993, p. 45). Through the process of dance making, aesthetic, cognitive, social, cultural, historical, and psychological benefits are presented to the student.

Dance Sharing

Dances are shared through live performance venues that range from school gymnasiums and concert stages to on-line Internet events. Dances are shared among people by dancing together or by performing for one another regardless of time and
space, through recording dance notation scores, music video, and film. There are many reasons for conducting a dance sharing: parents and relatives want to see their children perform, and some teachers use performance as an opportunity to highlight the year's work to showcase for school achievement, or as an opportunity for assessment and accountability (Dyer & Schiller, 1993). However, many educators question whether dance performances are meaningful to the children themselves.

The National Standards documents advocates dance sharing that comes from students' own creative efforts, thereby gradually increasing students' confidence in demonstrating and sharing. Contexts for sharing dances can range from in-class demonstration for classmates to more elaborate presentations for family and community. It is widely held that a presentation of a child's composition or dance study may help children communicate their personal ideas about dance (Hawkins, 1991).

When performances are facilitated as non-judgmental opportunities to share ideas, they can provide a free and secure environment for communication. Important features of the child's dance sharing should respect personal ideas and creations as well as valuing the relationship between the choreographic process and product (Muehlhauser, 1998). When a teacher adopts this approach, a child's performance can lead to a meaningful experience and consequently, to ownership and learning. Through the process of dance sharing, the student receives aesthetic, cognitive, social, physical, cultural, historical, and psychological benefits.
Dance Inquiry

Dance inquiry reveals the experiences of people within the context of their society and their culture. It can be approached from different contexts: historical, cultural, social, and philosophical. During the inquiry process, students discuss, research, observe, and learn about dance. When viewing a dance, the inquiry process encourages students to look at the artist's work within the historical context of the time it was created. In this active process, students may examine the relationships between artists, artworks, and culture and begin to deepen their awareness of the dance of individuals and of world cultures. As Mirus states, "Through inquiry, our perspective is broadened to include many cultural manifestations of dance, their functions within their cultural contexts, and the many ways that dance has developed and changed over time in transit from one geographical area to another" (p.73).

This process may involve investigating, recording, and analyzing the place of dance in students' own lives, in popular culture, and in students' communities or may involve evaluating the quality of a dance the students have created. In a philosophical context, dance inquiry fosters the development of critical thought and analysis of a dance's meaning, and an articulation of thoughtful comments about a dance presented. The process of viewing and discussing live and recorded dances can lead to the development of a life-long appreciation of dance.

Dance Movement Vocabulary

Knowledge of dance movement vocabulary is fundamental to communicating and creating in dance. Dance vocabulary includes knowledge of specific technical forms,
movement processes, and the elements or "ingredients" of dance. As students explore movement themes and concepts, they acquire a useful dance vocabulary that is adaptable to their creative work. In this CD-ROM, Laban Movement Analysis (LMA) is presented as the theoretical framework for the Elements of dance. The LMA framework organizes the basic dance themes of BESSR as applied in dance making, dance sharing, and dance inquiry.

Multiculturalism in Dance Education

Dance exists in virtually all cultures. Through motion and gesture, dance provides insight into specific cultures and supports distinctive cultural identities in the face of pressure of assimilation into the mainstream. Schwartz (1991) advocates multiculturalism in the dance education curriculum reasoning that, "Modern dance draws upon dances of other cultures, and through a study of folk dance, an appreciation of the similarities and distinctions of various cultures is also gained. Dance may be used as one of many windows to the history, religions, and customs of people." Nonetheless, dance education tends to mirror predominately European traditions that historically view dance as only a theatrical art. These biases can disenfranchise students from their cultural heritage and provide little preparation for their entry into a multicultural environment.

Multicultural education is a broad and multidimensional field. Stuhr et al. (1992), discussing multiculturalism in art education, define five categories of multicultural education that range from basic awareness of culture to the examination of education that empowers students from diverse racial, ethnic, and gender groups. These multicultural
categories are: (a) Teaching the Culturally Different; (b) Human Relations; (c) Single Group Studies; (d) Multicultural Education; and (e) Social Reconstructionist.

The Discover Dance CD-ROM situates itself within the first two categories of the multicultural paradigm. The CD-ROM's interactive experiences focus on developing students' awareness of and appreciation for dance in contemporary and past cultures, including western and non-western societies. This includes the knowledge of a variety of styles of dance, including ballet, African, folk, jazz, modern, as well as an awareness of the historic and cultural influences of dance. The Discover Dance CD-ROM's use of imagery and video motivates bringing forth an awareness of the diversity of cultural dance and appreciation for human expression.

**Laban Movement Analysis**

Laban Movement Analysis (LMA) is a system for movement description and a language for observing, describing, and notating all forms of movement. In 1963, Laban's *Modern Educational Dance* was published and quickly became an essential text in the field of dance education. Leaders in children's dance education, Russell (1965), Boorman (1969, 1971), and Joyce (1994) incorporated Laban's vocabulary into their philosophy of dance education and included the LMA framework in their textbooks on dance education. While each author somewhat varied the LMA organizational structure, their writing has influenced generations of teachers of dance.

Laban's framework was originally described as four concepts: Body, Effort, Space, and Shape (BESS). Schwartz (1995) defines these 4 concepts as...“a particular way of understanding and viewing the body (Body); dynamic qualities through which the
body moves (Effort); the space within which the body moves (Space); and the way in which one's body shapes itself in space (Shape)—are the heart of LMA” (p. 28).

Dance educators in Europe further elaborated Laban’s BESS framework. Joan Russell grouped the elements of Space and Shape together and established the element of Relationship as its own category (BESR). This evolved into the separation of Space from Shape, and established Relationship as a separate category, thereby forming the framework of Body, Effort, Space, Shape, and Relationship, or BESSR, which has become the foundation for the development of the teaching philosophy presented in the Discover Dance CD-ROM. A detailed outline of the BESSR framework included in the Discover-Dance CD-ROM can be seen in Appendix A.

In dance education, the LMA framework helps students identify the dominant feature of a dance form, style, or choreographic study. Once students learn LMA vocabulary, it can be easily applied in observation, discussion, interpretation, and evaluation activities.

Dance educator and Certified Movement Analyst (CMA) Jacqueline Davis (1995) comments that by supplying students with a common language of movement, educators are bringing consciousness to their dance experiences that requires using a vocabulary to express movement intention and action. “LMA illuminates conscious intent and commitment in dance and in the process of self-reflection” (p. 32). Davis further advocates the use of LMA to help teachers develop dance curricula and provide a paradigm shift from curricula that focuses solely on skills to curricula that combines skill, intention, and imagination.
LMA is valuable for the dancer/performer, choreographer, and movement analyst. The dancer/performer benefits from the system's anatomical organization and vocabulary which can be applied toward physical explorations and performance style. The choreographer benefits from LMA as a means of communicating what is desired in a dance movement sequence. The analyst benefits from LMA as a language of recording and investigating the details in a movement action or as a method to arrange theories together.

Dance Notation

For over 500 years, dance enthusiasts, professionals, and scholars have tried to devise a comprehensive codified system of recording dance onto paper. In the last century, of the 85 nonverbal notation systems, the system created by Rudolf Laban (1879-1958) became one of the most favored due to its ability to accommodate a great range of movement. The language of movement that Laban created for identifying, investigating, and recording all forms of human movement from the simplest to the most complex came to be called "Labanotation."

Laban explains the development of Labanotation in Laban's Principles of Dance and Movement Notation (1956), the goals for its application, the guidelines for the teacher, and the history behind the theory. He states, "The inaccessible and valuable content of movement and dance which cannot be explained in words, needs some form of description, and this can only be based on the motor facts of bodily action" (Laban, 1956, p. 8).
Laban was interested in finding the common denominator of all human movement and in bringing dance to the same prominence as other art forms, arguing that "no temporal art can achieve a full development without the notation which can capture, preserve, and examine its ephemeral creations" (1922, p. 675). Moreover, Laban (1920) wrote, "It is necessary to determine the symbols of dance in writing, because a tradition which will make possible a deeper evaluation of artistic achievements in dance can only arise from comparison, examination, repetition and recreation" (p. 65).

In the 1930s and 1940s, the field of dance research and education in Europe grew largely due to the theories and teachings of Laban. Laban’s students furthered his theories and methods of teaching dance and movement analysis by expanding upon them worldwide (Youngerman, 1981, p. 1). In the following years, two dance educator-researchers, Ann Hutchinson Guest and Valerie Preston-Dunlop (students of Laban in England), began to investigate the viability of Labanotation with children. Both Preston-Dunlop (Motif Writing) and Hutchinson Guest (Motif Description) developed lists of prime movement actions that are similar in many ways (Venable, 1994a, pp. 2-3). Each of their primary lists is located in Appendix B.

**Motif Writing**

Motif Writing can be thought of as an elementary form of Labanotation and can be used to varying degrees of complexity (Chilkovsky, 1980; Hutchinson Guest, 1984). Motif’s symbol system states the general idea behind a movement and allows for exploration, improvisation, and composition of that basic idea or theme. MW is intended to assist in the communication, creation, and teaching of dance, thereby advancing
students' dance learning. It is used to help record, analyze, document, generate, and create movement.

Language, whether symbolic, physical, or written, is designed to communicate. When written, language is a vehicle to transmit and receive ideas, information, and knowledge across space and time. Motif Writing is a vocabulary of tangible symbols to document any style or form of dance, thus offering users a versatile mode for communicating their ideas. As Kipling Brown (1987) states, "The importance of using symbols to attain and to organize ideas and beliefs has altered the conception of intelligence from the acquisition of factual and sense data to the ability to use data in building concepts and communicate expressively" (p. 13).

Motif gives children a language they can use to create, communicate, and document their thoughts and ideas through dance. These actions and ideas are conveyed through a selected symbolic vocabulary, and authorship (choreography) is achieved by converting movement ideas to symbols and writing them on paper or by translating actions from a score (notation on paper) and creating a movement representation. Motif provides a mental exchange between concept and creation (Kipling Brown, 1987). This written symbolic vocabulary empowers children to artistry and provides intrinsic satisfaction, since their ideas can be shared and understood (Parrish, 1997). By communicating in a common language, children become enthusiastic as they acquire and master new concepts and symbols and learn to communicate more creatively and effectively (Parrish, 1997).

A person can see the effectiveness of Motif Writing by integrating the raw materials of movement, the physical experience, the visual symbols, and the act of
writing scores. As a language of symbols that students of any age can use to organize, read, share, and remember, Motif Writing unites expression of the body with a modality for communication and creation.

As with all language systems, Motif Writing demonstrates a particular cultural perspective which frames how movement is observed, analyzed, and recorded. Notation systems are cultural products, and like any language system, Motif Writing presupposes a conceptual base related to the practices of a particular movement style. Labanotation comes out of a distinctly Western European cultural background, placing emphasis on the dancers’ awareness of their Body in Space and Time. Laban’s theories of movement analysis and notation “emphasize the moving body in space rather than attitudes of the body in relation to itself” (Marion, 1997, p. 155).

Still, Motif Writing symbols allow the student to remember and document movement ideas for later performance or study, to enhance compositional analysis, to heighten aesthetic awareness, to build esteem through authorship, and to unite the historic concepts of dance to children’s dance scores. By incorporating this unique nonverbal symbolic language with the process of creation, students receive tools to articulate their thoughts in movement.

Lockhart and Pease (1982) emphasize the advantages of dance making and dance sharing, stating that “although the opportunity to improve self-concept through the acceptance of one’s expression may not be the prime aim of dance in an educational setting, it should be seen as an important benefit which should be available to students” (p. 177). But in reality, current dance education practices do focus on movement-centered, and in most cases audience-centered activities (Hanna, 1994).

While a state-mandated curriculum advocates students doing, creating, sharing, and perceiving (Mirus, 1993), much of children’s dance today converges on entertainment or recreation with a perfunctory glance at the changes that occur when children dance (Hunt, 1994). In the next section, I will discuss current national levels of children’s dance experiences.

**National Evaluation of “Dance in Education” in the United States**

As a way to meet the growing need for assessment in 1997, the U.S. government conducted the first national assessment in the arts called the “National Assessment of Educational Progress” (NAEP) founded on the “vision of a society that believes the arts are essential to every child’s development” (p. 34). The NAEP framework included Visual Arts, Theater, Music, and Dance.

The assessment developed by the dance division was not administered in 1997 due to the lack of significant programs in dance. The field test indicated that “comprehensive programs in dance are rare in the nation’s schools” (p. 120). The NAEP committee found that there were not enough schools with dance fitting the description to constitute a statistically suitable sample. Schools with dance do not always teach a wide
range of dance forms, or the studies of dance aesthetics and the social, cultural, and historical context of dance as are required from a comprehensive program. Such schools could not fulfill the criteria of a comprehensive program in dance.

According to the NAEP dance committee, significant dance learning should include dance making, dance sharing, and dance appreciation. The NAEP governing board describes a comprehensive dance program as having the following features:

Students would learn how to convey ideas and feelings using movement and elements of choreography. They should be taught dance knowledge, skills and techniques that would enable them to use their bodies with confidence and insight when creating and performing. Through being taught how to create and perform, students would gain spatial and body awareness, musicality, and the ability to observe and refine movement. In learning how to respond to their own dance work or that of others, students would be taught how to identify compositional element, notice details, identify stylistic cultural and social and historical elements; notice details; and make informed critical observations about technical and artistic components of dance. (1997, p. 9)

Since the dance component of the NAEP was not evaluated in 1997, results in the NAEP dance assessment are more projections than facts. The general descriptions of dance in our nation’s schools presents a bleak picture. Most schools in America have little access to dance, although there are some exceptional K-12 dance programs across the nation being taught by classroom teachers, physical education teachers, and full time dance specialists. Yet, most students gain an understanding in dance through social situations and the media in the form of social dances, weddings, movies, TV programs, and musicals on videotape (e.g., Riverdance and MTV). While there may be the occasional dance residency or folk dance unit, few students “experience dance as a form of artistic expression, complete with its vocabulary and rich cultural, historical, and aesthetic integrity” (NAEP, 1999, p. 89).
The NAEP report on present dance programs closes with a statement a bit more hopeful: “A promising note for dance is the recent National recognition of the importance of kinesthetic learning” (NAEP, p. 89). Interest in multiple intelligences and learning styles has led teachers and principles to search for effective, noncompetitive approaches to movement education.

Before creating a dance education CD-ROM, it was necessary to have a basic knowledge of the topics presented in the review of literature. Taking these evaluations and suggestions from research in dance technology, educational technology, and dance education, I began to construct multimedia technology to support students’ potential to “experience dance as a form of artistic expression, complete with its vocabulary and rich cultural, historical, and aesthetic integrity” (NAEP, 1999, p. 89).
CHAPTER 3

DISCOVER DANCE CD-ROM DEVELOPMENT

Introduction

This chapter recounts the process of the development of the Discover Dance CD-ROM. It addresses essential design concerns, content features, and parameters for development. Detailed description of the CD-ROM components, interface, and layout are provided. The development process consists of several steps or stages. These include formulating the idea, defining project goals/objectives, identifying the process for development, conceptualizing the project, gathering resources, seeking permissions, converting media to digital format, and integrating all media and designing interface, followed by the process of ongoing formative and evaluative testing.

As an experienced educator in the public school system for many years, I was familiar with the integration of technology in my classes through the use of video, audio, projectors, and slides. Using these technologies, my classes studied social and cultural dance forms such as Native American Indian Powwow ceremonial and celebratory dances and science concepts such as metamorphosis and photosynthesis, among many others. These materials promoted students' comprehension, appreciation, and creation of dance. The students also enjoyed and benefited from video-recording, viewing, sharing, and analyzing their own choreographic works.
While each of the above-mentioned media provided rich resources and a fresh method of delivery, the results were often time-consuming, awkward, and difficult when trying to juggle the media elements while teaching. On numerous occasions, my ability to teach the class was hindered. But these media tools were valuable resources in providing content and materials that expanded my students’ dance experience. I wondered how I could organize these kinds of resources for student use, independent of the class and of the teacher.

Formulating the Idea

My personal interest in educational technology began when attending Teacher’s College, Columbia University from 1994 to 1997 for a Master of Arts Degree. At that time, there was growing attention to the use of computer-based instruction in general education classes, and Columbia University was at the forefront of several national initiatives. At Columbia, I took a graduate course titled Hypermedia in Education. This course addressed theories of constructivist learning as related to educational technology and covered the principles of interface design and basic scripting using authoring software called Oracle Media Objects (OMO). In the OMO software program, I was able to create and link web sites, audio, text, and digitized video to a hypermedia stack. Through the course, I became familiar with exemplary interactive multimedia and some of its potential for expanding student learning.

Fascinated by interactive multimedia technology and the possibilities for enhanced scholarship through technology, I volunteered at the technology outreach program at Columbia University’s Institute for Learning Technology (ILT). At ILT,
classroom teachers received training in computer software and curricular integration, employing technology in their teaching. I observed and assisted highly skilled educators delivering technological instruction in a fresh and uncomplicated manner, which was an invaluable experience for me. I learned of classroom teachers' interests and concerns about implementing technology within their classes and curriculum.

The integration of dance education and technology excited me. At that time, some of the questions I grappled with were as follows:

- Can dance education be translated and delivered through a technological medium?
- If so, then how could (should) dance be represented in instructional technology?
- Could computer-based learning fulfill and support requirements stated in the National Standards for dance education? If so, then how?

Aware of the restrictive aspects of sitting, typing, and clicking, I considered the possibilities of developing "new" kinesthetic reciprocity for the students to their technology. I wondered:

- What defined this relationship between the student and the technology? Was it a hardware or interface issue?

I proposed that innovative instructional technology on a CD-ROM could encourage the participants to expand their range of movement. I hypothesized that learning dance with IT might resemble the action and response of a dance improvisation. But I continued to wonder:

- Would the method of (technology) delivery affect students' movement invention and creative processes? If so, how?
My experience with IT gave me information about technology from teachers and authors, but I had not yet received input from children using the multimedia technology. With many questions, I visited public and private elementary and middle schools in NYC, the Bronx, and in New Jersey to observe the use of technology in students' classrooms, libraries, and media centers. These experiences in the schools informed me of the various IT issues facing education.

One of the most pervasive of these issues was that of inequity. Influenced by consumer propaganda and government media advertising, I had come to believe there were good computers in every school. I listened to government officials stating the arrival of the technological revolution, and I believed that schools, teachers, and students had computer resources in the form of hardware, software, and technical support available to them. However, when I visited these schools, I was awakened to the stark reality. Striking contrasts were readily apparent. Some schools (often in affluent communities) had designated computer resource personnel, school web sites, high-speed Internet access, individualized work stations for students and teachers, while other schools struggled, working with outdated computers without Internet access or any technical support. Students in the latter group were unable to participate in the technological revolution. Many schools fell somewhere in the middle of these two scenarios, with 3-5 adequate computers (with CD-ROM drives and Internet capability) in their school libraries.

While visiting these schools and observing students, I became familiar with students' favorite programs, CD-ROMs, and games. I observed students teaching one another, helping and sharing information. I observed the movement of their bodies while seated at the computer. I compared these observations at the computer with students'
behaviors during other activities. I observed that although connected to the computer by their mouse and at times, a set of headphones, students continuously moved—turning, stretching, and continually shifting their weight. I observed students rounding their spines, twisting their torsos, and popping up and down to the upbeat musical themes on certain CD-ROMs. I discovered that students were not fixed in space, they had mobile and active relationships to the surroundings and the computer media.

When there were no students to observe, I explored playing these CDs and games, myself. I was able to study and compare CD-ROMs in terms of content, method of presentation, range of activities, evaluative procedures, and learning outcomes. Then, as students arrived, they walked up and asked me what I was doing, believing I was doing “teacher stuff”—making a database or gathering on-line research. Consequently, they were surprised to find me enjoying and wanting to learn from their software and CD-ROMs. Encouraged by my enthusiasm, they began to tell me their favorite parts and activities. These same students, advanced in their knowledge of these programs, frequently rescued me when I was stuck.

After observing the children, I began to conceive of a dance curriculum delivered and supported through technology. I began to consider content, interface design, log-on prompts, hard-drive databases, and Internet links. At this point, I realized that I would need to design my CD-ROM to meet the capabilities of the average school technology environment. Over the next four years, these ideas would challenge, fascinate, and frustrate me through my research and design of the CD-ROM.
Defining Project Goals

In creating a CD-ROM for dance education, I was interested in creating an interactive multimedia CD-ROM (1) supporting the National Standards for Dance Education; (2) providing a resource rich in multiculturalism, and the principles of Motif Writing and Laban Movement Analysis, and (3) furnishing high-performance multimedia delivery.

Procedures for Development

This project has spanned over four years. After conducting my initial inquiry into children’s multimedia, I began to define what content material could be most appropriately delivered in a multimedia CD-ROM for dance education. The Alpha version of the CD-ROM called Discover Dance was developed in 1996-1997. This version was very helpful, as I was able to define my ideas but I needed some direction. To get feedback, I discussed my investigations and shared the early Alpha prototype with several dance educators and choreographers. These esteemed dance educators were Ann Green Gilbert, Joy Friedlander, Elsa Posey, Margot Faught, Janis Pforscich, Claire Porter, and Martha Eddy. I wanted to gather their interests and concerns about the integration of technology and dance education. These women provided enthusiasm and support, encouraging my efforts in the Alpha version. Several themes emerged in our conversations.

Positive observations included the following

• Visible support of multiple intelligence theory in the layering of media elements.
• Clear representation of LMA concepts, a valuable vocabulary to learn by both teacher and students of dance.
• Student writing, printing, and database features would increase dance visibility in the schools and at home.

• The digital database could promote and encourage portfolio assessment structures’ use by teachers.

• Technology innovation could advocate for multiculturalism and diversity in dance.

• The power of video to broaden teachers’ and students’ knowledge of what dance is due to content clarity, inclusion of motif writing, and analysis activities.

• Encouraging students with injuries or disabilities to participate in the dance class.

Concerns were expressed about the following

Spontaneity: The loss of students’ natural kinesthetic movement as organization and focus are encouraged in the CD-ROM.

Facilities: Fear that administrators would consider dance activities needing little or no space in the building as they are facilitated by the computer.

Digital vs. Physical: Concern that teachers may consider physical expression of dance unnecessary and inconvenient. Computer-supported dance education may comfort teachers who feel uncomfortable with dance, or dislike the creative chaos (and noise) which comes in the dance-making process.

Physical Safety: Need to inform students exploring movement concepts shown in the CD, that although some of the movements may look easy, they are actually highly skilled and require many years of practice, and therefore may be inappropriate or too difficult for beginners to attempt.

Taking their comments into consideration, I began formulating an integrated design.
Design Considerations

In the design process, I read books and visited websites on interactive design and explored the interactive media for children. These included science and history videotdisks created by Tom Snyder productions, Pokemon Nintendo games, and many others. Looking for common principles in their design, I studied the depth of content, navigation buttons, interactive links, Internet connection, interactive elements of video, sound, instructive vocal narration, music, interactive games, reward procedures, optimization of imagery, and the uses of text. Below are the essential design considerations for the Discover Dance CD-ROM:

Global Perspectives- A variety of cultural dance forms need to be presented to expand students' conception of who dances, where people dance, and why people dance. In addition, links to the Internet and cultural web sites increase students' awareness of the broad definitions and contexts for dance.

Active Discovery- The interface and screen design should allow students to explore and navigate in a non-linear manner. Activities are designed to engage students in the authentic personal involvement and to promote student inquiry and self-reflection on their learning process in dance. Navigation should encourage exploration without overwhelming the student. Interesting prompts, using imagery and sound, should support the ease of navigation (Shneiderman, 1998).

Pluralistic Thinking- Visual, audio, and text-based content and activities should be layered to promote multiple strategies for learning. Focus is placed on the multiplicity of solutions to a task or movement problem. Design should
concentrate on the layering information found in video, music, speech, and text and reduce a dominance of text-based learning (Gagne et al., 1992).

**Child Appropriate**- Designed for upper-elementary and middle school students, all language, text, audio directions, information, and video should conform to educational guidelines of age-appropriateness. Dances and music selected should be interesting to a student's sensibility. Video content should include dances created and performed by this age group.

**Dance Writing**- While using the CD-ROM students are encouraged to write reflective comments in their notebooks. Database activities invite students written output. This includes recording dance research from the Internet and other sources and in "game like" writing tasks to analyze, compare and contrast "Fantastic Dances."

**Personal History**- The interface should encourage thoughtful comments with guiding prompts. Digital databases should encourage students' collection and documentation of their ideas and experiences in dance class. This journal can encourage communication between the teacher and the student and can support ideas of portfolio assessment by recording student progress.

**Engaging Repetition** - All photographs, audio, and video should stimulate student interest. Narration should encourage expression and experimentation without affecting clarity of instruction. The selection of dances and how they are presented should encourage students' interest in learning and analyzing a dance. The same dance content should be cross-referenced and presented in different
context sections, to encourage knowledge construction carryover when moving between sections.

Since I lacked a research and design team, this project was largely a solo endeavor. The content of the Discover Dance CD-ROM is derived from my philosophy, experiences, and vision of dance education. The dance content areas addressed in the CD-ROM were influenced by my diverse teaching experience, university coursework, and the dance curriculums that I developed over the years. Three experiences had direct impact on the content found in the Discover Dance CD-ROM. They were motif writing, interdisciplinary dance education, and Laban Movement Analysis.

**Method of Technological Delivery**

Multimedia technology yields vast amounts of information and allows for the layering of video, text, sound, and images to create a web-like interface. Students can navigate expansive resources of text, images, graphics, and video segments, all of which can be personalized to the interests and needs of students. Navigation through buttons, hypertext, and web links empowered students to personalize their experiences. Key concepts addressed in the instructional media were video, Internet connection, and database function, printing capabilities and layered components.

**Video**—Dance is a visual medium; therefore, using quality video was a priority. On the CD-ROM, these video resources would provide a shared context for the teacher and the student to discuss dance, rather than referring to abstract examples. Video clips in the CD-ROM are concrete, allowing students to be able to revisit them whenever necessary. In addition, video clips would encourage
students’ practice, discussion, and reflection. Central to the CD-ROM is intent to present a wide variety of choreography from around the world. Multiple methods were created to display the dance video. They included short, highly edited video clips, to represent the Elements of Dance and longer video clips of choreography to be analyzed and interpreted in Fantastic Dance.

**Internet Connection**- Using the Internet was emphasized to encourage students and teachers to move beyond the dance that exists around them. Using links to internet web sites encourages students to research, investigate, and bring the outside world into their dance sharing, dance making, and dance inquiry.

**Database**- The student database was designed to provide a place for saving their work. Easily accessed by the student, the database allows the student to continue working after class has concluded, to communicate with the teacher, and to save one’s work for later reflection and use. The database feature encourages students in the process of self-reflection, self-critique, and self-correction. In addition, the storage of students’ work provides teachers practical information on student learning (Darling-Hammond, 1994). Such a database can display students’ progress over time, and can provide more in-depth information than typical testing and grading procedures used in dance education programs. Portfolios can empower students and teachers to reflect upon the teaching and learning process (Herbert, 1992).

**Printing**- When the dance experience concludes, a printed paper copy is a solid reminder of each student’s achievement. The print function secures a copy of a student’s ideas about particular dance experiences created or analyzed. Printouts
can be saved by the student for later reflection, taken home and shared with family, or placed in a dance portfolio for assessment.

**Knowledge Transfer** - Audio and video clips are layered and re-visited in several sections. This layered design allows students to transfer knowledge from one activity to another.

The Alpha version of the Discover Dance CD-ROM was created on Oracle Media Objects (OMO), which is a straightforward and easy-to-learn multimedia authoring application. While OMO supported interactive multimedia with sound, video, and text, it lacked the ability to manage multiple sound files, movies, and linked databases concurrently. This necessitated finding a more suitable authoring application. I decided to move the Alpha version of Discover Dance into Macromedia Director.

One benefit of moving into Macromedia Director was the opportunity to revise and improve the layout, interface, and activities. By converting applications, I was able to identify what technology equipment (i.e., hardware, software) and IT training I would need to create the CD. Also, in the three years since I had begun working, industry standards for video compression improved, allowing me to take advantage of improvements such as including larger video and longer dance clips within the same 650 MB CD-ROM.

The conversion process provided the opportunity to address issues of copyright. Changing the authoring program gave me the opportunity to rebuild the CD-ROM with secured copyright permissions for all images, video clips, and music. In the Alpha version of Discover Dance, I concentrated on how media could be combined to support learning in dance. At that time, I was oblivious to copyright restrictions and
considerations. When I needed a movie to support a dance concept, I simply pulled famous videos (i.e., Fred Astaire tap dancing) off my shelf. These selected video clips were then digitized, text and sound were added, and the components assembled. Graphics and interface images from the Alpha version of Discover Dance CD-ROM are shown in Figures #1-6.

The principle disadvantage in the authoring application transfer was the time necessary to learn a new authoring program. To do this, I took multimedia courses at The Ohio State University Multimedia Dance Prototype (OSU-MDP) for two summers, and I enrolled in Macromedia Director authoring coursework at the Pratt School of Art and Design and at Future Concepts in New York.

**Conceptualizing the Project**

The Discover Dance CD-ROM was conceptualized by mapping out sections using a flow chart (see Appendix C). The flow chart of content resembled a spider web showing layered links and intersecting content in each of the sections. The web-like interface expressed essential dance content being addressed and cross-referenced.

With the content flow chart as a guide, I began to consider aspects of interface design using a handwritten template on 8 X 10 paper. On each template I placed all essential features with text, video, and audio and the corresponding navigation button and interactive link. This process of layout design was modeled in my hypermedia coursework at Columbia University and at the OSU-MDP.

Unification between the seven sections was created by consistent interface, and the same navigation bar at the bottom of the screen. The design and the layout of text and
images were unified with similar aesthetic preferences. When choosing the design "look" of the CD-ROM, I chose active movement-oriented images of children over pristine technical dance images. Consistent text fonts were identified and used to assist in the presentation and clarity of the layout. Sample screen shots from the Discover Dance CD-ROM can be viewed in Figures # 7-18.

Gathering Resources and Seeking Copyright Permissions

Knowing that copyright can be a trying and expensive process, which often terminates multimedia projects, I was resolved to only using dance works for which I had signed permission from all parties, choreographer, dancer videographer, and musicians. I was able to address issues of copyright permissions by requesting submissions of dance works from friends and colleagues who were interested in supporting this project. Over 160 people helped in the development of the project.

Digitizing Components

Once the permissions were secured and all materials (text, images, video, and sound) were gathered, I began converting this material into a digital format. Several different programs were used for this digital conversion, including Adobe Premiere, Sound Edit, Media Cleaner Pro, Adobe Photoshop, Microsoft Word, and Adaptec Toast. Sound: Two types of sound files were used in the CD-ROM, with each file type requiring a different method of compression. Music files were edited and digitized using Adobe Premiere, while narration files were recorded, edited, and digitized using Sound Edit.
Video: Dramatic advances in video compression occurred during the four years of project development. Video clips in the Alpha version were digitized for the smallest screen size (120 X 180 pixels) using Adobe Premiere with Cinepack compression. Video for the Beta version was digitized for a larger screen size of (320 X 240 pixels). I used two different applications to digitize: Media 100, and Adobe Premiere with Media Cleaner Pro at Sorenson II compression. Sorenson II was selected for the ability to retain high image quality and color range while reducing the MB size of all video. This made a big improvement in the overall quality of the CD-ROM, as students testing the Alpha version complained about the movie clips' small size. There are 93 video clips ranging in length from 16 seconds to 40 seconds.

The video and sound files dominate the 650-MB storage capacity of a single CD-ROM. In development, I was conscious of the MB remaining, and I worked to carefully maintain video quality without limiting their number. At one point in the development, due to the lack of space, I considered employing two CD-ROMs, but this proved to be ineffective, as the student would need to switch CDs periodically during use.

Images: Images were scanned, digitized, cropped, and manipulated using Adobe PhotoShop. Image enhancing features such as filters were applied to the images to increase the quality and assist in creating an engaging design layout for the screens.

Text: Text-based instructions and resources are either visible on the screen or can be retrieved with a hypertext button. To maintain a clear and simple layout, the number of words on each screen was limited to less than forty. Longer text-based resources are located on the main navigation bar as an “eye”-shaped icon. The student clicks on the “eye” icon and a hypertext field appears with additional information. This “pop up”
interface keeps the main screen uncomplicated with blocks of text and allows students to read this at their own pace. In these hypertext fields, black lettering on white background is used to make the text easy to read. All text files were created in Microsoft Word and then imported into Macromedia Director.

Storing the media: As the project grew larger, new methods of media storage were explored. Initially, 100-Megabyte Zip disks were used, but this became cumbersome when the project was spread on six or seven zip disks. The project was then transferred onto a Jazz disk, which holds 1000 MB of information. Unfortunately, digital storage media can fail and all work is then lost. In fact, on multiple occasions I had to recreate sections due to storage disk failure. Therefore as the project progressed, each of the working drafts of the CD-ROM was pressed onto a CD-ROM using Adaptec Toast. The continual process of burning CD-ROMs was time consuming, but absolutely necessary.

### Integrating Components

Once components were digitized, all the text, sound, image, and movie files were imported and arranged in Macromedia Director to create the CD-ROM. This was the most rigorous, exciting, and time-consuming portion of the CD-ROM development.

During this process, issues of storage space on the CD-ROM was a big factor, as digitized video contained the largest percentage of content (approx. 5/8) on the CD-ROM. A single CD-ROM only holds 650 Megabytes (MB) of storage space. Since this is a video-based project, I was constantly monitoring the 650-MB limitation.

Changes and modifications were natural in the evolution of the Discover Dance project. An example of this occurred in the Alpha version. Eight content sections were

One of the first sections to be created in the Alpha version was called "Slide Show," consisting of a series of dissolving images of dance. These images were designed to build a context for student knowledge-building in the CD-ROM. The dissolving feature supplied the impression of a travel log or home movie of multicultural dance. Slide Show contained 25 images and ranged from Hula dancers on the beaches of Hawaii to Lindy Hoppers at the Savoy ballroom in New York City.

While students enjoyed viewing these superb images of dance diversity, they were passive and would have preferred to control the multimedia interface. Students wanted to hold an image, study it, and learn more about it much longer than my programming allowed. The students wanted to discover, to collect the images' meaning, to create their own series of dance images, and to play back the dissolving images in reverse order.

"Slide show" had failed to provide adequate cultural context and to give control to the student. User control is one of the fundamental principles of CAI and multimedia technology. Once aware of this restrictive design, I began to find out what students were interested in understanding about these multicultural dances. I then focused on creating an Internet database of multicultural content, which was supported through pop-up information buttons, and a navigation structure that supported student control and discovery. Slide Show in the early Alpha version evolved into the "WWWeb dance of the current Beta version.
While designing, I began to restructure and re-conceptualize the CD-ROM’s content. An example of this is in the section called “What is dance?” In the Alpha version, “What is dance?” contained 15 different ethnic dances and included a description of the purpose, identifying features, and cultural context of the dance. An analysis of the dance movement themes were described, a short motif notation of the dance was presented, and a list of on-line Internet resources were included.

The “What is Dance?” section had rich and rigorous content but I struggled with the relationship to the seven other sections. Due to issues of hard disk space (as stated above), I limited the number of Dances to 15. This was very difficult, as there are thousands of ethnic dances, each being an important and worthy inclusion in the CD-ROM. I grew concerned that students may interpret these 15 dances as more worthy of analysis, based simply on their inclusion in the only CD-ROM on dance for children.

While I did realize that this in-depth study of cultural dances would be a valuable resource for dance educators and students, I could not ignore my limited MB space on the CD-ROM. I then realized that I did not need to separate these ethnic forms of dance (although they were included in all other parts of the Alpha version) but I could present multicultural representations within the entire content of Discover Dance CD-ROM. Therefore, the Alpha “What is Dance?” section was eliminated.

Other modifications occurred based on my experience in the schools. I eliminated the section in the Alpha version called Digital Dance, as it required a small digital camera, which is not widely available in the schools.

After initial testing of the Alpha version with students and teachers, additional revisions were necessary. For example, I was very enthusiastic about audio instruction
and direction. Audio directions were exhibited on all section and sub-section screens. Even though these audio files provided valuable information, the deluge of audio sound was annoying to the students and teachers. In response, I included a sound icon (shaped like an ear) on the navigation bar. If students wished to listen to more information about a particular dance or to clarity directions, they could press the “ear” icon and listen to an audio direction.

The Discover Dance CD-ROM: Eight Content Themes

The current Beta version of the Discover Dance CD-ROM is comprised of eight component sections: Inside and Outside Dance, Elements of Dance, Motif Writing, Make a Dance, Meet the Choreographers, Fantastic Dance, Mini Dance, and Dance Journal and Quiz. The eight content sections communicate using a navigational structure of linking buttons. The navigation panel located at the bottom of each screen allows the student to move forward or backward, revisit a previous section, return to the main menu, or exit the program all at their own pace.

Inside and Outside Dance:

Dance is a cultural phenomenon. This section asks students to become familiar with dance that is both near them and far away from them. Two sub-sections in Inside and Outside Dance are Dance Identity Map and WWWeb Dance. Dance Identity Map and WWWeb Dance work in tandem to build students’ awareness of how cultures express dance in numerous ways and for different reasons.

Using inquiry methods, Dance Identity Map prompts students to investigate and share their awareness of dance as it exists in their family, school, and community. For
example, a student is asked to investigate: "What kinds of dances are done in your community?" Students are asked to examine and write about how dance is experienced around them. These written responses are saved into a database and can develop into a personal history in dance. (See Figure #8 for Dance Identity Map layout and design.)

WWWWeb dance moves beyond a student's neighborhood and presents the breadth of dance from around the world. WWWWeb Dance introduces the rich diversity of dance from the "outside world" and brings it into the classroom. Pre-selected web-links allow students to navigate the Internet and gain an awareness of culture and dance forms that may be unaccustomed. An example of a website in the WWWWeb dance section include: Korean Folk Dance and the Native American Indian Powwow dances. (See Figure #9 for WWWWeb dance interface design.)

**Elements of Dance:** presents fundamental tools for dance defined by LMA, which are Body, Effort, Space, Shape, and Relationship (BESSR). In Elements of Dance, the five BESSR concepts are broken down into the following framework: (1) Body and basic movement actions—the ways the arms and legs can bend, stretch, reach, turn, and jump; (2) Effort—the dynamics of movement available to the body: quick, sustained, strong, and light; (3) Space—the directions and levels the body can move in; (4) Shape—how the body moves in relation to its environment: in rounded sweeping actions or straight direct motions; and (5) Relationships—the ways the body moves in relation to other people or things: touching, pushing, holding, or moving toward or away. There are over seventy individual BESSR elements presented in this section. A complete list of BESSR in Elements of Dance content is located in Appendix A.
Within an organized framework, students learn the Elements of Dance through video, text, and audio and in motif writing (a simplified form of dance notation).

Encouraging student exploration of movement, Discover Dance presents examples of the BESSR elements through multicultural and multi-generational dancers. Performers range from experienced professionals to amateurs, from senior citizens to second graders. Highly edited video footage of a large variety of dance forms prompts the student to view dance elements from different perspectives, including culture, location, performer, purpose of the dance, and dance type. (See Figure #10 for Elements of Dance interface design.)

**Motif Writing**: presents a system of notation used for dance exploration, analysis, and documentation called Motif Writing. Eighteen basic movement concepts are layered by written motif symbol, linked image, sound, text, and video. This section introduces motif writing symbols and shows how they are structured and used to identify, describe, and record movement. In addition, it shows the processes of symbol sequencing, analyzing, and notating related to short dance video excerpts. Activities in this section include Motif score analysis and designing personal motif scores. Interactive multimedia linking supports students’ awareness of symbol-to-action and action-to-symbol relationship as part of an analysis cycle. (See Figure #11 for Motif Writing interface design.)

**Make a Dance**: presents themes on the choreographic process including decision strategies, conducting research, creative process, and recording choreography. Students move through a progression of choreographic decisions, from naming the theme of their dance to recording their research, from deciding essential body actions to defining what pathways and levels they will use, and from defining the dynamics in the dance to giving
the dance a title. After completing the ten questions in this section, students can print their responses and can use the printout as a guide to begin choreography. (See Figure #12 for the Make a Dance interface design.)

Meet the Choreographers: presents an introduction to people who create dances. Interviews and video excerpts with a variety of children and professional choreographers are shown. Students choose a choreographer and learn about their dances by viewing a movie clip or reading about their history or experience, and by listening to an interview with the choreographer. Twenty choreographers are shown representing a broad diversity of dance, created by people of all ages and backgrounds.

Learning about an artist's ideas, motivations, investigations, personal histories, and creative processes exposes students to the complex processes employed when creating a dance. With this knowledge, and the activities in the other sections of the CD-ROM, students are encouraged to pursue their own dance making. (See Figure #13 for Meet the Choreographer interface design.)

Fantastic Dance: presents a library of digital dances representing adults' and children's choreography. In this section, students can view a dance and answer related questions that encourage description, interpretation, and analysis of the dance, or refer back to the BESSR Elements of Dance. For example, the student might choose to view a dance entitled "Tornado" and be prompted with questions such as: "Describe this dance" or "Identify the essential themes in this dance" or "Identify the levels, directions and pathways seen in this dance." Once students respond to a question, their answers are linked to a word processing database, which is saved on the computer's hard drive.
Fantastic Dance student statements support portfolio assessment methods. (See Figure #14 for Fantastic Dance interface design.)

**Mini Dance:** presents an interactive dance-making approach. Using 18 motif symbols, students design, sequence, and printout a dance score. To create a score, students drag motif writing symbols onto a dance score (on the screen) to compose a dance. Once complete, a student’s dance score can be printed and brought to the dance space and used as a tool in planning their dance. (See Figure #15 for Mini Dance interface design.)

**Dance Diary and Quizes:** presents the student with three interactive games and activities. These include the following:

- **Dance Diary:** Presents an opportunity for reflecting on and recording their experiences in dance, which can be saved on the hard drive. (See Figure #16 for Dance Diary interface design.)

- **Notation Quiz:** Presents students with the opportunity to test their abilities notating one of six short movement phrases. (See Figure #17 for Notation Quiz interface design.)

- **Comparison, Contrast, and Description:** Presents activities encouraging the student to identify essential themes and to describe a variety of dances. (See Figure #18 for Compare, Contrast & Describe interface design.)

In addition to the eight content sections, two design features are essential in the Discover Dance CD-ROM. These features include the opening movie and the help tutorial. Opening movie, “a celebration of dance,” advocates multicultural and multigenerational representation of dance. In the 40-second opening movie, dance is portrayed as an art
form, a cultural expression, a theatrical production, a religious ceremony, a physical
expression, and a professional dance form.

Help Tutorial

The help tutorial provides information on the process of navigating between the
seven sections (forward, backward, and return to the main menu), how to open a personal
notebook, how to save a file, play a movie, listen to a sound file, and exit the program.

Process Of Ongoing Testing and Evaluations

As this CD-ROM is designed for student use, I needed to find out what held
student interest and what was boring or frustrating. I wanted to learn where students
found success and where they worked to gain mastery in the material. Because of my
favorable experiences in observing students using multimedia technology (as referenced
earlier), I conducted ongoing evaluations by students throughout the research and design
process. These evaluations entailed the students playing the CD-ROM as I observed their
behaviors. These early evaluative procedures were essential in defining the content,
layout, and design of the CD-ROM.

During 1997-1999, I requested participation for over 100 children to use sections
of the Discover Dance CD-ROM during the developmental process. These children
included my nieces and nephews, neighbors, and colleagues’ children. In addition, I
visited schools where I knew the dance educators or classroom teachers. With
permission from principals, parents, and teachers, elementary and middle school children
from a variety of cultural and socioeconomic backgrounds tested Alpha and Beta versions
of the CD-ROM. On several occasions, schools lacked adequate technology, so I brought my home computer and printer for students to use.

These early evaluations helped me understand students' needs and the potential of CAI to meet such needs. This process also acted as a "reality check," informing me of the disparity of technology in the schools.

In 1998, I tested the alpha version of the CD-ROM in a dance studio in Long Island, New York. I worked with six children who took lessons at the studio. These children were scheduled for a 30-minute session using a new innovative computer program for dance. In this evaluation, the students were able to follow their interest and freely explore the sections of the CD-ROM. Below are three examples of students' comments:

• An eight-year-old girl who had been using a computer for 2-3 years. She first visited the "Elements of Dance" and viewed movies in the Space and Relationship categories. Her exploration was orderly, playing each movie and then moving the forward arrow to see the next section. Once finished, she wrote in her notebook, "I learned backward and forward direction, right side and left side symbols. My favorite was the toward movement. It looks like this \( \checkmark \). I like it because in the movie the boys bump into each other."

• A ten-year-old girl who had been using a computer for 5 years. She visited the "Motif Writing" section. She repeatedly played each of the motif symbol sounds. She then moved quickly through the content, until she arrived at "Mini Dance." In Mini Dance, she created a dance score by dragging the motif symbols onto the blank score. She created several different versions of her Mini Dance before settling on one. With each
version, she got up from her chair and physically tested the movement sequence. Once she decided, she printed her score and created her dance. Later, she wrote in her notebook, "In my dance, I decided to start in a low level and wanted to jump. I realized that it did not work. So, I changed my last movement, which was stillness and put that first." Then she viewed the "Slide Show" (a series of images of dance) twice. In her notebook, she continued, "I discovered that dancers have many dances to dance. All people can dance if they try. The dancers are in all shapes and sizes. Some dances are simple and some are very difficult. Now I am even more eager to become a dancer."

- A 10-year-old boy who had been using a computer for 4 years and dancing for 8 months. After 10 minutes of exploring "Slide Show" and the "Motif Writing" sections he turned around and asked me, "How do you spell Jamaica?" In his notebook he wrote, "I discovered that there are many ways to dance. Lots of people like to dance. Many countries like dance: South America, France, and Jamaica. You can make a "Mini Dance" and you can learn about many dances. I like these symbols. It's really fun to make a Mini Dance." Next, he moved through the "Make a Dance" section where the student answers a series of choreographic questions. He wrote in the interactive database, "My dance is about a shark. A shark can wiggle. A shark can eat many things. My shark is a very old one. It is about a hundred years old. My shark likes to eat sea turtles, fish, tadpoles, and smaller sharks than him." After creating and performing his dance, he wrote in his notebook, "I made a dance about a shark. It felt very good to express myself. It felt good to dance. I like to make dances for other people" (Parrish, 1999).
From these and numerous other student evaluations, I began consider the following:

(1) **Children will study dance on the computer, especially those created by other children.** Humorous and surprising dances performed by children were viewed over and over, analyzed and remembered. Newly aware of these children’s interest in viewing other kids, I worked to secure a wider variety of dances created and performed by children.

(2) **Children want control of what they see and how they view it.** Students want to control the experience of their own learning. The “Slide Show” (Alpha version: stated previously) would not allow the student to stop the images. This was changed and evolved to allow students to learn more about a dance image, who is dancing, where the dance is being performed, why the dance was created, where students could learn more about this kind of dance, etc. Interactive pop out information buttons and Internet access provide high quality images and extensive information resources for the student. Also, media control was necessary for movie playing and therefore a controller bar was included for playing movies to give students options for viewing i.e., frame by frame, in reverse, or in sections.

(3) **Students like writing on the computer.** Notebook features were integrated in the CD-ROM design. The database feature placed value on students’ ideas and provided a different way of communicating with their peers and their teacher. While some of the students showed effortful struggle when using the keyboard, they did express interest in seeing their ideas on the page. Satisfaction came from the printing and journalizing aspects as written and printed notes were saved and shared with fellow students.
(4) Students move freely around the room to create dances. Movement concepts, which were highlighted in the CD-ROM movies, were physically explored. Students were eager to try out all movements. An example in the Alpha version occurred when a group of students were viewing the Highlands Fling dance on the computer; then without prompting, they got up and performed them, physically traveling around the room.

Since Discover Dance was the first dance education CD-ROM designed for children, I received numerous opportunities to share this work nationally and internationally. In the past four years, I gave over 15 conference presentations, workshops, and lectures on the Discover Dance CD-ROM. I was eager to gather feedback (ideas and concerns) from participants, as these individuals would probably be the very teachers whose students might use the program. At the conclusion of each presentation, I requested participants to fill out a short questionnaire (Appendix D). In this manner, I collected a total of seventy response evaluations from practitioners from around the world. Their comments addressed these themes:

• Desire to view a wider variety of dance forms.
• Desire to view larger movies.
• Interest in single CD-ROMs on a particular dance theme, i.e., choreography, dance notation, or analysis.
• Interest in viewing complete dances, not excerpts or clips of dance.
• Interest in providing students with the ten “best” dances for preservation and analysis.
• Interest in translating the CD-ROM into other languages i.e., Korean or Spanish.
• Interest in on-line resources and teacher guide for educators using the program.
While infeasible to apply all points of view to the current CD-ROM, I considered each argument seriously.

Rarely are projects of this kind solo endeavors. This narrative is supplied to inform the reader of the intricacy of people and experiences that influenced the content, design, and development of the Discover Dance CD-ROM. In the next section, I will share the formal testing procedures of the Discover Dance CD-ROM.
CHAPTER 4

METHODOLOGY

Introduction

The review of literature for this study indicated a need for further research to address the issues impacting the use of technology in dance education. The current study investigated the design, development and testing of the Discover Dance CD-ROM and made an attempt to determine the effects of the Discover Dance CD-ROM on fifth graders’ learning in dance. Qualitative methods were used to collect and analyze data. Attempts were made to identify themes related to participants’ experiences and other factors contributing to the integration of dance learning with the Discover Dance CD-ROM.

Novak (1991) considers research in educational technology to be a complicated process with numerous relationships interacting in endless and often unforeseen ways. He suggests careful expansive examinations using qualitative research. Eisner (1991) further identifies the features of a qualitative study as follows:

Field focused; reliant on the self as a research instrument, interpretive in character, reliant on the use of expressive language and the presence of the voice in the text, attending to particulars, believable and instructive because of their coherence, insight, and instrumental utility. (pp. 32-39)
Janesick (1998) adds to these features of qualitative design:

Holistic, in order to understand the whole picture of the social context under study; looks at relationships—within a system or subculture, refers to personal—face to face immediate interactions in a given setting, focused on understanding the social setting—rather than prediction and control, demands equality in the field and in analysis, incorporates a complete description of the role of the researcher, relies on the researcher as a research instrument, incorporates informed consent documentation and is responsive to ethical concerns in the study. (p. 91)

In the realm of dance education, Riley (1987) rejects traditional quantitative research methods when studying children's dance, because dance [a diverse phenomenon] impacts children's affective, cognitive, and physical domains. Conservative quantitative approaches, Riley believes, have detrimental influence on the phenomenon. He advocates natural and responsive qualitative approaches to studying children's dance, because they are flexible, emergent, and recognize the context-bound meanings in dance. Dance education scholar Sue Stinson (1985) similarly cautions researchers of the incompatibility of quantitative research models when studying children's dance, believing that the richness and reality of both dance and the children will be lost.

As the researcher, software developer, and instructor in the current study, I matched the qualitative design with the research as well as the researched, since both are intertwined in the data collected and the process itself.

**Participants/Subjects**

Participants for this research study were 14 students from the Indianola Alternative Elementary School in the Franklin County School District in the city of
Columbus, Ohio. Columbus is the capital of Ohio and has a population of 670,234. The Indianola Alternative Elementary School is an arts magnet school and is one of 88 schools in the Franklin county school district. Students study dance from kindergarten through fifth grade with a full-time dance instructor. Indianola has a student population of 331 students, and a student-to-teacher ratio of 17 to 1. One-third of the students qualify for a reduced-free lunch. In 1998-1999, the statewide assessment evaluated Indianola as a low-performing school. The statewide proficiency test scores in fourth-grade reading placed Indianola Alternative Elementary School at 53%. Overall, Indianola ranked below standard, as less than half of their students met proficiency criteria in all subjects.

**Timeline/Outline**

In preparation for the study, I spent three weeks at Indianola observing, talking to fifth-grade students, teachers, and their principal, viewing dance classes and performances, and collecting background information on the school community to build a profile on students. Initially, I had planned to conduct the study within the 1999-2000 school year but due to time constraints and the lack of available Macintosh computers and tech support, I decided to conduct my research at The Ohio State University (OSU) over the summer. This location was desirable, as the OSU campus is two blocks from Indianola Elementary School. In May, I gave several short 15-minute presentations to students about the upcoming two-week workshop for fifth graders (Appendix E. Oral instructions to subjects). I handed out information sheets and parent consent forms to any and all interested students (Appendix F. Letter to parents). Over 50 students received participation forms. Although there was much interest from students in the Discover
Dance computer/dance workshop, students' participation was dependent on transportation, with the parents driving the student to and from OSU each day. When the consent forms were returned (only 14), the times and dates for the workshop were set. The dates for the workshop coincided with the end of the school year, before summer camps and family vacations. There were 14 students, seven boys and seven girls. The breakdown of ethnic groups in the workshop was as follows: four African American and three White-non Hispanic boys; five white-non Hispanic and two African American girls.

During the two-week workshop, students used the Discover Dance CD-ROM and physical dance exploration daily for two hours. The daily lesson content and student needs dictated whether classes began in the studio or the computer lab. Generally, class time was equally divided between the two locations. During the workshop, students worked independently and in small groups improvising, creating choreographic studies, viewing dance movies, answering questions in the CD-ROM, creating notated dances, and recording their experiences in dance journals. (The two-week lesson outline is located in Appendix I)

**Role of the Researcher**

A qualitative researcher is a storyteller who becomes highly connected to her research participants to establish trust. Trust enables individual participants to feel comfortable and to tell their particular stories. A qualitative researcher becomes a part of the community she is studying. As Janesick (1998) points out, "meaning is constructed in the ongoing social relationship between the researcher and the participants in the study"
Lincoln and Guba (1994), cited in Janesick (1998), discuss the role of the qualitative researcher as that of a "passionate participant actively engaged in facilitating the 'multi-voice' reconstructions of his or her own construction as well as those of all other participants" (p. 63). The qualitative researcher does not relate to facts, but must listen to "informed hunches" and personal intuition as they may "lead to more powerful explanation of the setting, context, and participants in any given study" (p. 64).

Aware that as the researcher/instructor I assumed a pivotal role in the workshop (guiding, observing, listening, and interacting with students), I was sensitive to the students’ needs and interests and made them the highest priority.

Using the constructivist learning model, I became a facilitator or a "coach" rather than the research project director. I was responsible for setting up inquiry projects, securing lab access, and creating the organizational structure for the students to do their work. Within the workshop, the pacing, tempo, and lesson content depended on student interest and abilities. A flexible student-centered inquiry process was useful, as it allowed me to step back and provide assistance to the students.

In addition to the 14 fifth-grade students and myself, the workshop support staff included one lab assistant, who was on call in the next room, two videographers, and a non-participant observer. The 14 energetic students created a great deal of attention and interest from faculty and students in the dance department. As a result, 4 graduate students were invited to participate and to share their talents during the course of the workshop.
Design Considerations

As stated above, the research location originally proposed was at an elementary school during the school year. Unfortunately, no schools met my criteria of adequate technology (processor speed and number of Macintosh computers). In response, The Ohio State University Department of Dance computer lab and a dance studio were used for the test sites.

Although initially undesirable, as the OSU test site would entail removing the students from the context of their classroom and school, the OSU site offered several advantages. These included a break physically and metaphorically from the style and content of dance instruction that many had received for the last six years. The change in location coupled with a change of instructor and method of delivery allowed for a fresh start. This location was familiar, as students from Indianola Elementary had taken numerous field trips to the Wexner Center for the Arts and Sullivant Hall during the school year.

In addition, the OSU site afforded students access to large dance studios with high ceilings, lots of light, walls of mirrors and barres that were unavailable in their school. This contrast is striking because at Indianola, dance class is held in a cafeteria and students often complain of sticky floors, due to juice spills at lunchtime. Students commented that the studios were the "real thing," a place where dancing was the most respected and most highly esteemed experience. Students excitedly peeked in to see what was going on in "real" dance classes and rehearsals. Having professional facilities raised the significance of the research in the students' eyes, the value of which cannot be underestimated.
The OSU facility also offered individual access to high-end Macintosh computers and Internet connectivity unavailable in most Elementary schools today. The OSU computer lab had 12 high-end computers available to students, so with a tiny bit of juggling, the 14 workshop students got hands-on individualized experience.

**Procedure for Data Collection**

This research looks at the complexity of components surrounding the Discover Dance CD-ROM and sheds light on the issues surrounding the teaching and learning of dance using CAI. In the data collection, emphasis was placed on description and interpretation of the elements rather than measurement and predictions. This qualitative research takes into account the wider context in which CAI functions, connecting changes in the learning environment with intellectual experiences of workshop students.

A research strategy was used to examine the Discover Dance CD-ROM: how it operates, how it is influenced by various situations, and what its advantages and disadvantages are. Firstly, I became knowledgeable about the day-to-day activities and ongoing events in the school and with the students. McBride (1998) calls this an "immersion period," as the researcher listens to issues and records discussions with participants in the study. I visited Indianola Elementary School for three weeks (at various times of the day) to become familiar with the school and student culture.

Secondly, my observation and inquiry became more directed and selective. I focused on selective questions and made inquiries to further familiarize myself with the students and about their methods of using the Discover Dance CD-ROM. This occurred during the two-week workshop.
Thirdly, I began looking for general principles underlying the Discover Dance CD-ROM. Here, I searched for patterns in the causal relationships and in the data analysis section and reported my findings in a broad explanatory context. This occurred upon the conclusion of the workshop.

I relied on multiple methods of data collection: observation, interview, background history, dance making, and, video to gather a broad picture of the issues surrounding the teaching and learning of dance using the Discover Dance CD-ROM. In the next section, I will further discuss research methods employed: (1) observation, (2) interviews, (3) background history, and (4) dance making.

**Observation**

Observation was selected as a main method for data collection in this research study, as observation techniques allow for the documentation of human behavior and events as they occur. Spradley (1980) discusses three kinds of observation: descriptive observation, focused observation, and selective observation (p. 33). All three observational methods were used in data collection. During the profile building, descriptive observation was used to record the behavior of the students, teachers, and the overall school environment. Then based on my perceptions, hunches, and questions, more selective and focused observations were utilized during the workshop.

Observational data was gathered and recorded from all participants in the study. The students used personal dance journals, the non-participant observer used a notebook, and I used a personal dance diary to reflect and record my daily observations. In addition, the entire workshop was videotaped using two cameras. Upon conclusion of the
workshop, I reviewed all observation materials and developed coding sheets to structure the analysis.

**Student Journals**

As the Discover Dance CD-ROM was created with fifth-grade students in mind, I thought it appropriate that workshop students become stakeholders and active co-researchers in the data collection process. Janesick (1998) describes this method as "active learning," where "power is de-centered and the research process is demystified" (p. 71). With students as research stakeholders, I was able to encourage their feelings of empowerment and participation. Each student in the study was required to be (and honored to become) a co-researcher. Student journals, in the form of spiral notebooks, were handed out to the students on the first day of the workshop. To limit the possibility of loss, and to allow the researcher to analyze and write individual comments, student journals were collected at the end of each day. In their journal, student researchers were asked to write about their ongoing dance experiences, discuss their own and other students' choreography, record in-class observation exercises, and discuss their opinions about this method of instruction.

As co-researchers, students enthusiastically took on this role which was somewhere between a participant observer and active researcher. Students valued their journals and the private comments of the instructor, sometimes arriving 20 minutes early to read instructor comments.
Instructor/Researcher Diary

During this study, I kept an ongoing diary of events and experiences in the school. The diary included my verbal comments to the class, concerns, students’ responses, anecdotal conversations with students, parents, teachers, and a record of what happened and when. Further, my diary became an invaluable resource, as it provided a place and time for critical reflection of my assumptions and perceptions during the investigation. This diary became an unexpected resource into the teaching-learning cycle of the workshop.

Non-participant Observer

As the instructor and principal researcher in the study, I was immersed in the minute-to-minute teaching responsibilities regarding students’ instruction. Consequently, I had rich personal data, but was unable to personally maintain an awareness of the “big picture” as it unfolded in the classroom. Therefore, a non-participant observer (NPO) was asked to watch and record activity in the classroom. NPO focused on the instructor’s interaction with students, the students’ interactions with one another, and students’ employment of the technology, while noting changes in atmosphere in both the dance and the computer classroom environments. Additionally, two methods of video recording were used for the duration of the workshop.

Video

Two types of videotape recording were used to corroborate data from the instructor’s diary, student journals, and the NPOs notes. Video recording methods
included a standard wide shot of the computer lab and the dance studio on a steady tripod, and a roving videographer, recording students engaged in the workshop processes. Each workshop class was recorded in both methods.

Aware that there are certain drawbacks to the validity of research that is dependent solely on observation (since observation only measures what the researcher can see), I chose additional methods for data collection which included interviews and students’ dance making.

**Interviews**

Interviewing was used in this research to reveal as much as possible of the students’ understanding, reasoning, and viewpoint. Interviews were an important component, providing substantive data on the personal perspectives unique to the students being interviewed (Spradley, 1979; Janesick, 1991; Metzler, 1989). The interview structure offered students a chance to explain their answers and to elaborate further, which in turn brought new issues to the surface that had not been considered, predicted, or anticipated. Knowing that “interviews are human interactions, and the interviewer affects the quality and quantity of data gathered directly,” I concentrated on listening with heightened sensitivity to the natural unfolding of the interview, trying to take time and not rush, and allow students the opportunity to reflect and formulate their response before I asked them another question (Drew, 1996, p. 182). In addition, I avoided displaying verbal or non-verbal signs of approval. Conscious that the manner and type of question I presented to the students would influence student answers, I employed
two interview strategies: semi-structured individual and focus group interviews during the study.

**Single-Subject Interviews**

An even number of boys and girls were selected for individual interviews. There were a total of 12 fifth-grade students interviewed at the beginning and at the end of the workshop. As class time was scarce, students were asked to stay late to conduct the interviews. During the interview, questions were tailored to the level of knowledge of the student, being careful to use everyday language familiar to fifth-graders.

The first interview was semi-structured and occurred during the first three days of the workshop. In the interview, I asked descriptive questions to gather information about the students’ experiences, their perspective on dance education, their interest and experience in technology, and their everyday lives at school. The second interview that occurred in the last three days of the workshop was more focused. I asked follow-up questions that are directly connected to my research question.

All interviews were videotape recorded and selectively transcribed to establish a data record. Aware that videotape can intimidate and diminish frankness, I worked to build a warm trusting relationship with the students. As Drew (1996) states, "The researcher communicates the importance of the person being interviewed by assuring privacy, freedom from distractions, and respect. When respondents feel confident that their rights are being respected, they will be more likely to give useful and trustworthy responses" (p. 182). The students valued the interviews as personal one-to-one time with
the instructor. All students wanted to be interviewed. Unfortunately this was not possible, due to the students commitments elsewhere.

**Focus Groups**

Semi-structured focus group interviews were also used in this research, as they can offer dynamic interactive relationships between students. Janesick (1994) encourages focus group interviews as they can “bridge the gap between the professional and the real world target group” (p. 35). Data collection using focus groups allowed me to (1) observe interaction between students discussing a topic for a sustained length of time (Janesick, 1998); (2) obtain multi-voiced, multi-layered data which could not be easily found elsewhere; (3) orient myself to the student population, language, and culture of the school and provide heightened interaction in a rather short period of time; (4) develop a rich understanding of the students’ point of view; and (5) equalize the power differential (Boyd, 1996, cited in Janesick, 1998) by obtaining feedback from and giving voice to students. During the focus group process, students interacted with one another taking control, which in turn allowed me to step away from a position of leadership to listen and learn from the students.

In this study, I conducted two focus groups with the entire workshop group. Each took place in the computer lab and lasted approximately thirty minutes. The first focus group occurred at the beginning the workshop and the second occurred at the end of the workshop. Focus groups were a highly effective means of letting me into fifth-grade student culture. Students were enthusiastic and jovial, sharing their thoughts and listening to their peers. As McBride (1998) states, “The language conventions, slang, jargon, and
metaphors that characterize conversations... can reveal tacit assumptions, interpersonal relationships and status differentials” (p. 3).

**Background Data**

Documentary and background sources were used in the data collection to build a profile. I observed the students’ school environment, their instruction in dance education and in technology. In addition, I looked at grades, attendance, demographic characteristics, National and State school ratings, teacher experience levels, and published articles about the school. These artifacts provided valuable background data for a substantial information profile. At the end of the study, parents were given questionnaires regarding their children’s experiences during the workshop (Appendix. H) Unfortunately, only five of fourteen parents responded to the questionnaire.

**Dance Making**

As the focus of this research is the investigation of the Discover Dance CD-ROM as related to student dance making, the students’ expressive body movements while dancing had great importance. To gather this type of data, I employed my skills and training as a Certified Movement Analyst (CMA), to analyze the students’ physicality while in the process of dancing. A CMA holds an advanced degree in Laban Movement Analysis (LMA), which is a system and a language for observing, describing, and notating all forms of movement. LMA provides a language for describing the qualitative features of movement (Brennan, 1999). LMA is used in a variety of research strategies, mainly concerning nonverbal communication or motor behavior. LMA as a research tool
has seen limited use because it requires rigorous study and in-depth training to learn the system to attain accuracy of observations. LMA is not recommended as a stand alone research method, but when used in tandem with other methods, it creates a solid foundation that is perfect for dance research (Brennan in Fraleigh & Hanstein et al., 1999).

During the research, I applied LMA frameworks and language to identify, analyze, and record the complex actions expressed through students’ bodies. Specifically, I considered the details of how each student’s body was engaged during computer use, improvisation exercises, and during the creative process. Such details included spinal connectivity, clarity of intent, complexity of action, and whole body articulation. I jotted brief notations/observations during class and later viewed the daily class video to corroborate my observation. Upon the conclusion of the workshop, I developed coding sheets to record, compare, and analyze students’ expressive physical process while dance making (See Table #15; 16)

**Methods of Data Analysis**

**Process of Data Analysis**

In qualitative research, data analysis is an ongoing process directly related to data collection. In the process of data analysis, I developed coding systems to organize the accumulated data. This coding system has evolved during the data analysis process, as themes and patterns have emerged and developed from the data. To maintain the authenticity of my data interpretation, I have been cautious during the collection, analysis, speculation, and follow-up process to resist jumping to convenient
interpretations. Drew (1996) recommends qualitative researchers consider initial field findings cautiously. In the field, initial themes provide awareness to promising areas of study, “but they should not be treated as findings until data is re-analyzed from the distance of time and place after the researcher leaves the setting” (p. 417).

Gathering data through multiple sources (observation, interview, and children’s dance making activities) allowed for the triangulation of data. My experience, single-subject interview transcripts, non-participant observer notes, student journals, and the analysis of student process and product of dance making all ensure credibility. After my fieldnotes, journals, and interviews were transcribed and emergent themes identified, coded, and catalogued, I employed an analysis cycle. Using an analysis cycle modeled after Janesick (1998), I began by (1) looking for frequent patterns and empirical assertions in the data. (2) Then I organized exact participant quotations, descriptions, and observations of dancing, computer use, and situational vignettes to support my assertions. (3) Next, I returned to other research sources, journals, background information, and other research in the field (to draw insights from them). (4) I then added “interpretive commentary” as it related to patterns in the data. (5) I then included theoretical discussions relating data to the theories that guided the research study. (6) I then described my role in the research and (7) stated issues that arose during the research (pp. 64-65).

**Specific Analysis Structures**

**Observation**

Observation played an important role in this research. My observation diary, personal accounts from student journals, non-participant observers’ notes, and daily
videotapes were carefully examined for patterns and emergent themes. Specific analysis structures are as follows:

**Instructor Diary**

My observation diary provided a validity criterion and assisted in my sorting out shifts and changes in reasoning and methodological choice. The diary, while reflective in nature, secured a sequence of my thinking and decisions made during the research process.

**Student Journals**

Students’ journals became a valuable resource, providing insight into students’ understanding of their own experiences. These journals also offered a method to dialogue directly and privately with the students. Following each day’s workshop, I collected and read each student’s journal. I used this opportunity to pose questions, provide praise for their efforts, and add evaluative comments to daily questions posed to the class. Student journals were selectively transcribed to establish a data record.

**Non-Participant Observer Notes**

As I would be busy guiding and teaching students during the workshop, I chose to employ a non-participant observer (NPO) to assist me in gathering a broader picture of the workshop. The NPO participated in all aspects of the workshop, arriving early and staying until the last child had gone home. The NPO was not required to use a particular coding sheet to record her observations. Rather, I encouraged observation in several areas. These included (1) Transference: The dance making relationships between what is experienced through the technology and in the students; (2) Problem solving strategies: The type and kind of questions the kids ask. Where do the students get stuck? When they
get stuck how do they resolve it? (3) Relationships and environment: Is there evidence of the class community changing? How? Evidence of students in showing signs of Boredom/Frustration/Enthusiasm/Excitement; (4) Learner /Teacher behaviors such as: evidence of kids helping or hindering kids to use the technology, or evidence of student autonomy in learning. Visibility in the computer lab and in the dance studio was at times restrictive; therefore, the NPO was encouraged to move around the rooms, observing students’ behavior and listening to students’ conversations and then recording these in her notebook.

**Individual Student and Focus Group Interviews**

All interviews (individual student and focus group) were selectively transcribed to establish a data record and the relevant information was taken into the data pool.

**Specific Assessment Structures**

Research in assessment in the arts warns against oversimplification of assessment tasks. Rather, they propose assessment tasks that focus on the holistic aspects of artistic creation including performance, knowledge, understanding, interpretation, and judgement. Brent Wilson, Director of the Penn State Center for Policy and Evaluation in the Arts, elaborates: “Holistic tasks assess students’ inquiry process relating to an integration of creative and performance activities, critical analyses of works of art and performances, understanding of the history of the arts and aesthetic issues (These tasks may be directed toward the students’ own artistic process or toward the process of
others).” Wilson continues that comprehensive holistic tasks, if carefully prepared, “can synthesize all of the major goals of an arts program into one exercise” (1992, p. 39).

In addition, complex tasks permit students to assume a more active role in defining their own learning goals and regulating their own learning. Students learn not because they wish to recount their studies on demand, but to comprehend a subject more fully and to seek new information. In this research, three specific assessment structures were implemented. These include (a) Student explorations, (b) “Out of Ohio Dances,” and (c) Fantastic Dance Documentation.

**Student Free-Time Explorations**

Students were given daily unstructured free time when they could explore their own ideas in self-selected ways. This open-ended exploration could have included using the Discover Dance CD-ROM, writing in their journals, or dance making. Students could have selected any of the above-mentioned activities. Unusually, all students chose the CD-ROM over other possible free-time activities. Students were asked to record in their journals what they did during their free time. Student journal notes were corroborated with detailed description of student free-time explorations. The student explorations were documented in my journal, in the NPO’s notes, as well as on video. At the conclusion of the workshop, these records were gathered and charted. Coding sheets were created to assist in the reflection of what the students did and how they used their time. As the CD-ROM developer, I was interested in matching content with student interest. My analysis focused on several themes:

- Which section of the CD-ROM was most desirable?
• Did choices reflect an interest in exploring unknown sections or reviewing known sections or activities?
• What activities or movies did they view?
• What methods were used to play/view them?
• When did they get stuck?
• How did they get unstuck?
• How much time did they spend in a particular spot?
• In what ways did they share their experiences with fellow students, with their teacher, and, with the NPO?

"Out of Ohio Dances"

The second assessment activity is called "Out of Ohio Dances." In this activity, students employed a choreographer's cycle: to create, notate, record, reconstruct, perform, and analyze a dance. The assessment occurred over 3 workshop days. The point was two fold:

1. A gauge of the students' abilities in symbol to action transfer, movement invention, and memorization, into individual choreography.

2. A visual, verbal, and written record of students' thinking when creating and describing their dance.

The goal and objective of "Out of Ohio Dances" assessment included the following:

The students will...

1. appreciate dance as an art form from experience as a choreographer, notator, critic, and an audience member.
Procedure

(1) Students created and documented a dance using Motif Writing and descriptive methods. (2) Students performed their dance. (3) Students wrote a short description of their dance reflecting personal importance submitting details on how it could be reconstructed. (4) Written documentation of the students' dances was collected. Later, a special courier returned to the class and delivered dances from the students “Outside of Ohio” (their fellow classmates). (5) Students reconstructed and performed from the delivered dance scores. And (6) after each dance was performed, students wrote in their notebooks describing, interpreting, and evaluating each dance, after which, the class discussed them.

The “Out of Ohio Dances” assessment required the students to complete complex and authentic tasks. Assessment criteria included the following: Were both students actively participating in the creative collaboration? Did choreography presented reflect innovative original ideas and an understanding of motif writing? When preparing the dance to be sent “Out of Ohio” did the students’ writing include the following? (a) a description of the dance, what the dance is about, (b) why it is meaningful to you, (c) how it was created, (d) a title if there is one, (e) the important dance elements which define the dance, and (f) an analysis of your dance. The collected data was analyzed and evaluated using scoring rubrics developed for the assessment task.
Fantastic Dance

The third assessment activity was called "Fantastic Dance." In this activity, students employed methods of analysis, description, and inquiry on a "Fantastic Dance." The assessment took approximately 20 minutes and occurred on the eighth day of the workshop. In the assessment the students view a "Fantastic Dance" in the computer and answer questions about that dance on a dance database.

The focus of the assessment was: to assess students' abilities to identify the Elements of Dance (Body, Effort, Space, Shape, and Relationship) to a short dance video in the Discover Dance CD-ROM.

The goals and objectives of "Fantastic Dance" assessment included the following:

The students will:
• develop the ability to identify the Elements of Dance (BESSR).
• appreciate dance as an art form based on their experience as participants, critics, and as audience members.
• recognize the interdependent relationship between the choreographer and the audience.

Procedure

On day 8 the students went to the "Fantastic Dance" section of the Discover Dance CD-ROM. The sequence was as follows: (1) students visited the "Fantastic Dance" section of the Discover Dance CD-ROM and looked at several Fantastic Dances; (2) the students chose one Fantastic Dance and answered the five inquiry questions relating to the BESSR dance analysis; (3) the students recorded their comments and saved them on the computer's hard drive; (4) each student shared his/her observations.
with the class; (5) the class then viewed the “shared” dance on their own computers and added additional observations.

The data collected from the assessment was analyzed and evaluated using scoring rubrics developed for the assessment task. These scoring rubrics are as follows:

3-point–Extensive response: The student accurately and fully describes how details of the dance communicate information. There is a clear connection between the interpretation and the details offered in support. The information is extended and expanded to fully articulate the response.

2-point–Essential response: The student offers a reasonable, general interpretation with adequate supporting details. When a specific number of details or comparisons are requested, the response falls short of being complete.

1-point–Partial response: The student provides only plausible interpretations, or a plausible interpretation attached to a vague or non-supporting characteristic of the dance work.

As described earlier, this study aims to find patterns, define causal relationships, and explain findings within a broad context. The Discover Dance CD-ROM activities, movement examinations, and individual and group interviews are used to record students’ understanding in the dance domain.

The following steps have been taken to ensure internal reliability. Integral to the study were multiple researchers. These included students as co-researchers, a non-participant observer, and the use of video recording to provide rich data collection and allow for data triangulation.
To date, there is very little research in K-12 dance education in general, and research of this kind does not exist. This study lays the groundwork for further inquiry. Recommendations for appropriate use and sequencing of instructional technology will bring credibility and advocacy for this kind of emerging innovative instruction. The Goals 2000: Priorities for Arts Education Research document speaks to the need for research studies on student learning, which identify the most effective uses of educational technology in teaching the arts.
CHAPTER 5

DATA ANALYSIS

Introduction

Data from the study consisted of layered qualitative information to provide a vivid description of teaching dance education using the Discover Dance CD-ROM. In this discussion, I will provide characterization and demographic information on each of the 14 workshop participants. I will analyze the CD-ROM based on stated goals (criteria) and analyze the data, substantiating the effects of the Discover Dance CD-ROM on students’ dance inquiry, dance making, and dance sharing.

Participants’ Demographics

A total of 14 students participated in the study, seven girls and seven boys, all of them 10 or 11 years old. The participants’ national and ethnic makeup included 2 African American girls, 5 White-Non Hispanic girls, 4 African American boys, and 3 White-Non Hispanic boys. All students attended the same Elementary School and were taught by the same dance teacher. All had studied dance in school for the past five years. In order to protect the identity of the participants, I have used pseudonyms for the names of teachers, visitors, parents, and students.
Participants’ Disposition

Students were very eager to participate in the 2-week Discover Dance workshop for various reasons. Some students were excited about using the computer to make dances and to go on the Internet. Other students were eager to dance all day in "real dance studios." Some students wanted to learn modern dance, or different cultural dance forms. Other students were excited about making their own choreography and working with new people, and still others said they wanted to attend the workshop because it was better than just hanging out at home all summer: attending the workshop meant that they could "hang out with my friends." Additionally, this is a highly selective sample population, which is not representative of the general 10-to-11-year-old student population, as the participants were experienced dancers who were already highly motivated to dance.

Students’ Profiles

Kathy is a sweet and sensitive 10-year-old girl. She is a focused hardworking choreographer who prefers to work with a partner. She loves to dance and dances all the time. She cancelled her first week of summer camp to participate in the workshop. Kathy tells me that she often dances to change her mood. "When I’m feeling sad, I get up and dance and after I dance, I feel better." In school, Kathy’s favorite subject is math because it is challenging. Kathy has been using computers for less than 1 year. She feels she needs more experience to feel comfortable using technology. In school, she went on-line to Yahoo to collect pictures for a class project. She likes using computers to play games, making cards, and drawing pictures.
Chris is an extremely social 11-year-old boy. A highly physical dancer, Chris prefers large expansive difficult movement. In school, Chris’s favorite subject is math because it is both hard and easy. He is glad to be part of the workshop because it is fun and “better than sitting at home, here [at the workshop] I get to see my friends.” Chris is a knowledgeable computer user with five years of experience and he sometimes goes online for up to 3 hours a day, to “get cheats (Nintendo tips) and talk to friends with instant messages and e-mails.” Chris takes the evaluation of the CD-ROM seriously, daily sharing his likes, dislikes, inconsistencies, and errors that he finds in the CD-ROM. He is a very active member of the class and resolute in class discussions and focus groups, but he rarely writes in his journal.

Margaret is a bright and considerate 11-year-old girl. She is a “method” choreographer who works well with a partner. Her favorite subject in school is reading “because it is not like math where you have to get the right answer. You can lose yourself when reading a book.” Margaret has been using computers for 3-4 years--mostly educational CD-ROMs like Carmon Santiago and Amazon Trail. At home, she is restricted from playing computer games or using the Internet.

Lilly is a creative and perceptive 11-year-old girl who is considering dance as a profession. Lilly creates long sculptural dances. She is focused and serious when creating, often adapting the Elements of Dance in her choreography. A quiet leader, she works well with a partner and actively participates in critical discussions with supportive comments and observations. Lilly is influenced by the professional dance space available at OSU: “it is a lot more fun to dance when you have a good space to do it in.” She has
been using computers on and off for three years, mostly going on-line to get research for school projects. Her favorite subjects in school are art and music.

**Sean** is an inventive and at times querulous 11-year-old boy. He enjoys improvisation and his choreography is detailed and original. He frequently shifts between high and low energy in class. He is captivated with Motif Writing and memorized Motif symbols very quickly. Sean’s favorite subject in school is science because he likes to “understand the way things work.” He has been using the computers for three years to gather research, write papers, and sometimes get sports scores.

**Channel** is an easygoing 11-year-old girl. At school, her favorite subject is math because she enjoys working with numbers. Channel feels it is important to express her feelings and emotions through dance. During the workshop Channel became an ardent Dance Diary author. She has been using the computer for two years and is already an experienced Internet consumer going to NIC.com and Mamamedia.com to play games and Shockwave movies. She was very enthusiastic about attending the workshop: “I really like using computers and dancing and I couldn’t believe I could do them together.”

**Derek** is an energetic and passionate 10-year-old boy who loves music and singing. He is a generous mover, ranging from subtle detailed gestures to powerful leaps. Derek’s concentration can be inconsistent particularly in the dance studio when kinesthetic sensation overwhelms him. There is abandon in his dancing, which at times manifests itself in his classroom behavior in the form of posturing for his friends and singing rap songs into the camera. Derek is the only student in class who does not have a computer in his home. He has been using the computers at school and at his aunt’s house for two years. During his free time, Derek is absorbed with printing images and text.
is highly focused when at the computer and is skilled in movement analysis, able to identify the Elements of Dance with great accuracy.

**Max** is a 10-year-old boy with a propensity for computer analysis and full of inventive ideas for choreography. He has been using the computer for 4 years, mostly playing CD-ROMs and games like Tank 2, Math Blasters, Road Rash, Dark Forces, and Rebel Force 2. He undertakes the job of co-researcher seriously and in fact spent his free time investigating and challenging the parameters of my programming, by looking for bugs and error messages. At school, his favorite subjects are math and writing. Max is quick to understand a lot of information in a short amount of time. He enjoys sharing his observations, experiences, and choreography with his classmates.

**Brooklyn** is a highly social 11-year-old girl who loves to write in her Dance Diary. She is very sensitive to the group dynamic in the class, and knows what is going on with all of the students at all times. In school, her favorite subject is math, because she is good at it and it is her strongest subject. Brooklyn was eager to participate in the workshop to be with her friends, use computers, and dance. She has been using computers for the past 3 years mostly at home playing games and using CD-ROMs, which she borrows from the library.

**Matthew** is a quiet and reflective 10-year-old boy. In school, his favorite subject is science and he enjoys making secret codes and sending secret messages to his friends. He has been using the computer for three years mostly to gather research, play games, and to draw pictures. An imaginative choreographer, Matthew’s dances often follow themes full of fantasy and contrasting relationships. Matthew has absorbed Motif Writing symbols and principles with facility and ease and enjoys applying them to all his writing.
He is a serious notator creating complex dances in notation, including very sophisticated themes such as accumulation and retrogrades.

**Elizabeth** is a thoughtful and observant 10-year-old girl. In school, her favorite subject is reading. She likes to use her imagination and pretend she lives in other cities and countries. Elizabeth has been using the computer for two years mainly to write papers and look up facts for school. She prefers making dances with a partner or in small groups. Elizabeth is an astute listener with perceptive observations of fellow students' works. She has strong abilities in dance description and interpretation and assumes a leadership role in class discussions and dance sharing.

**Ryan** is a bright and expressive 10-year-old boy. In school, his favorite subjects are math, basketball, and music. He has been using the computer for 4 years, "mostly going on-line to learn how movies are made and to play games." Ryan is an extremely focused choreographer, intensely drawn to the concepts of Effort expression, timing, expressive body shape, and stillness. In his choreography, he readily applied dance concepts addressed in class. A musical and expressive performer, he is highly self-directed and focused, rehearsing independently.

**John** is an organized and inventive 11-year-old boy. In school, his favorite subject is math because "I'm good at it." Ryan has been using computers for 3 to 4 years e-mailing family members, playing video games, and doing homework. John is a team player and an active participant in group discussions who is able to give and take constructive comments and criticism. He is a natural storyteller requiring planning time to organize his thoughts before dance making.
Colleen is a quiet and sensitive 10-year-old girl. She is highly observant and prone to watch others dance before joining in. In school, her favorite subjects are history and music. She has been using the computer for the past year and a half mostly using CD-ROMs and finding images for the stationary she makes. Colleen’s energy fluctuates and she often gets tired when making dances and sits on the side.

CD-ROM EVALUATED AGAINST MULTIPLE CRITERIA

As the literature indicates, the development and evaluation of technology in dance education is highly limited. This study looks at the research, development, and testing of the Discover Dance CD-ROM. Guiding this assessment of the technology were three main questions:

• Does the CD-ROM support the National Standards for Dance Education?
• Does it promote knowledge in multicultural dance, Laban Movement Analysis, and Motif Writing?
• Does it exhibit criteria for high technology performance?

In the following section, I consider these questions, providing accounts of classroom observation, student focus group and individual interview comments, non-participant observer (NPO) notes, and responses during the most recent field testing with twenty-two dance educators at a National Conference in October, 2000.
The National Standards

Technology is largely an unknown and underutilized tool for teaching and learning dance. Although it is not directly stated in the National Standards document, most states and school districts have adopted integrated use of technology within their curriculum frameworks. To illuminate a relationship between the content presented in the Discover Dance CD-ROM and the National Standards, I will address each of the seven Content Standards for fifth-grade achievement that the Discover Dance student comments on and experiences in the data.

My analysis of the data reflects a positive correlation between the Discover Dance CD-ROM and four of the seven National Dance Content Standards. These four standards relate to identification of the elements of dance (Standard #1); choreographic processes (Standard #2); communication of meaning (Standard #3); and critical thinking skills (Standard #4). The remaining three National Dance Content Standards are less supported. They relate to understanding cultural dance (Standard #5); healthy living (Standard #6); and making connections to dance and other disciplines (Standard #7).

It must be mentioned that some of the Content Standards in a CD-ROM are inherently difficult. An example of this is in Content Standard #5, which states, “Demonstrating and understanding dance in various cultures and historical periods.” In the CD-ROM there is video, text, web links, and audio information about a wide variety of cultural dances with the intent on broadening students’ appreciation of dance.

The data analysis reflects that although there is a variety of cultural dance forms represented, the content information is very brief and addresses only a level of surface knowledge. It therefore does not approach a true understanding of a cultural dance form.
To meet the above-mentioned Content Standard would require learning about cultural context, which is much more than can be addressed in this CD-ROM.

As related to the National Standards for Dance Education, the potency of the Discover Dance CD-ROM is located in the areas of understanding the elements of dance, descriptive analysis, inquiry, and creative process. The areas which the CD-ROM does not take into account are understanding cultural dance forms, healthy living, and in support of other content areas, as elaborated below.

**Content Standard #1**

**Identifying and demonstrating movement elements and skills in performing dance.**

The Discover Dance CD-ROM strongly addresses the content of this standard in the identification of the elements of dance and integrated movement skills in dance performance. Clearly expressed as a critical focus is the instruction in Motif Writing and the elements of dance. The field test revealed that the students are learning to read, write, think, and to move fundamental dance components.

The CD-ROM emphasizes the identification of movement by providing students with the opportunity to look back at the dance clips. In a conversation, Ryan described the meaningful analysis available when using the computer stating, “you can keep going back into the dances.” Here, Ryan is addressing the capacity of the CD-ROM to allow students the advantage of looking back at the dance clips. Multiple re-visitations support the student identification of movement and elucidate learning. In activities such as “Mini Dance” and “Fantastic Dance,” students hone critical skills of identification and analysis by communicating about and documenting dance.
In the class discussion, Margaret demonstrated her ability to identify and analyze a dance. "It [Ryan's reconstruction of Kathy's dance] is the same. Their dances are almost exactly the same. Look, they even have the same contracted low-level ending shape." Students showed exceptional accuracy in describing and identifying movement in their Fantastic Dance analysis and Out of Ohio reconstructions.

The interactive layering of symbols with text, sound, imagery, and video act as anchors in the student's formation of movement identification. The NPO states that "The CD-ROM is a great example of multi-sensory learning. They [the students] read, write, as well as dance and create. As they look at Elements of Dance, there is a lot of whispering intently, pointing and giggling. Yes, they are totally engaged. Mentally and physically. 'Wow did you see that?!' Also, they mimic what they see. They physicalize it. The students bend, twist and make shapes with the movies. An example of this connection is hands contracting and expanding, a favorite amongst Max and Matthew."

Content Standard #2
Understanding choreographic principles, processes, and structures.

The field test revealed that the Discover Dance CD-ROM strongly supports students' understanding of the concepts and principles of choreography. The CD-ROM provides a substantial foundation of examples and exercises for learning dance composition and choreography. The focus on Motif Writing and LMA in interactive sections support the investigation and understanding of the principles, processes, and structures of choreography. Choreographic structure is clearly demonstrated in the CD-
ROM's Motif Writing section. The videotape shows the students' investigation as they manipulate and organize their dance content in the process of dance making.

The knowledge of Motif Writing structures further assists students' understanding of movement sequencing. An example is the use of the double lines to signify when the movement action starts and stops as the student choreographs.

The "Make a Dance" section was observed to focus, define, and organize students' invention on a particular idea (i.e., expanding and contracting) rather than following anything which comes to mind. Students' "Make a Dance" answers were printed and became a visual reminder of the sequencing of ideas, helping students to accurately repeat choreography. In his notebook Max asserts, "Motif Writing and Make a Dance give me guidance when I'm making a dance."

Another student addressed the ability to define and describe dance in meaningful visual patterns. John states, "I've never danced from an actual writing. And I think that is a good thing." John later asserted, "the motif symbols are a great part of my success."

The process of creating, writing, performing, describing, and evaluating their work influenced the students' creative work. By observing, analyzing, and discussing their dances, the students took a hard look at choreography, and this resulted in their understanding the principles and processes necessary for dance making. The field test provides strong correlation data between Discover Dance CD-ROM and the students' understanding of choreography. There are numerous examples of this relationship, which are presented in later sections of this chapter.
Content Standard #3

Understanding dance as a way to create and communicate meaning.

The Discover Dance CD-ROM was found to provide an in-depth resource for students' dance inquiry. This was observed in the more than 20 student and adult choreographers presented in the “Meet the Choreographers” section. In addition, several choreographic phrases are visually notated, anchoring and informing students' movement perception.

The field test revealed that the CD-ROM is a stimulus that encourages students' active participation in both personal investigation and class discussions. Having a vocabulary to communicate movement helps students “own” their dances and discuss their meanings with competence and confidence. In his notebook Ryan wrote, “Motif [Writing] helped me the most because you can make dances in your mind before you put them in your body.” Further, students expressed the ability to create and communicate meaning throughout the workshop. This is particularly evidenced by their choice of choreographic themes (i.e., skate boarding) and in their solid work, focus, and commitment in the process of creating their dances.

The students were able to critically understand the dances that they observe and create, because they have learned the components of dance. By having the tools of identification, the students were able to make and create a dance that explicitly relates to the content theme that they are interested in expressing. A good example of this occurred in the final interview with Ryan. He commented on his last dance called “Paranoia,” which was clearly the most sophisticated and complex of the class, stating, “I made up a movement using that hand gesture from the Body/Basic Body Actions/Hands section in
the Elements of Dance. I have a sudden and sustained time part (he dances this for me with incredible effort accuracy) and then I start doing a curved path ...I am moving on a curved path because I have been caught and try to escape. I then go into my shapes and I do a pin, a ball, and a twisted shape to show my paranoia and then I fall to the ground at the end.” (See Figure #19 and Figure #20 for Ryan “Paranoia” dance notations.)

With this statement, Ryan not only addressed the creation of meaning in his dance, but he demonstrated an advanced understanding of the elements of dance as applied to his choreography, as well as expressing intent on communicating his own thinking and complex storytelling through dance.

**Content Standard #4**

**Applying and demonstrating critical and creative thinking skills in dance.**

Before I discuss Content Standard 4, it must be mentioned that this is a particularly difficult content standard to meet entirely, as it addresses reasoning, problem solving and inquiry strategies. In order to fulfill the standard, students need to conduct critical analysis and evaluation of choreography, which is clearly a challenge. However, the field test revealed that several sections of the CD-ROM work together to support the student investigation, synthesis, and thinking in dance.

The Discover Dance CD-ROM furthers critical and creative thinking by providing both a structure and a method to view dance. The analysis of data revealed that in their Mini Dances the students were able to realize multiple solutions to a given movement problem and that the interactive games and database activities encourage the application of inquiry and critical thinking skills.
In “Fantastic Dance,” students identify, analyze, and record the BESSR themes and descriptive analysis of 15 dances. The students were evaluated as highly successful in the critical identification of dance movement content found in the Body, Space, Shape and Relationship themes presented in these 15 dances. In “Compare these two dances” and “Describe this dance,” students discuss their observations and evaluate how the two dances are similar and different. In each of the above-mentioned activities, the students are writing about dance and applying strategies of investigation.

Elizabeth writes in her journal: “Today, I learned how to interpret dance. It is very important to know this because instead of just thinking ‘that’s a good dance,’ you think... ‘that reminds me of something.’” Brooklyn further describes the value and support of dance in critical and creative thinking in the CD-ROM: “This dance class has inspired me in so many different ways— it has shown me Motif Writing and how to read what people are doing in their dances.”

**Content Standard #5**

**Demonstrating and understanding dance in various cultures and historical periods.**

As previously stated, the presentation of cultural dance in the “Meet the Choreographers” section is an area where the CD-ROM only partially succeeds to meet the parameters of the content standard. Cultivating a knowledge of and a respect for the dances of other cultures falls very short of “understanding dance in various cultures.” While the CD-ROM clearly misses the fully expressed content of the National Standard #5, it does establish a foundation of valuing and knowing about other cultural forms and
styles of dance. This level of knowing can be considered foundational or the very first phase of knowledge building toward the understanding of cultural dance.

Through the Discover Dance CD-ROM, students cultivate respect for dances of many cultures. This respect is supported in all content and visual materials including dance video clips, background images, photographs, and web links. The “Meet the Choreographers” section introduces forms of dance by presenting over 20 different representations of student and adult choreographers. Students study a particular dance while learning the choreographers’ and performers’ biographical and historical information by reading or listening to dance descriptions located under the “ear icon” on the lower navigation bar.

While the CD-ROM does demonstrate many cultural dances, it does not lead to a true and complex understanding of the cultural dance form. The CD-ROM lacks the presentation of context surrounding each of the 20 cultural dance clips. In the analysis, it was clear that the CD-ROM is not descriptive enough of other cultures. Its content is so brief that it may in fact present the cultural dance form as though it were context-free. As all dance movement has been developed by the people as part of their culture, for students to truly understand a cultural dance form, there must be a context (social, historical, religious, or cultural) to situate their learning.

**Content Standard #6**

**Making connections between dance and healthy living.**

The CD-ROM does not develop relationships “between dance and healthy living.”
Content Standard #7

Making connections between dance and other disciplines.

The Discover Dance CD-ROM does not directly make connections with other disciplines. The focus of the CD-ROM is an instruction in dance as a discrete subject area. Table #2 on the following page provides a summary of the National Dance Education Content Standards as related to the Discover Dance CD-ROM.
<table>
<thead>
<tr>
<th>National Dance Content Standards</th>
<th>Discover Dance CD-ROM Rating</th>
</tr>
</thead>
</table>
| (1) Identifying and demonstrating movement elements and skills in performing dance. | Achievement standards  
   a) Students demonstrate the following movement skills and explain the underlying principles: alignment, balance, initiation of movement, articulation of isolated body parts, weight shift, elevation and landing, fall and recovery.  
   b) Students accurately identify and demonstrate basic dance steps, positions, and patterns for dance from two different styles or traditions  
   c) Students identify and clearly demonstrate a range of dynamics: movement qualities.  
   d) Students demonstrate increasing kinesthetic awareness, concentration, and focus in performing movement skills.  
   e) Students demonstrate accurate memorization and reproduction of movement sequences.  
   f) Students describe the action and movement elements observed in a dance, using appropriate movement/dance vocabulary. |
| (2) Understanding choreographic principles, processes, and structures. | Achievement standard  
   a) Students clearly demonstrate the principles of contrast and transition.  
   b) Students demonstrate the ability to work cooperatively in a small group during the choreographic process.  
   c) Students demonstrate the following partner skills in a visually interesting way: creating contrasting and complementary shapes, taking and supporting weight. |
| (3) Understanding dance as a way to create and communicate meaning. | Achievement standard  
   d) Students create a dance that successfully communicates a topic of personal significance. |
| (4) Applying and demonstrating critical and creative thinking skills in dance. | Achievement Standard  
   a) Students create a movement problem and demonstrate multiple solutions; choose the most interesting solutions and discuss the reasons for their choice.  
   b) Students demonstrate appropriate audience behavior in watching dance performances; discuss their opinions about the dances with their peers in a supportive and constructive way.  
   c) Students compare and contrast two dance compositions in terms of space, time and effort.  
   d) Students identify possible aesthetic criteria for evaluating dance. |
| (5) Demonstrating and understanding dance in various cultures and historical periods. | Achievement Standard addressed  
   There are no direct correlation in the achievement standards in this category and the material covered in the workshop. |
| (6) Making connections between dance and healthy living. | Achievement Standard addressed  
   There are no direct correlation in the achievement standards in this category and the material covered in the workshop. |
| (7) Making connections between dance and other disciplines. | Achievement Standard addressed  
   There are no direct correlation in the achievement standards in this category and the material covered in the workshop. |

Table #2 A Summary of the National Dance Standards and Discover Dance CD-ROM.
Broad Dance Knowledge

Multiculturalism, Laban Movement Analysis, and Motif Writing were defined by the researcher as essential components in a student’s comprehensive dance education. They were therefore central themes in the development of the Discover Dance CD-ROM. In this discussion, I will present written comments, evaluations, and interviews to assess the Discover Dance CD-ROM’s ability to deliver and instruct students in three key themes: Multiculturalism, Laban Movement Analysis, and Motif Writing.

Multicultural

When looking at multicultural learning, two key areas were identified as deficient in the Discover Dance CD-ROM: content and context. In my development of the CD-ROM, I felt I addressed the necessary content by providing a great deal of video and images of cultural dance forms. Going into this field test, I was confident that the CD did support multicultural learning. However, during this analysis I realized that it provided only a cursory glance at the issues of content and context in multicultural dance. This is a scary oversight and very difficult to admit.

Dance teachers at conferences were often “wowed” by the multicultural content. One teacher wrote: “The CD-ROM would be a valuable tool to bring more of the dance world to my children.” Another teacher wrote: “When completed, I will use the CD-ROM as a resource for bringing social and cultural dance forms to my students.”

In examining these comments, I believe that the teachers were not addressing the quality of instructional resource that might encourage young dancers to explore dances of other cultures, but were focusing on convenience. The CD-ROM is thoughtfully
organized and is a handy instrument to deliver multicultural dance video clips which would enhance the teaching of dance. Although I am unable to verify, it seems reasonable to interpret these teachers' comments, as equating the recognition of cultural dance forms with an understanding of cultural dance forms. This observation may reflect the broader field of dance education. The content standard as written, is difficult to attain and with the limited time assigned to dance education classes, it seems questionable whether the standard is met at all.

A possible benefit for the CD is the use of Web links that can empower the students with the tools to gather both content and context to support their learning multicultural dance education. The CD-ROM does promote a respect for other dance forms, which is directly related to comments made by students in the workshop. One example is Derek who stated, "In the CD I learned about different cultural dances like Chinese dance and African dance." This sentiment is further addressed by Channel who stated, "I really like seeing all the dances from other countries." These student remarks are in sharp contrast to their detailed comments regarding their experiences using LMA or Motif Writing. The students' simple commentary here relates to their cursory experience in multicultural dance.

The fact remains that in order to learn about a cultural dance, fully introducing the context is imperative. In this research it is clear that the CD-ROM's content is so brief that it does not allow for time to explore the context of a dance. It in fact presents the cultural dance form context-free. Multiculturalism, as an essential component in a student's comprehensive dance education as defined by the researcher, is not promoted in the Discover Dance CD-ROM. It is clear to this researcher that the scope of the Discover
Dance CD-ROM, while presenting some resources and interesting movies for
Multicultural inquiry is too broad to influence true understanding in a cultural dance
form. Greater depth is necessary. This would require a single CD-ROM for an
individualized dance form.

Laban Movement Analysis

In the research, development, and testing of the Discover Dance CD-ROM, Laban
Movement Analysis was identified as being essential to comprehensive dance education.
Prior to testing, the underlying assumption was that the innovative inclusion of LMA
would support students’ dance investigations and their ability to communicate their
thinking in dance.

In their journals and interviews, the workshop students addressed LMA’s
relevance to dance analysis and creative process. The analysis of data from these
journals, interviews, and observations presents two themes evidenced by students’ dance
making, dance sharing, and dance inquiry as related to their use of LMA in the Discover
Dance CD-ROM. The students demonstrated that LMA (1) enhanced their movement
investigations and expressive dance action and (2) provided a useful vocabulary for
discussion, reflection, and analysis.

Enhanced Movement Investigations

After two weeks of using LMA vocabulary (BESSR), the students were clearly
building a foundation in a descriptive language used for dance. In their dance journals,
students expressed that the LMA vocabulary had become a familiar tool easily applied to
their discussion and self-reflection and did in fact change the way they observed movement and created their dances.

The students' final dances clearly demonstrate the investigation of new creative range and territory. In these dances students were exploring combined actions and complexity of actions not previously seen. The analysis revealed a significant expression of range of movement inventions. Furthermore, the use of BESSR concepts of body, space, and shape were highly represented. In conversation, many students directly related their investigations to the use of the BESSR framework in the Discover Dance CD-ROM. One student stated that the BESSR concept of space had influenced his dance expression. John wrote, "the CD-ROM has changed my space--how I use my space, the ways I use my space like levels, directions, and pathways, and the amount of space I use in my dancing. Before the workshop, I did not think of space at all, now I do." In this statement John not only confirms the significance of LMA informing his dance thinking, but he verifies that he has learned what space consists of (level, direction and pathway). This is not a simple task: even many university dance education students would not be able to identify their relationship to space and their use of space.

The LMA framework supported students' expressive physical dance action. Margaret's dance "Mist" is a good example. In Mist, Margaret reveals her knowledge of the LMA in her physical movement clarity. Presented below are three separate areas which demonstrate her thoughtful use of LMA in the process of creating and performing her dance Mist: (1) the expressive use of her whole body dancing as related to the length of time and spatial pathway she would travel in (walking, turning and running) as the mist, or (2) in the range of reach space (the distance described between her arms and
head) used to signify that she was transformed and now was a person unable to see where she was going while lost in the mist, and (3) in her strong weight and quick time effort to demonstrate exuberant freedom (leaping and turning) when pushing forward to find her way out of the mist. See Margaret's Make a Dance and Out of Ohio Mini Dance scores (Figure #21, Figure #22). While analyzing the students' choreography, it became evident that the structures found in LMA did provide a useful system for the students to think in allowing for invention and exploration in the creation of expressive individual dances.

A Vocabulary for Discussion, Reflection and Analysis.

The data analysis showed that the students were highly accurate using the LMA vocabulary in the identification of the dominant features in the choreography of professionals and peers. They were able to apply this knowledge to dances which were performed live and which were viewed in the short movies on the CD-ROM. Students were significantly able to identify four (body, space, shape and relationship) of the five elements of dance. It should be noted that effort identification was somewhat difficult for the students to pinpoint. While some students were able to accurately identify the aspects of time effort (sudden time and sustained time), most students were not able to identify the six remaining effort factors. These are weight effort (light weight and strong weight); flow effort (free flow and bound flow); and space effort (direct space and indirect space). Effort identification requires investigation and practice and is inherently complex and challenging for novices as well as professionals.

As observed by the researcher and concurred by the NPO, the workshop students were able to apply this LMA vocabulary in class discussion among peers, while engaged in collaborative dance making and in interpretation and evaluative activities. The LMA
framework was language-like and supported the student with the cognitive power of movement identification. One of the CD-ROM’s great strengths was observed as the students’ ability to control the playback of movies, which further encouraged the students’ identification and descriptive analysis.

In the computer lab, Sean realized that he was able to play the video clip at a variety of speeds and directions (forward, fast forward, backward, fast backward, and pause). Thrilled at this discovery, Sean shared this information with the class. Soon, all students were exploring the playback function on the CD-ROM’s movie clips. The video recording shows the students completely engaged with the controller bar on the playback feature. Several students began identifying the separate movement actions in a dance and locating the point of initiation of a new movement or body part action.

The NPO describes one such experience in the computer lab: “John and Ryan view a Break Dancer. They play the break dancing guy movie in slow motion, going frame by frame isolating different body parts. Very methodical, one click and stop, they notice the changes, and another click is followed by pause. Moving very slowly, these boys are completely absorbed. John says about Ryan, "He's so balanced, yet so fast!" I walk over and ask John what he is doing and he shows me his analysis process and states, “I'll do it [the frame by frame analysis] again, because it's so fun!" The NPO continues, “they are really analyzing the frame by frame movement of the dance.”

While using the CD-ROM, the students are able to practice and acquire the skills of movement identification and analysis. The Discover Dance CD-ROM is effective because the students can use it in practical ways: to go back, review, and view their work again; to choose what they wish to analyze and to write about; and to be able to create,
record, and remember their dances. Clearly, the data reflects that the students were able to analyze, identify, remember, repeat, vary, and experiment, using the LMA vocabulary.

Furthermore, the workshop students corroborated these themes and addressed LMA's relevance to movement analysis and the creative investigation. Numerous students wrote of the variety of movements in the Elements of Dance section and how the section informed their choreographic choices. Channel wrote, "You can do so much with just the parts of your body, like wrists, hands, elbows, and knees and be very creative." Another student directly associated LMA in her creative process. Lilly wrote, "I now think of all the aspects of dance when I make a dance: body, space, effort, relationship, and shape."

Motif Writing

As stated in the review of literature, LMA and Motif Writing share the historical lineage of Rudolf Laban. Motif Writing is an integral component of Labanotation, created for identifying, investigating, and recording all forms of human movement from the simplest to the most complex. Motif Writing has been identified by this researcher as being essential to comprehensive dance education due to its flexible interpretation and capacity for developing students' skills of dance composition. The analysis of data revealed two themes as related to Motif Writing. The students demonstrated that Motif Writing (1) facilitates preparation and planning dance compositions and (2) supports organized thinking in dance.
Organization, Preparation and Planning Dance Composition

During interviews and discussions, students identified the value of Motif Writing as allowing them to create, organize, and record their dances in writing; to translate dance movement; and to communicate with others about dance irrespective of place and time. Student organization and planning in association with Motif Writing was apparent in all aspects of the class. Many students addressed Motif Writing as a productive compositional tool. A good example occurred in an interview with John who stated, “Motif really helped me use my time effectively because now I can record my dances and read my scores to remember my dances. I don’t waste time trying to remember what I did.”

The advantages of Motif Writing were recognized in its capacity to enable the dancer to dance in his/her head before physically dancing in his/her body and vice versa. Motif Writing’s structured organization and freedom of interpretation aroused the students’ faculty to create their own movement inventions and to see more than one way of expressing their ideas. Furthermore, Motif Writing facilitated the investigation of timing, mathematical sequencing (i.e., cannon and accumulation), repetition, as well as the ability to visualize difficult concepts prior to their physical manifestation in the students’ final choreography. Clearly, one advantage of Motif’s symbol structure and visual representation of movement action is that the students could plan, describe, and organize their thinking. It was also apparent that Motif kept the workshop students grounded so that they could explore and think about their dance.

On several occasions during the workshop, students expressed difficulty collaborating and decision making without first solidifying the movement thinking into
the structure of a Mini Dance or a Make a Dance printout. Chris and Derek’s collaborative dance making is a good example of the strength of Motif Writing maintaining a visual representation of the students’ dance thinking.

The NPO’s notes describe watching these two students in collaboration: "they seem to love the technology and the dancing equally.” She continues, “each team is going through different processes. Chris and Derek work out the movement before they choose the symbols. These boys do a lot of analyzing: "It's stillness at middle level...oh, that's a balance--oh, that's ok, try the low level, hmmm, that's hard to jump from a low level, yeah... that transition is hard. Chris and Derek begin moving, creating their dance from the scores--the boys really seem to be talking it out, out loud.”

Once in the dance studio, the students get to work reading their scores and creating their dances. Chris and Derek are moving back and forth from the printed score. Having the Motif score seems to help them to make interpretive decisions and to work collaboratively. The “Mini Dance” guides and grounds them. It is a useful tool, affirming the team to remain focused on their task and to spend less time arguing.

**Supports Complex Thinking Strategies Learning in Dance.**

In the analysis of data, Motif Writing was identified as supporting the students’ thinking processes. With ease and discernment, students were able to translate visual motif symbols into physical action on the first day. As the workshop progressed, the students were evaluated with highly proficient symbol-to-action and action-to-symbol transfer as is expressed in their Out of Ohio dance and Quick Quizes.

When I observed the students in the process of dance making and dance sharing discussions, the students were becoming skillful at identifying what worked and what
didn’t, and where they needed to develop new movement material, to the point that they
were maturing as dance thinkers.

The language and symbol identification both expanded the students’ ability to
analyze and describe a dance, but also worked to create meaningful movement choices.
Motif writing builds cognitive associations between the written symbol, reading skill, and
physical investigation. As students’ dances grew in complexity and length, the dance
scores and written notation symbols enhanced the students’ ability to remember their
dances. In preparation for our dance sharing performances, the students would rush to
their dance scores for review so that they would not forget or omit anything while
performing. Motif Writing became a manner of communicating and memorizing the
students’ thoughts and ideas about dance articulately and with rich detail.

Motif was the first aspect of the workshop that students shared with their parents.
The students discussed the flexible interpretation of the symbols and the built-in
relationship of understanding dance when expressed in reading and writing Motif
symbols. They expressed their fulfillment in the command of the language and their
ability to communicate and share their ideas with other individuals who had also learned
the Motif Writing language. As Elizabeth addressed the inherent value in learning Motif,
"It is important to learn motif symbols to make dances and to read dance scores." This is
because the ability to identify, to read, and to write dance changes the way dance is
understood.

The student application of Motif Writing was not limited to their thinking as
related solely to a dance score but was understood physically in their improvisation and
performance. An example of this is during a conversation with Lilly. She addressed the
new clarity and intent in her movement due to Motif Writing as she stated, "I now think about what exact movements I'm making as I dance, because of the motif symbols."

Evident were the changes in the student thinking strategies. The CD-ROM made available multiple opportunities to support problem solving and inquiry activities which the students found challenging and educational. When looking at the students' written journals, it became evident that the students went beyond problem solving to the implementation of Motif Writing as meaningful personal expression. It is further concluded that the use of technology as seen in the CD-ROM reinforced the students' verbal skills and writing abilities, while building associations between the written Motif symbol and creative process.

This evaluation presents three essential components in a student's comprehensive dance education which were central themes in the development of the Discover Dance CD-ROM. Two of these three themes get strong support in the CD-ROM, while one is relatively unsupported. In this field test, the CD-ROM provides only a cursory informational overview of the intended component of multicultural dance education, while it provides convincing support of the components of Motif Writing and Laban Movement Analysis.
Technology Performance (NCERL)

One of the strongest assessed factors was the technical quality of the Discover Dance CD-ROM. This high mark is a result of four years of continual assessment, evaluation, and revision by the researcher. As the only CD-ROM in the field of children's dance education, my work has received much recognition. I have been privileged to share my work nationally and internationally with educators in dance and other fields and instructional technology specialists at conferences and forums on technology in education. All along the way these opportunities and input from individuals has strengthened the Discover Dance technological product.

As stated at the beginning of this chapter, I solicited the teachers' feedback through a two-page teacher exit evaluation, following a two-hour hands-on workshop given in October 2000. The 22 teachers' evaluations and written responses helped me to examine the Discover Dance CD-ROM's technological performance. Using a modified rubric from the North Central Regional Educational Laboratory (NCREL) for evaluating technological performance, I looked at teachers' responses relating to four factors: operability, organization, engagability, and ease of use. These indicators are present in the Discover Dance CD-ROM to varying degrees. I then correlated the dance teachers' actual experience using the CD-ROM with the fifth-grade workshop students' actual experience using the CD-ROM. See Appendix H for the Discover Dance teacher exit evaluation.
Operability

Operability relates to the interface and function of instructional technology (IT).

According to NCREL standards, technology should allow the student to exchange information and data in one section for use in another section. It should have open architecture, allowing the student to open other applications from within the IT. An example would be to launch Netscape, simple text, or one’s printer. The interface and software should be transparent so that one can operate it without previous experience.

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<tr>
<th>OPERABILITY</th>
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<tbody>
<tr>
<td>High Performance Indicators:</td>
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<tr>
<td>• According to NCREL standards, technology should allow the student the capability of exchanging information and data between differing applications.</td>
</tr>
<tr>
<td>• The interface should be transparent: the student should not need to know how the hardware or CD-ROM operates in order to use it.</td>
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<tr>
<td>• The software should allow the student to be able to access third-party software.</td>
</tr>
<tr>
<td>Discover Dance Ratings</td>
</tr>
<tr>
<td>Students were able to navigate in and between the 8 content sections without needing assistance from the teacher.</td>
</tr>
<tr>
<td>NPO comments that the students are “capable of using the CD independently; many children need no assistance at all after just one use.”</td>
</tr>
<tr>
<td>I was surprised at the students’ ability to learn and remember using the CD. In my journal I wrote, “In two days the students were playing movies, writing in their databases, making folders, saving files, and printing. Wow.”</td>
</tr>
<tr>
<td>Increased confidence in use of technology was visible during the workshop. Several students stated in their notebooks that they became more comfortable with technology during the workshop.</td>
</tr>
<tr>
<td>In response to the question: the self-study mode is an effective method for the Discover Dance CD-ROM, 70% of the teachers strongly agree; and 30% agree. (2 teachers did not submit comments on this question.)</td>
</tr>
<tr>
<td>One teacher wrote, “I like the independent user aspect of the CD-ROM.” Another teacher wrote, “Kids could easily figure it out.”</td>
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Table #3. Discover Dance Operability Table

135
**Organization**

Technological organization relates to the students' ability to make the CD-ROM do what they need it to do. According to NCREL standards the interface should be designed for student contributions and the students should be able to include their own input (written or otherwise) into the technology as they wish. In addition, the interface, layout, and content organization should allow for students' collaborative projects.

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<tr>
<th>ORGANIZATION</th>
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<tbody>
<tr>
<td><strong>High Performance Indicators:</strong></td>
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<tr>
<td>• According to NCREL standards technology should be designed for student contributions so that the students can provide input on demand.</td>
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<tr>
<td>• The technology should have clear and well organized arrangement of activities and collaborative projects.</td>
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<tr>
<th>Discover Dance Ratings</th>
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<tbody>
<tr>
<td>The students were able to create and save journals, database entries and printouts without the assistance of the teacher.</td>
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<tr>
<td>During the workshop the students were able to record answers to their quick quizzes and journals without help from others.</td>
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<tr>
<td>After only two days into the workshop, the students were easily able to remember the location and content in a particular section. They were able to retrieve this information when requested.</td>
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<tr>
<td>Margaret stated, “The CD is really easy to use. Especially Mini Dances and Fantastic Dances. You just drag the symbols or type in the boxes. Click, and you print your dance.”</td>
</tr>
<tr>
<td>100% of the teachers defined the interface: color, texture, and background decoration as clear, accessible, and useful. Comments included, “The backgrounds were simple, so that the topics to click on were easily known.” Or “texture was used very well.”</td>
</tr>
<tr>
<td>Of the 22 Teacher evaluators: 68% strongly agree; 23% agree; and 9% were uncertain that the design interface supports the appearance of the teaching of the material. One teacher wrote, “background not busy, or distracting; aesthetically good and logical throughout.” Other teachers’ comments included, “really nice frame for learning about dance”, “well done”, and “nice contrast in color.”</td>
</tr>
<tr>
<td>In response to the question: The program presents clear navigation method for the Discover Dance CD-ROM, 73% of the teachers strongly agree; 23% agree; and 4% were uncertain. One teacher wrote, “the navigation was easy to follow, good prompts for saving and printing.” Another commented “The CD-ROM was very easy to navigate.” Or, “I’m a very basic computer user and it was something even I could do.”</td>
</tr>
<tr>
<td>In response to the question: The combination of multimedia information presents a comprehensive explanation of subject material, 77% of the teachers strongly agree; and 23% agree. One teacher wrote, “very exciting content and variety; my students will love it.” Another teacher stated, “I like the variety and professional clips that allow us to see what we might otherwise not have an opportunity to be exposed to.” And “Good incentives, the CD will create much student interest.” Or “wonderful image quality, the selections and cultural representations are great.”</td>
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</table>

Table #4. Discover Dance Organization Table

136
**Engagability**

Technological engagability relates to students' investigation by doing. According to NCREL standards the technology should support the learning goals and guide students through simulations, inquiry, and authentic problem solving. Technology should offer the student challenging tasks and at the same time provides guided participation, encouraging the student to diagnose and prescribe new learning.

<table>
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<tr>
<th>ENAGABILITY</th>
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<tbody>
<tr>
<td><strong>High Performance Indicators:</strong></td>
</tr>
<tr>
<td>• According to NCREL standards the technology should enable learning by doing; the technology should offer access to simulations, goal-based learning, and authentic problems.</td>
</tr>
<tr>
<td>• The technology should provide access to challenging tasks; the technology should offer students access to challenging tasks, data and learning opportunities that stimulate inquiry.</td>
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**Discover Dance Rating**

The NPO wrote, "The students just love the Quick Quizes. They collaborate moving, dancing, guessing, and analyzing (there are definite strategies here) to figure out the solutions. The kids are absorbed and completely engaged."

A dominant thread in these students’ comments was the flexible and dynamic learning environment.

The NPO wrote, "Even though Brooklyn and Channel are not particularly good typists, they really are feeling satisfied by creating long journals. They entered well over a page of typing today."

In her journal Lilly wrote, "The CD gave me inspiration. I liked watching the movies in Body and in Meet the Choreographers. They were good dancers."

Matthew wrote in his notebook, "I learned it was kind of hard to identify the movement ideas when people are dancing. I learned that people can do things in dance that are very interesting and that it takes a lot of work to make a good dance."

Ryan, engaged by the CD-ROM and workshop, is now considering a profession in technology: "If I can’t be a professional basketball player then I would like to be a computer animator or computer programmer and make exciting educational video games."

Max described the CD-ROM as a great resource for students as it is "packed to the max!"

100% of the teachers defined the Mini Dance, Fantastic Dance, Quick Quiz and Dance Identity Map interactive games as clear, accessible, and useful. Comments included "I love the Mini Dance and feel it will help my students learn to follow directions and inspire them to create." "Mini Dance is FUN to do, and writing comments develops observation skills well."

Table #5. Discover Dance Engagability Table
Ease of Use

Technological ease of use relates to students' ability to independently navigate around the program. According to NCREL standards technology should provide effective “help-areas” and descriptive procedures to allow the student full use. The programming should be clear, without overly complex procedures, allowing the student to access information on demand. The technology should provide enough information as is necessary to allow the student multiple points of entry.

<table>
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<tr>
<th>High Performance Indicators:</th>
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<tr>
<td>• According to NCREL standards, technology should provide just enough information just enough times: the technology should allows for random access, multiple points of entry.</td>
</tr>
<tr>
<td>• The technology should provide user friendliness / user control: the technology should facilitate use and be free from overly complex procedures; the student should be able to easily access data and tools on demand.</td>
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<tr>
<td>• Effective help: the technology should provide help and indices that are more than glossaries; the technology should provide procedures for tasks.</td>
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<tr>
<th>Discover Dance Rating</th>
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<tbody>
<tr>
<td>Due to the technology's ease of use, I was able to move freely around the room watching students and listening to conversations and to assist students individually.</td>
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<tr>
<td>In conversation, Derek stated, &quot;The CD lets you learn all about dance. Motif Writing, how to make a Mini Dance, forms of dance, and how to express yourself in dance.&quot;</td>
</tr>
<tr>
<td>A comment from Mila's notebook: &quot;The students are sponges. They are able to grasp, adapt and apply all that they learn... so quickly. These students find comfort from the computer. It is clear that the program facilitates student access to information and provides numerous opportunities for self-directed learning. In two weeks, we will only scratch the surface of possibilities.&quot;</td>
</tr>
<tr>
<td>In response to the question: The glossaries give easy access to all areas of the Discover Dance CD-ROM, 77% of the teachers strongly agreed, 18% agreed, and 5% were uncertain.</td>
</tr>
<tr>
<td>In response to the question: Is the Discover Dance CD-ROM very useful in teaching dance education, 68% of the teachers strongly agreed; 27% agreed, and 5% were uncertain. One teacher wrote, &quot;Particularly in the teaching of Motif Writing and with the variety of dance styles.&quot; Or &quot;Very good for young dancers, my students would enjoy the complexity and detail.&quot;</td>
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</table>

Table #6. Discover Dance Ease of Use Table
My assessment of the CD-ROM's performance was correlated with the workshop teachers' evaluations. As presented above, the CD-ROM is evaluated as a high-performance learning tool.

THE CD-ROM AS EVALUATED BY THE STUDENTS

**Free Time Activities**

During the workshop, time was divided between the computer lab and the dance studio and included both semi-structured and free-time activities. Free-time activities were very useful as they allowed me to observe the section(s) of the CD-ROM that students were interested in, what sections they revisited, what sections they wanted to master, review, or investigate further. Free-time activities occurred on four occasions, each of the periods lasting between 15-20 minutes.

Following free time, I asked the students, as co-researchers in this project, to record in their journals where they went and what they learned. Some students wrote detailed statements describing their interest and what they learned in a particular section, others submitted single factual answers, such as "I went to Mini dance," and some did not write at all. I compiled all students' responses and charted their free-time use.

The most popular free-time activity was Quick Quiz with 16 student descriptions. The next most sought-after free-time activities were WWWeb Dance with 8 student descriptions, and Dance Diary and Mini Dance, each with 7 student descriptions. The videotape, the NPO's notes, and my own dance journal revealed students' focus, enthusiasm, and engagement during their free-time activity.
Games and Quick Quizes

The students' favorite activity was Quick Quiz, because it is a game that directs the students to view a short dance and identify the proper sequence of symbols to notate that dance. All of the students visited and wrote about their experience in Quick Quiz. Some students made single visits to Quick Quiz, while other students spent the majority of their free time taking Quick Quizzes. Many students commented on which of the six quizzes they took and its degree of difficulty. Matthew described the challenge of the Quick Quizzes: “I went to the quick quiz and then onto the Internet (WWWeb dance). I learned so much. I can't remember everything. I learned it was kind of hard to identify the movement ideas when people are dancing.”

Another student, Brooklyn, related the Quick Quiz activity to her class work, thus: “I went to Quick Quiz and Mini Dance and that's it, basically. It was very fun and the quizzes test what you have learned in class.” Kathy explained the inherent movement analysis in the section stating, “I went to Quick Quiz for my free time. John (her partner) helped me with some of the quizzes. We did the motif quiz. A motif quiz is a movie or dance where you have to match up the motif writing to the dance. It was really fun!” Later, in a conversation she continued, “I like Quick Quiz because it’s like a puzzle and you have to match the actions together. It's real neat because it's not like a regular puzzle, the quiz is made of motif symbols and videos.”

Students' knowledge of Motif Writing as applied to creative process, dance analysis, and documentation was met, encouraged, and further expanded in the Quick Quiz activities. Eager for a possible prize (typical of video games), several students stayed within the section till their time ran out. Earnestly wishing to conquer all of the
Quick Quizzes, Chris commented, “I went to Quick Quiz and I did ALL the Quick Quizzes that I could do in 20 minutes.”

**Internet and WWWeb Dance**

From the moment the workshop began, students were eager to surf the Internet. Their limited previous experience, combined with new computers, high-speed Internet connectivity, large monitors, and big hard drives available at the OSU department of dance facility deepened their fascination. One of the students’ favorite sections was WWWeb Dance because it enables students to go onto the Internet to pre-selected, student-appropriate dance web sites and gain an understanding of culture and dance forms. Student investigations, ideas, and research gleaned from the web sites were collected in student notebooks and printed for later use.

Students wanted to go to nik.com, a large children’s entertainment website, and were disappointed when I informed them that this was not possible in the Discover Dance CD-ROM. I explained that in WWWeb dance, there is a large variety of cultural dance forms with images, music, and movies that they could explore. Derek described his eagerness to see each and every on-line resource: “I got to the Internet and looked up all the different dances and printed some to take home.”

Not every student was satisfied with the WWWeb content. Sean stated, “I went to the WWWeb Dance and onto the Internet and I didn’t really go anywhere, because I didn’t really like anything.” Yet another student, Max, wrote about the wide variety of content: “I went to the Internet for dances. I learned that many people and cultures can do different things in dance that are all very interesting.”
Reflective Writing and Dance Diary

In the Discover Dance workshop, several students (all girls) were completely engaged with the Dance Diary activity; these students arrived early to write and develop lengthy entries about themselves, their experience in class, their feelings, their friendships, and the process of making and sharing a dance.

Margaret wrote in her Dance Diary about the blissful feeling of being “inside” her dance. “Today, I am working on a dance called Mist. Me and my partner Colleen made up this dance. I like to dance a lot. It is fun. When I do my dance, it is like I can just forget the whole world.”

Kathy commented on her need for time in the creative process: “It felt great dancing today! That is because I made a new dance with my partner. We did not finish it yet. We did not title yet either. But it is still fun to start our dance. It is still fun to begin a dance without finishing it right away. I don’t think it is good to rush into making a dance, unless it is an emergency. Then the dance would not be as detailed as it would be if you did not rush.”

Mini Dances and Printing

One of the students’ favorite sections was Mini Dance, because the section enables students to design, sequence, and print a dance score. In Mini Dance, students’ dance ideas are identified, clarified, and organized in the creative process of making a score. The videotape, NPO’s notes, and printed scores from students assert students’ interest and satisfaction in making a Mini Dance score. As stated previously, students requested returning to the computer lab and create a Mini Dance in order to organize their dance-making ideas.
Another student examined the possibility of employing chance-related methods when composing a Mini Dance. Sean, excited by his invention, called me over: “Look, Mila, I can make a Mini Dance with my eyes closed. See!” Keeping his eyes closed, Sean randomly clicked on the screen and dragged symbols to the score. He continued, “The combined motif actions are cool, I would never think of this. Some of these movements are easy and some are really really hard, they’re almost impossible.”

Printing is a powerful teaching tool. Despite the many advances in technology moving toward a paperless society, students like paper. They receive pleasure from having something in their hands, a hard copy, and a tactile reminder of their work. In a discussion Max declared, “Mini Dance and Make a Dance are fun because you can write down your own ideas and make your own dance scores to show your friends.”

The printed Mini Dance score holds, contains, and reminds the students of the physical, emotional, and intellectual experience they have in dance. In addition, Mini Dance helps the student to translate and organize the elements of movement (BESSR) into meaningful visual patterns.

In his diary, Ryan discussed a heightened understanding due to the Motif Writing and Mini Dance activities: “You understand more about dance with Motif Writing and by making a Mini Dance because it [the symbols] tells you a lot more about what it [the dance] means. You can keep on going back into the dance. [With Motif], I understood it more because I could write it and dance it out.” John discussed the value of recording and reading a dance: “I’ve never danced from an actual writing before, and I think that is a real good thing.” Table #7 presents the number of free time observations in the Discover Dance CD-ROM sections.
When differentiating between the students' preferred and least preferred sections of the CD-ROM, I observed that students preferred activities which led to quick accomplishment, writing in their journals, going on the Internet, playing dance movies, and taking Quick Quizes. During their free-time, the students delighted in their skills of analysis and enjoyed testing their knowledge.

Free-time was very special and occurred on only four occasions. Students' selections are directly related to these limitations of time. Activities requiring more thought and reflection like Make a Dance and Motif Writing were less popular. Make a Dance is complex purposeful activity requiring a considerable amount of time to answer the 10 questions. The Motif Writing section was also less popular. This may be the consequence of students having visited this section during class. The students may have felt they had experienced the content covered in Motif Writing and were interested in moving into new and unexplored territory.

<table>
<thead>
<tr>
<th>Free time comments in their notebooks</th>
<th># of times stated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discover Dance Section</td>
<td>16</td>
</tr>
<tr>
<td>Quick Quiz</td>
<td>16</td>
</tr>
<tr>
<td>WWWWeb Dance</td>
<td>8</td>
</tr>
<tr>
<td>Dance Journal</td>
<td>7</td>
</tr>
<tr>
<td>Mini Dance</td>
<td>7</td>
</tr>
<tr>
<td>Elements of Dance</td>
<td>6</td>
</tr>
<tr>
<td>Motif Writing</td>
<td>5</td>
</tr>
<tr>
<td>Meet the Choreographers</td>
<td>4</td>
</tr>
<tr>
<td>Fantastic Dance</td>
<td>4</td>
</tr>
<tr>
<td>Make a Dance</td>
<td>1</td>
</tr>
</tbody>
</table>

Table #7. Student Free Time.

Students' Favorites and Least Favorites

During student interviews and the final focus group, I asked the students to state their favorite and least favorite parts and sections of the CD-ROM. Their responses
ranged from simple to elaborate, with many addressing the CD-ROM's interface, navigation, and content. Six students said they would not make any changes, while other students gave thoughtful criticism.

The majority of student comments addressed two themes: more variety of dances, websites, and quizzes, and longer dance clips. In addition, the students wished to get into the CD-ROM quickly, have musical accompaniment for all dance selections, and to have more historical and biographical information on the choreographers and dances available to them.

Clearly, some of the students' suggestions reflected their special interests in dance. Lilly suggested a glossary of modern and ballet terms and Brooklyn suggested an analysis of an N'Sync or Brittany Spears music video to watch frame by frame and learn the choreography. The students' favorite and least favorite Discover Dance sections are reflected in Tables #8 and #9.

<table>
<thead>
<tr>
<th>Favorite sections of the CD-ROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick Quiz</td>
</tr>
<tr>
<td>Mini Dance</td>
</tr>
<tr>
<td>Fantastic Dance</td>
</tr>
<tr>
<td>Dance Journal</td>
</tr>
<tr>
<td>Elements of Dance</td>
</tr>
<tr>
<td>WWWWeb Dance</td>
</tr>
<tr>
<td>Meet the Choreographers</td>
</tr>
<tr>
<td>Make a Dance</td>
</tr>
<tr>
<td>Motif Writing</td>
</tr>
</tbody>
</table>

Table #8. Students' Favorite Sections of the Discover Dance CD-ROM
Students’ Least Favorite Parts of the Discover Dance CD-ROM

- The opening movie is too long. I don’t want to wait to get to the main menu.
- There should be more options for the Elements of dance shape category.
- There should be more Quick Quiz movies, harder ones to include all the Effort factors.
- There should be different dances for Quick Quiz. It should include cultural, social, popular, and kids’ dances.
- There should be more variety in the dances that are represented. It should include more modern, ballet, tap, and jazz dances.
- There should be more historical information about all the dancers and choreographers.
- There should be more dance websites, cool ones with movies and games.
- All the dances in the CD-ROM are too short.
- There are no famous music videos.
- Some of the narration and the voices in the CD-ROM are too low for me to hear.
- The Elements of dance movies need to be longer and show more of the dances.
- There should be music for all of the dances.
- There should be a glossary of modern and ballet terms

Table #9. Students’ Least Favorite Parts of the Discover Dance CD-ROM
ANALYSIS OF STUDENTS

Broad domains emerged from the analysis of data, and several themes appeared concerning the students’ use of the Discover Dance CD-ROM. These themes are the students’ (1) assumed responsibility for their own learning, (2) assumed higher cognitive quality, (3) explicit LMA use, and (4) effective collaboration with their peers. In this section, I will describe student use of the Discover Dance CD-ROM as related to dance making, dance sharing, and dance inquiry, and provide anecdotal comments and direct quotes from students, the NPO, and myself. In addition, I will present descriptive movement analysis of students’ physical experiences during improvisation and choreography. To support this discussion, I have provided the most vivid descriptive student comments, as it was impossible to represent all of the students in this writing.

Responsibility for Learning

During the workshop, students’ personal responsibility for their learning was observed in several ways. Students exhibited (a) self-regulated behavior during free time, dance-making and dance-sharing activities, (b) the ability to define their own learning goals, (c) the capability to evaluate their own achievement, and (d) enthusiasm and motivation by their own learning.

Self-regulated Behavior

Workshop students exemplified a depth of investigation, research, and purposeful learning during dance-making, dance-sharing, and free-time activities. An example of a student’s informed and responsible decision-making behavior is Channel. During free
time on the eighth day of the workshop, Channel went to the “Meet the Choreographers” section of the CD-ROM. She selected four dances. She watched each dance clip several times playing it forward, backward, and stopping at self-determined intervals. Channel recorded what she liked and what she would include in her next dance. In this free-time activity, she defined her need (i.e., ingredients for her next dance), followed by her own interests, which directed her investigation and defined what she intended to learn.

The students’ free time choices were revealing during the 4 non-evaluated free time periods. Students had the opportunity to “mess around,” investigate, and follow their interests using the CD. The random character of the free form exploration allowed some students to explore the potential of the computer and the CD-ROM. Without a set task, the students remained focused on building their dance vocabulary, constructing choreography, analyzing dance, and recording movement ingredients as Channel had, or even creating a randomized “Mini Dance” score as Sean had done. These students were watching, imitating, writing, recording, organizing, and creating. The CD-ROM enabled students to use the computer in complex ways, allowing them to focus on a particular aspect of the program that would assist them.

The students’ diverse free-time approaches emphasized their uniqueness and their differing learning styles. Watching the students’ free-time excursions unfold, I observed that students used the CD-ROM as a resource for dance movement ideas and images, stimulating them to a new understanding of dance. Quickly, the students acquired the skills for navigation and became confident in their abilities. After the second day of the workshop I wrote in my notebook, “the students listen and watch closely; they are becoming confident, experienced, and skilled.”
The Ability to Define their own Learning Goals

The CD-ROM interface and activities allowed the students to progress at their own rates and define their own learning goals. An example is Kathy and John in their “Make a Dance” collaboration. Working together on their final dance, Kathy and John exhibited thoughtful and directed decision making. In the computer lab, they created a “Make a Dance” score. Proceeding slowly and thoughtfully, they reflected on each decision. At one point, John questioned Kathy, “Do you really think it is important to include the sideways direction? I’m not sure we need it in our dance.” Cautiously, these two students navigated through the series of questions, taking much more time to define their dance than their classmates. Clearly, they were pursuing serious work. Together they decided on the theme of their dance “Untitled” and the necessary ingredients and printed their “Make a Dance” score. (See Figure #23 for Kathy and John’s Make a Dance score.)

Once in the dance studio, Kathy and John worked diligently on their choreography. They were so intent discussing, practicing, and recording their dance that they were unaware of anything else happening in the room. The videotape shows detailed communication between the two students. The NPO wrote, “Kathy and John talk out what they are doing... move and talk, move and talk, move and talk at the same time.” After 10 minutes, they asked me to watch their dance. I encouraged their use of detail and reminded them to consider effort dynamics and body shaping, as their theme was the elements. As soon as I finished, they were back to work discussing, reviewing, and recording their dance.
Later that day, Kathy wrote in her journal, "It felt great dancing today. That is because I made a new dance with my partner. We did not finish it yet. We did not title it yet either. But it is still fun to start our dance. It is still fun to begin a dance without finishing it right away."

Kathy and John demonstrated students' abilities to define and set their own goals using the CD-ROM. As a result of the open framework of the "Make a Dance" section, the students were able to work at their own pace defining, planning, and recording all aspects of their dance.

**Evaluation of Personal Achievement**

During the workshop, students discussed their process of organizing, practicing, and reflecting on their learning. In the CD-ROM, there are activities that guide students toward self-evaluation, such as "Quick Quiz" and "Dance Journal." Our classroom activity "Out of Ohio Dances" also encourages students' self-reflection. In the "Out of Ohio" activity, students created new choreography from other students' "Mini Dance" scores and then shared them in class. During this sharing, the original choreographers evaluated their own achievement reflecting on their information provided in the "Mini Dance" score and their own choreography.

Margaret in her interview reflected on the value of this experience stating, "I really liked it when we switched our dance scores. When I was in the audience watching I thought, "Hey that's my dance!" I noticed something the same in the dance that I did. I thought John did my dance very nicely. He thought of things [movements] I never thought of. His version was different from mine, he moved in more shapes than I did. I liked John's version a lot. He gave me some new ways of thinking about my dance."
her dance journal, Margaret wrote, "it is neat to write a dance, do it myself, and then give it to someone else and see what they come up with." In this experience, Margaret used the CD-ROM's "Mini Dance" to create and record a dance and to write in her journal an evaluation of the experience and of her own work.

Dance journals and diaries encouraged the students' self-reflection, evaluation, and planning during the process of creating and sharing a dance. Lilly wrote in her journal, "In the dance that I will make today I think that I should use the space more. In my Mini Dance I stayed in one place the whole time and maybe if I use space better this time my dance would be more interesting." The same student later wrote, "It felt good to dance today! We are trying to come up with ideas for our dance. We have the main idea for our dance, but it needs a lot of work. Hopefully, we can work on it hard enough so that it will be done in time." Lilly's journal acts as an available resource for planning, organization, evaluation, and reflection.

**Energized and Motivated by Learning**

Students' energy and enthusiasm occurred at all phases of the workshop. The videotape revealed how much pleasure the students took in their work both in the computer lab and in the dance studio. Our main videographer Kim Green, also a dance teacher wrote, "The first thing that struck me when viewing the kids on the first day was how fluidly they were able to transition from dancing to playing the CD-ROM to dancing again. They never became sedentary in their seats, but were dancing through their computer experience. It was wonderful to see them actually begin to work on their "Mini Dances" in the computer lab. They seemed constantly engaged in whatever they were
doing, whether it was the warm-ups, playing with the CD-ROM, working on their dances, or discussing their experiences."

Each day, students arrived early for the workshop and did not want to leave. One student commented, “It can’t be time to go. Oh… please… can’t we stay here for another hour to work on our dance?” This sentiment was reiterated daily in different methods and concurred by all. The students were so completely engaged in what they were doing in the computer lab or in the dance studio that we all wanted the time to pass more slowly.

An example of students’ energy in dance making and dance sharing is the work of Chris and Derek. On the second day of the workshop, during our dance sharing, the class observed one another’s dances, considering these questions: (a) What do you think the dance is about? (b) What are the themes expressed in this dance? and (c) Can you identify some of the movement elements that you see?

The NPO reflects on Chris and Derek’s participation stating, “Chris and Derek share their dance called "Shooting Stars." To explain their title they say, "It's about a lot of speed." The kids are very hyped to tell each other what they see in the dances, their favorite parts, and what the dances make them think of…” (See Figure #24 for Chris and Derek’s Shooting stars Mini Dance.)

The students are in fact “hyped” reading the scores, analyzing the content, and communicating with their peers. In their notebooks the students record their observations. Lilly describes “Shooting Stars” as “splitting apart and going back together.” John writes, “lots of spinning and falls, great beginning and good balance, cooperation and the mixes of movements.” Elizabeth writes, “It was like the Duracell battery commercial, going and going and going getting bigger and faster all the time. I really liked the joined
shape they made at the ending.” These statements are just a sample of the students’ engagement and eager demonstration of their knowledge.

The students’ dance making, sharing, and inquiry continued past the hours of the workshop and occurred at home. In a questionnaire to participants’ parents I asked, “What has your child shown, shared, or discussed with you about the workshop?” One parent wrote that her son discussed “the symbols you used to record the movements—that there is some interpretation possible with those symbols—that it is really fun—that the computers were really cool—that they are collaborating.” She further provided evidence of her son’s enthusiasm stating, “He wants to wake up and come every day even though it is the summer and he is staying up later. Also, he did a short choreography while waiting for me at my Irish Step dance group. He wrote it down and everything!”

Higher Cognitive Quality

Barbara Means and Kerry Olson (1993) contend that “technology can motivate students to attempt harder tasks and to take more care in crafting their work.” They further express that technology can support activities that have always been part of the curriculum by making these tasks easier to accomplish and adding “value to the task by making it possible for students to produce products in the same way adults would to approximate real-world standards of quality” (cited in Knapp & Glenn, 1996, pp. 14-15).

During the 2-week workshop, students similarly expressed that the utilization of technology enhanced their productivity by (a) recording their dances in Motif Writing and (b) remembering their dances and effectively using their time. In addition, students
expressed that viewing content, frameworks, and movies in the CD-ROM (c) assisted them in their choreographic process.

**Recording their Dance in Motif Writing**

One of the primary innovations of the Discover Dance CD-ROM is the integration of Motif Writing and Laban Movement Analysis framework into the teaching and learning of dance. Motif Writing was layered and reinforced in five sections of the CD-ROM, “Motif Writing”, “Mini Dance”, “Make a Dance”, “Quick Quiz,” and “Elements of Dance”. In each of these sections, colored “clickable” symbols reinforced the students’ ability to use a symbolic language for movement description, creation, and documentation.

The following students’ comments are representative of many of the students’ experiences. On the educational value and potential of Motif Writing, Ryan stated, “You understand more about dance with the Motif Writing and by making a Mini Dance because it [the symbols] tells you a lot more about what it [the dance] means. You can keep on going back into the dance. [With Motif], I understood it more because I could write it and dance it out.”

Margaret addressed the choreographic sequence presented in the CD-ROM stating, “I think now dancing is a little bit more fun. Because we write down what we want to do and we take that and we make it into a dance. If you use Motif Writing it is a little more specific than just picking a subject and then acting like that subject. I like working on the computer and going up and working on a dance and coming down and working back in the lab and then going up again to work on a dance. I think it is really fun.”

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Remembering their Work and Using their Time Efficiently

The CD-ROM is a repository of information. Its structure is flexible and allows for students to progress at their own rates. Students can review and repeat sections as is necessary. Remembering movement sequences is difficult for all dancers but by recording and printing their dance, students felt they were able to not only concentrate, plan, and remember their work but that they could use their time more effectively.

Margaret addressed the value in transferring a score to another person. “It is fun to print out your Motif score and to use your score. Sometimes, it’s easier to print out a score than telling someone to do this and do this. Because, with a dance score you have a score right in front of you, so you kind of know what to do.”

Ryan commented on the value of “Mini Dance” scores and “Make a Dance” activities as increasing his efficiency in remembering movement, thereby allowing him to create more detailed and longer dances. “With the score, I am not wasting my time trying to remember my dance. I record it and I can read it. I don’t forget it. ... I can keep making it longer.”

Assisting Choreographic Process

Choreographing longer dances was very important to this group of students. During the first week of the workshop, students began expressing interest in entertaining one another. The students’ final project reflected their interest, knowledge, and the dance making complexity. Students’ dances covered a wide array of topics including skateboarding, spying and hiding, places, earth elements, cooperation and culture. Their dances ranged from 30 seconds to 2 minutes in length.
Students often used compositional structures in their dances. These compositional structures appeared in the form of repetition, retrograde, and ABA in their efforts to increase the detail, complexity, and expressive meaning. While these structures were not specifically addressed and discussed in the workshop, they were clearly represented in the “Fantastic Dance” and the “Meet the Choreographer” movies.

Realizing that the students were assimilating movement from the CD-ROM into their dances, I asked the students in our focus group discussion, “In what ways has the CD-ROM influenced your dance making? Kathy commented, “The CD-ROM has helped me with ideas for my dancing. When I was watching the Gymnastic Hoop Dance, I found new ideas for my own dance.” Derek stated that the CD-ROM helped him to generate ideas and possibilities for movement. “In the computer lab it [the CD-ROM] shows you different movements and thinking about the basic twist and how they can move in different ways, that is where you can get your ideas from and then you can go upstairs and make your dance.”

Matthew raised his hand and stated, “I got ideas from the contract and expanding movie and also from the “Meet the Choreographers” Irish Step dancing movie.” Ryan described the complexity of detail in his observation, stating, “I liked the way the dancers from Bali twisted their fingers and hands to make different shapes and gestures and I used that twisting gesture in my dance.”

John summed up the conversation stating, “I think the CD-ROM is a good way to help people learn more about dancing, like the different ways to use dancing, some people think only about the basic moves like turn, and contract and jump. But by watching other people and seeing what they do and why they do it, you know more. Like
when you hear the titles of people's dances and you can kinda get an idea of what their
dances are about. The CD helps because you can learn from them [the performers and the
choreography] in seeing what movements they use. And then using the computers and the
Motif Writing.”

The students discussed that by using the CD-ROM they had greater access to
materials and outside resources which they felt directly influenced their dances and dance
making. Another example of the CD-ROM’s influence on students’ dance analysis and
evaluation occurred in an exchange between Margaret and Lilly. During our dance
sharing, Lilly addressed Margaret who had just finished performing her dance titled
“Mist”: “Your dance reminded me of the water dancer (Beach Dance in the CD-ROM). I
imagined you lightly flowing, splashing, and spinning above the waves during that high
movement.”

Lilly then physically arched her body backward while raising both arms curving
forward. In this moment, Lilly was clearly expressing the movement Margaret has just
danced and related her understanding in the comparison to Beach Dance, one of the 15
“Fantastic Dances” in the CD-ROM. Lilly’s description demonstrated not only that she
understood Margaret’s dance, but also understood how to physically embody and
describe the movement she had seen, in clear words—lightly (effort), flowing (effort), and
spinning (body action)—that the class could understand.

Lilly later wrote in her journal, “some people have very different ideas for dance
than me--like spies, skateboarding, and dancing in the mist. Today, I learned how to
incorporate body, space, shape, effort, and relationship in my dancing. Lilly’s
participation and description of Margaret’s dance demonstrates the richness of the
material and choreographic possibilities presented in the CD-ROM. As Friedlander states, “by encountering the material in a variety of modalities, students grasp the richness and the depth of the material. They also extend and refine their own capabilities, becoming better viewers, creators and critics” (p. 165).

**Explicit LMA Use**

During the workshop the students were exposed to LMA and the Elements of Dance in a variety of ways. Daily warm-up activities (in both the dance studio and in the computer lab) focused on one or more BESSR themes using improvisational structures. These physical explorations were further extended and supported by the use of interactive multimedia in the Discover Dance CD-ROM. Direct relationships between the improvisational, choreographic, and technological elements were observed. In this section, I will detail student LMA vocabulary as well as provide documentation of the students' (1) language use, and (2) a systematic coding of their final dances.

**Language Use**

In this field study, I was interested in detecting how the students were able to apply the LMA language and Motif Writing vocabulary in describing, observing, and analyzing dance. In order to do this, I employed two analysis activities: “Fantastic Dance” (a CD-ROM analysis) and “Mike’s Bike” (a class discussion with the choreographer) to assess the students’ LMA language skills.

The Fantastic Dance section of the Discover Dance CD-ROM requires the students to select one of 15 dances; to view the selected dance, and then to analyze their selection by recording (typing) their answers to five questions. These 5 questions
correlate directly to the LMA concepts of BESSR, and each BESSR content area is expressed in a single question. An example of a Fantastic Dance question for the Body category is: “Identify the basic body actions observed in this dance.”

In the analysis, each student chose a Fantastic Dance and his or her answers were recorded and saved in folders on the computer hard drive. As we had only 12 computers, two students worked as a team to record their answers. I collected the Fantastic Dance answers and analyzed each response in terms of the assigned BESSR categories.

Table #10 presents an example of one student’s Fantastic Dance response.

<table>
<thead>
<tr>
<th>Student Name</th>
<th>Fantastic Dance Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elizabeth</td>
<td>Ballet Allegro</td>
</tr>
<tr>
<td><strong>BESSR Category</strong></td>
<td><strong>Fantastic Dance Response</strong></td>
</tr>
<tr>
<td>Body</td>
<td>“The ballerina is a very good dancer. She jumps, turns, expanding contracting her body. She balances and travels on a straight path and anypath going around the stage.”</td>
</tr>
<tr>
<td>Effort</td>
<td>“The dancer uses lightweight effort, strong weight effort”</td>
</tr>
<tr>
<td>Space</td>
<td>“The ballerina uses lots of space. High and middle levels, straight and any pathways and she moves in sideways and forward directions.”</td>
</tr>
<tr>
<td>Shape</td>
<td>“I see the dancer making very tall and twisted shapes with her body.”</td>
</tr>
<tr>
<td>Relationship</td>
<td>“The dancer is moving toward and away from the audience, she is touching the stage. Her bodyparts are also moving away and near to each other at different times in the dance.”</td>
</tr>
</tbody>
</table>

Table #10. Elizabeth’s Fantastic Dance Response

The following parameters were used for evaluation:

(3) **Extensive response**: The student accurately and fully describes the details of the dance. There is a clear connection between the interpretation and the details offered in support. The information is extended and expanded to fully articulate the response.

(2) **Essential response**: The student offers a reasonable, general interpretation with adequate supporting details.
(1) **Partial response**: The student provides only plausible interpretations or a plausible interpretation attached to a vague or non-supporting characteristic of the dance work.

After collecting and analyzing individual Fantastic Dance responses from the students, I compared the students' answers along the common themes of BESSR to ascertain the overall ability of the class to use their LMA vocabulary. This analysis showed the students' particular strengths in the identification of Body, Space, and Shape elements, while students' principal difficulty occurred in the Relationship and the Effort categories. In this discussion, I will address two BESSR categories (Relationship and Effort) to demonstrate the students' range of description.

The scores indicate that the students' principal difficulty occurred in the Relationship and the Effort categories. In the description of Relationship in their chosen dances, 6 students gave extensive responses, 4 students gave essential responses, and 2 students gave a partial response. An extensive response is demonstrated in comments such as that by Elizabeth who wrote, “The dancer is moving toward and away from the audience, she is touching the stage. Her bodyparts are also moving away and near to each other at different times in the dance.” An essential response is demonstrated by Margaret who wrote about the concept of Relationship seen in the Gymnastic Hoop Dance, “toward, away, grasp, lift, throw and catch.”

Two students struggled with the theme of Relationship and gave a partial response. One student described Relationship in her “Fantastic Dance” as a sense of satisfaction from a well-executed performance: “the main dancer has a good relationship to her dancing. She loves dancing and she likes what she is doing. I think that is good that she likes dancing.” Still another student reflected on the historical relationship of
musicians and dancers in African Dance. The student wrote, “she [the dancer] has a relationship with the drummer and the music ’cause she is on the beat.” Table #11 presents the workshop students’ Fantastic Dance responses compared along the category of Relationship.

<table>
<thead>
<tr>
<th>Student</th>
<th>Relationship analysis</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elizabeth</td>
<td>“The dancer is moving toward and away from the audience, she is touching the stage. Her bodyparts are also moving away and near to each other at different times in the dance.”</td>
<td>XX</td>
</tr>
<tr>
<td>Lilly</td>
<td>“In the Ballet Allegro dance the ballerina has a relationship with the audience. She moves forward and backward on the stage going close to the audience and then going far away from the audience.”</td>
<td>XX</td>
</tr>
<tr>
<td>Matthew &amp; Max</td>
<td>“The boys hold hands. Grasp. One kid sits on the others kid’s back then one kid stands on the other kid’s back, lift, carry.”</td>
<td>XX</td>
</tr>
<tr>
<td>Sean</td>
<td>“The three boys hold hands in a circle. They are grasping. They break and move away from each other then they move together again and fall down at the end.”</td>
<td>XX</td>
</tr>
<tr>
<td>Ryan</td>
<td>“The dancers’ fingers tap and touch the floor. At the end the girl twists and grasps her arms around her body.”</td>
<td>XX</td>
</tr>
<tr>
<td>John</td>
<td>“The two dancers are moving close together. They grasp each other’s wrists. One dancer is lifting, carrying, and turning the other one.”</td>
<td>XX</td>
</tr>
<tr>
<td>Kathy</td>
<td>“The dancer throws her hoop far away and then grasps it.”</td>
<td>XX</td>
</tr>
<tr>
<td>Margaret</td>
<td>“Toward, away, grasp, lift, throw and catch.”</td>
<td>XX</td>
</tr>
<tr>
<td>Colleen /Chris</td>
<td>“in the Hip Hop dance there are no relationships, but the dancers stay tight together.”</td>
<td>XX</td>
</tr>
<tr>
<td>Derek</td>
<td>“The dancers are lifting each other up. They grasp their hands.”</td>
<td>XX</td>
</tr>
<tr>
<td>Brooklyn</td>
<td>“She [the dancer] has a relationship with the drummer and the music ’cause she is on the beat.”</td>
<td>X</td>
</tr>
<tr>
<td>Channel</td>
<td>“the main dancer has a good relationship to her dancing. She loves dancing and she likes what she is doing. I think that is good that she likes dancing.”</td>
<td>X</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>2 4 6</td>
</tr>
</tbody>
</table>

Table # 11. Fantastic Dance Correlation Analysis for Relationship

The students’ identification of Effort factors met with challenges as well. While all students recognized Strong Weight Effort and Sudden Time Effort, students were less
able to identify Light Weight Effort, Sustained Time Effort and Free and Bound Flow Effort. And no students addressed the concepts of Indirect or Direct Space Effort in their writing.

In the description of Effort in their chosen dances, 2 students gave extensive responses, 1 student gave essential responses, and 9 students gave a partial response. Table #12 presents the workshop students’ Fantastic Dance responses compared along the category of Effort.

<table>
<thead>
<tr>
<th>Fantastic Dance Correlation Analysis</th>
<th>Effort</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EFFORT</strong></td>
<td></td>
<td>1  2  3</td>
</tr>
<tr>
<td>Student</td>
<td>Effort analysis</td>
<td></td>
</tr>
<tr>
<td>Elizabeth</td>
<td>&quot;The dancer uses lightweight effort, strong weight effort.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>Lilly</td>
<td>&quot;The ballerina moves with light weight effort and sustained time effort.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>Matthew &amp; Max</td>
<td>&quot;The kids move with sustained time effort and strong body effort.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>Sean</td>
<td>&quot;There is bound flow effort, free flow effort, and strong weight effort.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>Ryan</td>
<td>&quot;The sea creatures dancer is doing strong weight movements going backwards, sudden time actions when she turns, and free flowing effort with her arms.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>John</td>
<td>&quot;The dancers move with sudden time effort when they lift each other. The dance is mostly free flow effort in spinning and there is some strong weight effort too.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>Kathy</td>
<td>&quot;The dancer uses strong flow, free flow, light flow.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>Margaret</td>
<td>&quot;Light weight effort.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>Colleen / Chris</td>
<td>&quot;The hip hop dancers have strong weight effort.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>Derek</td>
<td>&quot;The dancer has free flow and bound flow.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>Brooklyn</td>
<td>&quot;She is using her torso a lot in the dance putting pressure on herself.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>Channel</td>
<td>&quot;The girl in front is using strong weight effort. The girl in the back is using light effort.&quot;</td>
<td>XX</td>
</tr>
<tr>
<td>total</td>
<td></td>
<td>9  1  2</td>
</tr>
</tbody>
</table>

Table #12. Fantastic Dance Correlation Analysis Effort
These Effort preferences could be accounted for by the fact that Strong Weight Effort and Sudden Time Effort are more easily discernible or that the “Fantastic Dance” movies had more easily identifiable Strong Weight Effort and Sudden Time Effort representative actions in them. Or possibly children of this age are stimulated by agile quick movement actions with power and/or speed.

The cumulative analysis of the students’ “Fantastic Dance” responses placed 70% of the students at extensive response, 10% of the students at essential response, and 20% at partial response in their abilities to identify the Body, Effort, Space, Shape, and Relationship content themes in their chosen “Fantastic Dance.” Table #13 presents the workshop students’ Fantastic Dance cumulative LMA use.

| Cumulative Fantastic Dance LMA Assessment |
|-------------------------------|------------|------------|------------|
| LMA rating             | 3 extensive | 2 essential | 1 partial  |
| Relationship           | 6          | 4          | 2          |
| Effort                 | 2          | 1          | 9          |
| Space                  | 12         | 0          | 0          |
| Shape                  | 10         | 2          | 0          |
| Body                   | 10         | 2          | 0          |
| % totals               | 70 %       | 10 %       | 20 %       |

Table #13. Fantastic Dance Cumulative LMA Assessment

The video recording shows the students enthusiastically answering “Fantastic Dance” questions and later sharing in discussion their observations and interesting movements identified and analyzed.

The NPO’s notes support these examples and provide individual students’ experiences. She states, “Mila asks the kids to choose a ‘Fantastic Dance’ and to answer all the questions relating to that dance. Chris and Colleen choose the Hip-Hop ‘Fantastic
Dance.' They start to mix up body actions and directions. Likewise, Channel is answering
the questions about the basic body actions with body parts, while Ryan and John have a
question about the Time Effort and the Weight Effort words. Mila steps in and guides
them on their way. Now, they get it and shows a real affinity for Effort descriptions. A
calm energy pervades the room. The kids are working intently, answering questions
independently.” The NPO adds in her reflective comments, “this activity is very
interesting developmentally. It show that they are really getting this material, but then at a
certain point it's just the tiniest bit beyond them, over their heads. Perhaps a perfect
challenge!”

Another representative example of the students’ ability to apply LMA vocabulary
to their analysis and inquiry occurred in response to Kim Green’s dance, Mike’s Bike,
which is a dance video documenting Mike’s connection to his bike. The highly physical.
almost gymnastic choreography tells the story about Mike’s attachment to his bike and
his reaction to its theft. This activity occurred on day 6, in the computer lab, when the
students viewed “Mike’s Bike” on their computers and recorded their observations in
their notebooks. We then discussed students’ observations and analysis as a class. Ryan
used the LMA language to identify the key theme in the dance: Relationship. He stated,
“It’s really cool! It is about Relationship. The biker comes toward and away by dropping
the bike, grasping it and pulling it up. I like when he is turning around while balancing on
one foot. I think it is a difficult step to do but he makes it look easy.” In this example,
Ryan used the LMA language accurately, describing the movements in the dance as they
relate to the concepts of the story. In his descriptive statement, he also discussed the

essential dance subject matter of skills, practice, and performance, which he himself is presently working on.

Another student, Colleen, described “Mike’s Bike” as a blending of basic body actions, spatial concepts, and descriptive comments. She wrote, “It has a lot of jumping and turning, straight pathways and curvy pathways, Strong Weight Effort to balance, grasp, weight shift and jump. My favorite part is when he lifts the bike up to a high level and turns swinging it all around because it is a surprise and very unique.” Colleen’s description of the dance is a blend of works and motif symbols. For her, there is no need to write out the word for jumping or turning. Since she knows the Motif language, she simply records the symbol.

Another student, Lilly, while not 100% accurate in her Effort description, worked toward integrating the LMA vocabulary and descriptive story. Noticing the sequencing of movement actions and the consistency of the dancers’ flow she wrote, “The extreme biker. Wow! This is an amazing dance! It combines a lot of different movements. I love how each move is distinctly different but one movement flows into the next so smoothly. There was Strong Effort and Quick Time Effort and lots of flowing energy in the dance. I saw a balanced movement like in ballet. Mike expanded, contracted, jumped, turned, twisted, and went on a straight and curved pathway. In the dance he was always flowing, going from one movement to the next and the next.”

Clearly, the students use the LMA language with ease and grace. The integration of the motif writing notation and the BESSR concepts has been embedded in the creative, analytical, and descriptive writing of the students. The NPO reflects on the students’
process stating, "the students are quite sophisticated in their responses to "Mike's Bike," they really use the language of LMA."

**Systematic Coding of Final Dances**

As observed in the previous section, the students demonstrated the ability to express in writing and in speech their applied knowledge of the LMA language. But how does this LMA knowledge manifest itself in their bodies and in their dance making? In this section, I will address the students' kinesthetic experience as it relates to their final dance choreography. In order to observe the students' physical application of the LMA concepts, I looked at each student's movement expression in their final choreography. Specifically, I considered the details of how each of the students' body was engaged and expressive of dance content during their final dance.

To analyze the students' final dances, I looked at 8 key features and developed a coding sheet on which to record my observations. The coding sheet contained 8 thematic headings relating to the descriptive features and the students' physical manifestations of (1) spinal connectivity, (2) range of movement, (3) kinesphere reach space, (4) complexity of movement action, (5) active bodyparts, (6) effort, (7) use of space, and (8) use of shape. It should be noted that these key features are similar to but not the same as BESSR content themes. The eight features are commonly used indicators of movement expression used by Laban Movement Analysis. In order to guide readers who may be less familiar with these analysis categories, I have created Table #14 to clearly define the eight points of analysis used in the students' Final Dances.
### Final Dance Movement Expression Criteria

<table>
<thead>
<tr>
<th>8 movement themes</th>
<th>Definitions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Spinal connectivity</td>
<td>Does the dancer demonstrate a dynamic organization and connectivity in his/her body? Are their actions coordinated and centered with the spine actively supporting their movement? Without one part of the body leading or following another?</td>
</tr>
<tr>
<td>(2) Range of movement</td>
<td>Does the dancer move three-dimensionally? Demonstrating full use of the body in all three dimensions vertical, sagittal and horizontal. Are they exploring new movement material while stretching their physical limitations?</td>
</tr>
<tr>
<td>(3) Kinesphere reach space</td>
<td>Does the dancer demonstrate the ability to move from near reach (close to the body) to far reach (the furthest points away from the body) and all points in between in their movements and gestures?</td>
</tr>
<tr>
<td>(4) Complexity of movement action</td>
<td>Does the dancer demonstrate his/her physical exploration and ability to move beyond habitual movement patterns?</td>
</tr>
<tr>
<td>(5) Active bodyparts</td>
<td>Does the dancer demonstrate the ability to move beyond simple gestural actions? Is the dancer demonstrating single bodypart actions or complex actions, which present several bodyparts in relation to one another?</td>
</tr>
<tr>
<td>(6) Use of effort</td>
<td>Does the dancer demonstrate the ability to produce movement which exhibits dynamic use of effort? Is there clear demonstration of some of the following efforts: Strong and Light Weight Effort; Direct and Indirect Space Effort; Free and Bound Flow Effort; Sustained and Sudden Time Effort?</td>
</tr>
<tr>
<td>(7) Use of space</td>
<td>Does the dancer demonstrate the ability to produce movement which exhibits use of a variety of levels, directions and pathways?</td>
</tr>
<tr>
<td>(8) Use of shape</td>
<td>Does the dancer demonstrate the ability to produce movement which exhibits use of a variety of compound shapes: ball, wall pin and twisted?</td>
</tr>
</tbody>
</table>

Table 14. The Definitions of the Eight LMA Criteria Used in the Students' Final Dances.

I analyzed each of the students' final dances based on eight themes defined as quality indicators as seen in the students' dancing. For purposes of assessing and making comparisons, I devised a 3-point scale, using the following parameters:

**Extensive representation:** The student fully and accurately demonstrates this content theme. Highly expressive and articulate movement of the content theme is seen in the student's dancing.
Essential representation: The student accurately expresses the stated content theme in his/her dancing.

Partial representation: The student partially expresses the stated content theme in his/her dancing. (See Table #15 and Table #16 to view final dance coding sheet analysis for two students’ Final Dances).

<table>
<thead>
<tr>
<th>Student name</th>
<th>Dance Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>James</td>
<td>Paranoia</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evaluation criteria</th>
<th>Signifies partial demonstration of this theme</th>
<th>Signifies essential demonstration of this theme</th>
<th>Signifies extensive demonstration of this theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal connectivity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range of movement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinesphere reach space</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complexity of action</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active bodyparts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort flow, space, weight, time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shape</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship to spatial directions</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table #15 Coding Sheet for Ryan’s Final Dance “Paranoia.”

168
### Single Student Final Dance Coding Sheet

<table>
<thead>
<tr>
<th>Student name</th>
<th>Dance Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hannah</td>
<td>Mist</td>
</tr>
</tbody>
</table>

**General impression**

Strong storytelling, 2 part evolution, mist, then self lost in mist, evolved content. Hannah moves beyond her traditional boundaries here.

**Three evaluation indicators**

<table>
<thead>
<tr>
<th>Evaluation criteria</th>
<th>signifies partial demonstration of this theme</th>
<th>signifies essential demonstration of this theme</th>
<th>signifies extensive demonstration of this theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal connectivity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range of movement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinesphere reach space</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complexity of action</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active bodyparts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort flow, space, weight, time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shape</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship to spatial directions</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table #16. Coding Sheet for Margaret’s Final Dance "Mist."

There are some inherent problems in this type of analysis. All dances do not require the same levels of the above-mentioned movement expression indicators. Stated simply, the students do not take these themes into consideration when creating and performing a dance. They develop expressive movement based on their chosen theme or area of interest. A good example of the difficulty of coding the complexities of students'
physical dance expression occurred in evaluating Kathy and John’s dance. Kathy and John decided on the theme of the universe for their dance. In planning their dance, they defined use of space to be more critically expressive of their ideas than effort. In their analysis, these students scored lower marks in their effort expression than in their use of space, as it was not considered most expressive of their ideas.

Keeping this in mind, I decided to determine whether as a group the workshop students were expressing particular themes over other themes. In order to accomplish this, I correlated the individual student indicators along the stated themes and then grouped these themes based on the levels of partial, essential, and extensive demonstration. Two themes emerged from this analysis: the students’ use of effort and their expressed range of movement.

In this next section, I will focus my discussion on these two analyzed characteristics of the students’ final dances, because they demonstrate the range of response from “very successful” seen in the students’ range of motion to “less successful” seen in the students’ expression of effort. When the data was correlated, it was evident that almost all of the students exhibited only a partial representation of effort. However, the students exhibited a high degree of range of movement in their dances. (See Table #17 to view the workshop students’ overall rating of their indicators along these specific dance content themes.)
The Students' Cross Correlated Final Dances

<table>
<thead>
<tr>
<th>Evaluation criteria</th>
<th>Three evaluation indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>signifies partial</td>
</tr>
<tr>
<td></td>
<td>demonstration of this theme</td>
</tr>
<tr>
<td>Spinal connectivity</td>
<td>29% four students</td>
</tr>
<tr>
<td></td>
<td>21% three students</td>
</tr>
<tr>
<td>Range of movement</td>
<td>8% one student</td>
</tr>
<tr>
<td></td>
<td>71% ten students</td>
</tr>
<tr>
<td>Kinesphere reach space</td>
<td>8% one student</td>
</tr>
<tr>
<td></td>
<td>21% three students</td>
</tr>
<tr>
<td>Complexity of action</td>
<td>21% three students</td>
</tr>
<tr>
<td></td>
<td>8% one student</td>
</tr>
<tr>
<td>Active bodyparts</td>
<td>21% three students</td>
</tr>
<tr>
<td></td>
<td>29% four students</td>
</tr>
<tr>
<td>Effort flow, space, weight, time</td>
<td>86% 12 students</td>
</tr>
<tr>
<td></td>
<td>7% one student</td>
</tr>
<tr>
<td>Shape</td>
<td>7% one student</td>
</tr>
<tr>
<td></td>
<td>7% one student</td>
</tr>
<tr>
<td>Relationship to spatial directions</td>
<td>21% three students</td>
</tr>
<tr>
<td></td>
<td>29% four students</td>
</tr>
</tbody>
</table>

Table #17. Final Dance Combined Class Expression.

In an analysis of the students' final dance, their effort representation placed 7% of the students at extensive representation, 7% of the students at essential representation, and 86% at partial representation. In response to the students' low effort indicators, I would argue that the element of effort is very difficult for all dancers to achieve, particularly those of this age group and experience. But new questions arise when this observation is further corroborated with the students' inability to accurately observe and describe effort in their Fantastic Dance analysis. Perhaps effort is not an appropriate content to be addressed in a CD-ROM of this type. Students may need greater depth of material to accurately understand the complexities of the effort elements.

It should be mentioned that not all students exhibited a low degree of effort clarity in their dancing. Ryan is one example: In his final dance, Ryan expressed dynamic use of
quick and sustained time effort. This observation is corroborated in his Make a Dance notation (Figure #19) and was further confirmed in his final interview. Ryan clearly exhibits his interest in exploring and communicating his ideas using effort. When discussing his final dance, he clearly describes his performance: “I have a sudden and sustained time part and then I start doing a curved path.” Other reasons for a student’s weak performance in this category may reflect the dance instructor’s teaching style. In Ryan’s case, I may have provided more directives in the space and shape elements of dance than that of effort experiences.

In addition, the analysis of this data demonstrates the students’ range of movement. When discussing range of movement, I mean not only that the students are exploring new movement, but they are also physically expressing this movement while stretching their physical limits. When looking at the indicator of the new range of movement, the students’ final dance representations placed 71% of the students at extensive representation, 21% at essential representation, and 8% at partial representation in range of movement content theme as presented in their final dances.

The following comments from students reflect integrated relationship between the students’ investigation of new movement ideas and their use of the Discover Dance CD-ROM. An example of the students’ choreography directly influenced by the Discover Dance CD-ROM is Lilly and Elizabeth’s dance titled “A Dance for Two.” The dance shows explicit use of kinesphere reach space, spinal connectivity, and complex use of space. The pair moves in symmetrical and asymmetrical mirroring relationships. The girls are good movers and they created the longest dance of the workshop, over 2 minutes
in length. Their dance has three sections that they have identified as ballet, modern, and swing. Their thematic movement is representative of each of these dance forms.

Having visited Elizabeth and Lilly’s school and seen their most recent dance performance, I knew that the students had studied swing dance. Therefore it is natural that they would wish to include Swing dance themes into their dance. However, neither student had studied ballet or modern dance. But it was clear that these two students wanted to create and dance in the ballet and modern dance vernacular. They used the CD-ROM as a resource for learning ballet and modern dance in the movies and Internet links. But in their interviews Elizabeth and Lilly identified the Ballet Allegro and Sea Creature movies in support of their choreography. Elizabeth stated, “parts of the Ballet Allegro and Sea Creatures movies influenced our dance.”

The Discover Dance CD-ROM expanded Elizabeth and Lilly’s range of movement possibilities both creatively and physically. The video clearly shows Lilly and Elizabeth in first position, practicing the jump sequences as in the Ballet Allegro videotape. It is clear that the CD-ROM content has directly influenced their physical commitment to and creative expression in dance. After making these connections, I looked back at the Ballet Allegro movie on the CD-ROM and as the soloist is springing lightly traveling across the stage, I can see Elizabeth and Lilly’s faces, their desire to express what they are seeing in the video reflected in their own dance. I feel certain that without the influence of the Discover Dance CD-ROM, their dance called “A Dance for Two” would not have been created.

The NPO describes Elizabeth and Lilly in the process of creating this dance “The physicality of what they are seeing on the CD is continually manifested in their dance.
making... Elizabeth and Lilly are totally involved. Their rehearsals are very physical. They repeat and repeat and repeat until they get it.”

Margaret created a dance titled “Mist.” In the dance, Margaret, who in her previous choreography has shied away from large demonstrative movements, now is expressing full-bodied action in this dance. As exemplified by twisted traveling pathways turning, running, and leaping through the room.

In her interview Margaret expressed that the CD-ROM had a direct relationship to her movement choices and expanded her range of movement possibilities. She stated, “I thought it was cool to watch other people’s dances because you see that [a certain movement] and then I think I could use that in my dance.... I used the ‘Beach Dance’ movement when the dancer turns around and around in Mist to show that the mist has surrounded me and that I’m lost.”

John clearly described how his physical movement expression has been influenced by the use of the CD-ROM. In his final interview he stated, “the CD-ROM has changed my space. How I use my space, the ways I use my space like levels, directions, and pathways. And in the amount of space I use in my dancing. Before the workshop, I did not think of space at all, now I do.” John’s final dance created with Kathy is a strong example of expressive use of both personal space and general space. An abstract dance where the dancers move three-dimensionally twisting, expanding, and contracting within their own kinesphere. The pair then separates, with John exploring low-level traveling, while Kathy explores the high-level space above her. They come together and create a series of snapshot shapes quickly alternating at the end. It is clear that John is expressing his knowledge of space in his dance.
Channel also discussed a physical exploration directly as a consequence of the CD-ROM. She stated, "I wanted to do some movement from the Gymnastic Hoop dance but I couldn't quite do what she was doing, because she throws her leg back and I can't do that yet."

While I recognize that I cannot directly state that students' improved movement range is the result of their CD-ROM use, I believe it is possible that it was. The analysis of the students' expanded physical range combined with the students' own comments that demonstrate their belief that the CD-ROM and this method of instruction has strengthened their skill of dance making. When asked, "Has your dance making changed during the workshop?" Derek replied, "The videos have changed me because I now don't use the basic turn or twist anymore. I use more complicated and expressive moves."

As stated in previous sections, the students exhibited greater cognitive power due to their improved abilities in reading, writing, analyzing, and seeing dance. I believe that because the students have learned how to think more clearly, they in turn have created better dances.

**Communication and Collaboration**

The integration of technology in the teaching and learning of dance is a cognitive, social, and cultural event/experience. Workshop students said that by using the CD-ROM they were able to define new roles and relationships with their peers and teacher. Two themes reflecting students' communication and collaboration when using the Discover Dance CD-ROM were expressed: (1) students were able to effectively collaborate with peers (2) communicate with their teacher.
Forming Collaborative Relationships

Collaborative activities facilitated by the CD-ROM encouraged the students to ask difficult questions, define problems, set goals, and to take charge when appropriate. Means and Olson (1997) define the advantages of collaborative learning as "opportunities to negotiate the purpose of their work" (pp. 72). They suggest that when students act as critics of one another, their thinking becomes more reflexive and students are able to better assess the quality of their own efforts.

Channel wrote in her journal about the collaborative goal setting she experienced in creating her first "Mini Dance" with Brooklyn. "I learned how to work together on our "Mini Dance. We worked hard practicing and trying to remember it [the dance]. We put our two scores [of the dance] together to make a long dance."

Derek collaborated with Chris on their "Mini Dance." When asked what he learned in the workshop, Derek addressed the value of collaboration and teamwork: "If you work with someone, you could get good results... if you share your dance with someone, you could get good results." While working together, Derek and Chris had a distinctly different approach to creating their "Mini Dance" than did their classmates.

In his journal, Chris also addressed his "Mini Dance" experience as challenging, collaborative, and fun. He wrote, "I learned that just because something is hard you don't boss people around... working together to make a 'Mini Dance' is a lot of fun." He concluded, "Derek has a lot of ideas and he is a good partner." Creating a "Mini Dance" score helped Chris and Derek stay focused so they could solve complex problems creatively. In addition, it helped them improve their oral language skills and increase their social skills. The "Mini Dance" collaboration guided Chris and Derek (and their
classmates) to see them as others view them and to be fair-minded when dealing with difficult tasks.

Collaboratively using the CD-ROM, the students were encouraged to define their own dance making problems by creating a “Mini Dance,” taking a “Quick Quiz,” and answering questions about a “Fantastic Dance.” In her interview Kathy stated, “I had a fun time using the computer and making dances with people I don’t normally work with.”

In our focus group discussion, several students addressed sharing in the navigational responsibility of the CD-ROM: “I learned how to share my mouse and work with a partner better.” Or “I learned how to create an interesting dance with a partner better.”

Students expressed their satisfaction in determining the content and subject matter of their dances. Ryan wrote in his notebook, “my partner and I got to choose what our dance is about, not like in our regular dance class.” Ryan and his partner John created “Ouch!” a dance about a hardworking and determined skateboarder who while practicing his tricks always falls down. The dance illustrates how the two skateboarders gradually become more injured until they go home.

The NPO’s notes describe this team’s creative collaboration as deeply engaged and challenging. “John and Ryan are working together intently as partners. Sometimes disagreeing, John announces that he needs time alone to think! As he thinks, he seems to get further and further lost in the analytical / critical mode and farther away from his physical self. This pair is now the least physically engaged. Mila walks over and they look at their ‘Mini Dance’ score. She asks them to show her what is happening at a certain moment in the dance. They show her a kind of spinning foot grab. Mila’s intervention interrupts the pair’s splintered flow and gets them back into their dance.
Once back together, Ryan and John have fabulous sculptural, twisted elements in their dance ... clear movement in their spines."

The following day, Ryan describes the sense of empowerment and satisfaction he feels in creating a dance of his own design: "Today I learned how to make an exciting dance with my partner." (See Figure #25 for John and Ryan’s “Ouch” dance score.)

Students expressed in their journals and notebooks an understanding that learning about dance is a social experience. During his interview, Chris addressed his feeling of belonging and the formation of a community in the dance workshop: “even though all these people were not my friends [before workshop], most of them are [my friends] now.” Students worked cooperatively creating “Mini Dances.” sharing observations in class discussion and privately with their teacher. Inquiry strategies in “Fantastic Dance,” “Dance Comparison,” and “Dance Description” activities guided students to describe, interpret, analyze, and evaluate the dances on the CD-ROM.

Students derived comfort from working in teams at the beginning of the workshop. By working as a team, students were less apprehensive of the unfamiliar computer application. With a partner, activities such as opening the computer CD-ROM drive, logging on, navigating, and even playing a movie were less intimidating. As the students gained trust and understood what would be expected of them, they chose to work independently on the CD-ROM. In the preceding dialogues, students expressed indicators of collaborative engaged learning when using the Discover Dance CD-ROM.

**Enhanced Communication with the Teacher**

By asking the students to record their thoughts and ideas about a particular dance, the CD-ROM gives the students “the power to intervene, improve, alter the experience"
Student notebooks and dance diaries contained written exchanges where each student could carry on a private conversation with their teacher for an extended period of time. During the workshop, students' notebooks were a genuine means of communication between the students and myself. In their notebooks, questions were posed and answered by both the students and myself. The notebooks were an opportunity to engage the workshop students in reflection about experiences and "to think together with an adult about choices, problems, and ideas" (Staton, 1984, p. 260).

Some students wrote directly to me posing questions. Colleen asked "What is it like to perform in New York? "Or" have you ever danced with a prop? "Or" what is your favorite part of the CD-ROM?" While Elizabeth asked, "Have you ever felt nervous before a performance? I am really starting to feel my dance. I love to dance and to express myself but I get nervous when people watch me so they don't get to see the real dance.

The students arrived early to the workshop, eagerly reading my responses in their notebooks. Through their enthusiasm, I felt the value they placed on having a private communication with their teacher. Notebooks and journals were a means of students addressing their needs, as well. Lilly, reflecting on the workshop in her notebook, wrote that she enjoys the lab time, "but, I favor spending more time dancing in the studio."

These notebook dialogues were useful and served as a genuine means of communication between students and myself. Communicating encouragement and praise, the students' notebooks united the processes of reading and writing and motivated student thinking and reflection. Several students commented on the personal and emotional value
in diary writing. Channel wrote, “I really like writing in the Dance Diary, because the
diary lets me express my ideas and feelings about dance.”

Friedlander (1997) addresses the impact of digital databases and diaries stating,
“To leave your mark on a computer is a wondrous thing! The more power users have to
make the information their own, the more powerfully they will be drawn into the
interaction” (p. 165). In addition to communicating with the teacher, students used their
notebooks to record ideas, notation symbols and strategies for future dances. They left
their mark on the computer, in their digital databases, notebooks, and journals.

Final Thoughts

In the preceding discussion the analysis of data has shown that the Discover
Dance CD-ROM was effective in supporting the students’ dance making, dance sharing,
and dance inquiry to varying degrees. Of particular importance was the students’
exceptional ability to use the systems of movement notation Motif Writing and
movement description Laban Movement Analysis. When looking at the students’ final
dances, changes were observed in their range of movement; but due to the research
design (lacking pretest/posttest procedures), these factors were impossible to attribute at
this time. Further investigation with a larger population is recommended to assess the
impact of the Discover Dance CD-ROM on children’s learning in dance.
CHAPTER 6

CONCLUSIONS AND IMPLICATIONS

Overview of the Study

This research study covers the research, development, and testing of the Discover Dance CD-ROM from 1996 to 2000. The study critically analyzes and examines the process of design and development of the CD-ROM and the results of the field test. Case study methodology was used to explore the responses of the Discover Dance CD-ROM on fifth graders’ ability to make dances, perform dances, and make inquiries in the dance domain.

Summary of the design and development

Currently, there is limited research in the design and the development of instructional technology (IT) for dance education. The Discover Dance CD-ROM is one of the few projects in this area, and the only project which addresses the needs of the elementary school population. The Discover Dance CD-ROM design and development spanned four years and consisted of (1) visiting schools and libraries to watch children using computer-assisted instruction (CAI) and multimedia technology; (2) analyzing popular children’s interface, content and design; (3) developing a framework for the dance education content and specifying the organizational flow of the CD-ROM; (4) creating a Beta CD-ROM using Oracle Media Objects and gathering feedback from
school children and several leaders in the field of dance education; (5) procuring
copyright permissions for all media; (6) creating the layout and design and developing
the interactive components; (7) rebuilding an Alpha CD-ROM in Macromedia Director
with ongoing formative evaluation; and (8) field testing the CD-ROM with 14 fifth
graders at The Ohio State University.

Statement of the Problem

Computer-assisted instruction (CAI) is nonexistent in the field of K-5 dance
education. There is a need for the development and field-testing of instructional
multimedia to understand the effects of CAI in the teaching and learning of dance.
Numerous research initiatives suggest that educational technology is able to facilitate
diverse teaching practices; support individualized learning; foster new methods of
communication; and provide powerful tools to transform teaching into vivid, student-
centered interactive knowledge environments.

Current trends in education reflect constructivist pedagogy, arguing that learning
is an active process in which students actively construct knowledge from their
experiences in the world. Instructional technology has been widely praised for supporting
constructivist practices in teaching and learning (Budin, 1997) and for addressing the
needs of multiple populations at the same time (Mendrinos, 1997).

Research further indicates that instruction incorporating technology has the
potential to support students in various types of learning that include problem solving,
communication, and knowledge construction. Therefore, interactive video-based CD-
ROMs, when thoughtfully applied in the dance education curriculum, might be powerful
tools in creating a contextually rich instructional environment for teaching and learning in dance.

**Research Questions**

The following questions served as a foundation that helped guide my analysis.

Can a CD-ROM be created that will:

- support the National Standards for Dance Education?
- provide a resource for dance education rich in multiculturalism and the principles of Motif Writing and Laban Movement Analysis?
- enhance the students' ability to inquire about dance, make dance, and share dances?

**Methodology of the Field Test**

This research looks at the complexity of the components surrounding the Discover Dance CD-ROM and sheds light on the issues surrounding the teaching and learning of dance using CAI. For the field test, emphasis was placed on description and interpretation of the elements. I relied on multiple methods of data collection: observation, interview, background history, dance making, and video to gather a broad picture of the issues surrounding the teaching and learning of dance using the Discover Dance CD-ROM. In collecting the data, I took into account the wider context in which CAI functions and changes in the learning environment with the intellectual experiences of workshop students.

Participants for this field study were 14 fifth-grade students from the Indianola Alternative Elementary School in Columbus, Ohio. Students were observed in dance classes at Indianola prior to attending a two-week summer dance and technology workshop at The Ohio State University led by the researcher. The students were
instructed in dance using the Discover Dance CD-ROM and studio activities for a total of twenty hours, two hours a day for two weeks. Data was collected from multiple sources including student journals, interviews, focus groups, and dance making. All classes and student interviews were videotaped and selectively transcribed to provide a data record. A non-participant observer was employed to provide a broad representation of the workshop and to corroborate my research notes, observations and evaluations.

A research strategy was employed to examine the Discover Dance CD-ROM.

(1) For three weeks I visited the Indianola Elementary School to become familiar with the school and student culture.

(2) During the two-week workshop, I focused on selective questions and made inquiries to further familiarize myself with the students and about their methods of using the Discover Dance CD-ROM.

(3) Upon the conclusion of the workshop, I searched for patterns in the causal relationships and reported my findings in a broad explanatory context.

**Summary of the Findings**

In this research study, I learned that interactive multimedia in the Discover Dance CD-ROM shapes what students learn and creates an environment for the students to organize, refine, and reflect on what they learn. The following is a summary of my findings.

The Discover Dance CD-ROM is an engaging and successful tool for fifth-grade students to learn about dance. The CD-ROM strongly supports four of the Content Standards as defined by the National Standards for Dance Education. In this analysis,
four standards were identified as correlating directly to the CD-ROM: (1) the identification of the elements of dance; (2) choreographic processes; (3) communicate meaning; and (4) critical thinking skills. The remaining three National Dance Content Standards, (5) understanding cultural dance; (6) healthy living; and (7) making connections to dance and other disciplines, were identified as not correlating to the CD-ROM.

Multiculturalism, Laban Movement Analysis, and Motif Writing were defined by the researcher as essential components in a student's comprehensive dance education. Two of these three themes were strongly supported in the CD-ROM. While the CD provides convincing support of the components of Motif Writing and Laban Movement Analysis, it provides only a cursory glance at the intended component of multicultural dance education.

The technological performance indicators assessed the Discover Dance CD-ROM in terms of its operability, organization, engagability, and ease of use. It was defined as exemplary due to its open interoperable transparent interface, clear organized activities and navigational structure, numerous areas for student input and simulation, effective helps, and challenging tasks.

When using the Discover Dance CD-ROM, students were “constantly engaged,” “focused,” and intent on learning. Individual and collaborative activities encouraged the student toward complex inquiry, goal setting and self-evaluation. Students’ energy and enthusiasm was apparent at all phases of the workshop, extended beyond the workshop, and continued in their homes. Described as “packed to the max,” the students characterized the CD-ROM as a valuable and useful resource for self-discovery.
choreographic inspiration, understanding and clarifying difficult concepts, and for outlining and recording their thinking. Students also appreciated the CD-ROM for its large reserve of interesting dance movies and websites for active investigation and as a valued spot for self-reflection and productive dance thinking. Vivid description of student dance making points directly to their construction of dance knowledge in the CD-ROM.

Students, evaluators and the NPO concurred on the range and breadth of dance content in the CD-ROM. Their descriptive comments and observations focused on the comprehensive LMA framework in the “Elements of Dance” section, and the interactive and layered use of Motif Writing throughout the CD-ROM.

The students expressed that Motif Writing was highly effective in enhancing their ability to organize, create, evaluate and reflect on their own and others’ dances. One student articulately described the valuable Laban language and vocabulary for communicating, remembering and creating the meaning of his dance: “Motif helped me the most because you can make dances in your mind before you put them in your body.”

Using the computer, the students were able to conceptualize, formulate and expand on their ideas. The students were fluidly able to transition from dancing to playing the CD-ROM to dancing again. As a result of the workshop activities and CD-ROM representation of all types of people dancing, the students identified their own role in the broad picture of dance. After using the CD-ROM, one teacher stated, “I see your work as a wonderful way to expand my students’ ideas about what is dance, who they are in it, and how it can be used to express their learning.”

Students exercised their knowledge in the LMA frameworks, Motif Writing and the other activities in the CD-ROM in their dance making, dance sharing, performance
and reflective self-evaluation. While the material was rigorous and challenging, students ardently focused making connections to their choreography, creating dance scores and journal entries.

The interface, movies, interactive tasks, (even those created for students assessment), support a sense of learning as a game-like activity. Investigations and time to "mess around" on the computer were described by the students as inspiring and stimulating. Ryan describes the process of creating dances using the computer stating, "you can keep going back into the dances." He described the process of creating using the computer "like an improvisation." He continued, "We just get to improvise making up our own decisions as we go...[In the CD-ROM] there wasn’t really any containment, we just had the freedom to go where we wanted in the CD-ROM. ...This [method] is different. You don’t give us any instruction. When we go in the computer we learn more because you let us explore different ideas. ...Once you get an idea [using the computer] you can follow your ideas. Once you get an idea you can make it more complex, and more complex. Instead of [in previous dance classes] once you get an idea then, that’s your dance. You can see more varieties of dance in the computer, and you can find more ideas. You get to see what they [other dancers] have, and put it in your dance or save it for another time. It is like improvisation... you can do what you want when you want.”

Ryan discussed not only the new attention to detail and an interest in expressing his own complex ideas in his dance, but expressed the ability of the CD-ROM to support his learning in a self-guided manner. These comments demonstrate the CD-ROM’s direct connection to constructivist approach to education and learning. Self-navigation and
student-directed controls were essential features necessary for the students to take charge and construct their own learning.

The CD-ROM changed the way in which these students came to know about dance. Students described their experience using the CD-ROM as a journey and as an improvisation, where they could uncover, discover, consider, and follow their interests where they wanted, when they wanted. Students were able to follow their interests, direct their investigation, and were able to learn what they felt they needed to learn.

**Future Implications**

As a result of this research study, recommendations pertaining to student-to-computer ratio, planning time, transitions, and the location of the technology while using the Discover Dance CD-ROM are presented.

**Student-to-Computer Ratio**

In the study, it became clear that having a single computer for each student was not necessary; students enjoyed and worked well in partnerships and small groups.

**Planning Time**

The preparation of the computer lab was a time-consuming task, often requiring 20-30 minutes of daily preparation. Planning procedures included: checking the organization of chairs in the room, connecting headphones to the sound port, securing printer paper, testing network connections, loading daily resource files onto each computer desktop, and collecting each student’s class work at the end of the day. Designated computers within the dance studio are recommended, as the teacher would be
knowledgeable of her computer and its maintenance, thereby decreasing the amount of preparatory time.

**Transitions**

A greater challenge faced during the workshop was the process of transitioning between the computer lab and the dance studio. Changing locations was trying, as each student or pair of students worked at their own rate and often the parameters of time necessary to complete the lab portion was not consistent (i.e., Kathy & John, p. 138). There were awkward waiting periods while assembling all members of the class before we moved to the dance studio. Students' safety and computer lab security necessitated our remaining together at all times. Therefore, during the workshop the students could not move independently between the two locations. This fact contradicts the very design of the CD-ROM and the instructional method employed, which is aimed at cultivating student autonomy and constructivist teaching practices such as exploration, discovery, guided inquiry, and small group projects. The need to shift location as a group eliminated the students' ability to go back and forth between the computer and the studio on their own. The question then becomes, When using the Discover Dance where should the computers be located? In the classroom, the dance studio, or in a shared computer lab?

**Location**

The debate regarding the appropriate location of computers has been a consistent issue for the last 10 years. Understandably, computers are a broadly valued resource and a great deal of disparity exists among our schools with regard to technology. While equity considerations and political pressure argue for creating common computer labs, this research supports that computer resources be located in the classroom.
In the earlier formative testing of the CD-ROM, I had the opportunity to test the CD-ROM in school computer labs, classrooms and dance studios. However, as a result of this research, I recommend an integrated learning environment where computers are located in the dance classroom. During this study students expressed a need to have the computers in the dance studio because they wanted to make changes to their dance scores after working a while. Placing the computer resources where students request them encourages a dynamic dialogue between the CD-ROM, the students, and their choreography. This issue needs further exploration.

Changes to the Design

The workshop provided valuable information on the design, content, and interface of the Discover Dance CD-ROM and its effect on students' learning in dance. This study will result in several programming modifications. There are two big issues (the use of the Internet and multicultural learning) and one smaller adjustment (a fast link to the main menu).

WWWeb dance will be modified to include a more interactive interface and expansive content. It was observed that although students were eager to go online, they did not use the WWWeb dance feature. This may have occurred for a number of reasons: (1) students were not interested in the WWWeb dance content, (2) the students did not like the WWWeb dance interface design or navigation system or, (3) the students applied rules expressed by their parents and chose to do other sections of the CD-ROM rather than going online. I will need to consider this further.
The issue of multiculturalism and its assessed context-free position is a difficult one. The addition of a teacher guide could encourage moving beyond the identified cursory experience in the CD-ROM. I will need to consider this further.

A fast link into the Discover Dance CD-ROM's main menu will be included. This will allow the student to go directly to the main menu and not have to wait for the opening movie to finish to enter the program.

Suggestions for Further Research

The results of this study leave a number of unanswered questions, which should be considered in further research. This study supports the claim that multimedia technology can enhance students' learning in dance. The Discover Dance CD-ROM offers students a dynamic environment for dance making, dance sharing, and dance inquiry, and provides a tool for rigorous learning in the subject of dance.

In her notes, the NPO questions, "The CD is probably super effective because Mila as a teacher is so effective... Can it possibly be as effective otherwise?" As the principal researcher, teacher and multimedia developer of the Discover Dance CD-ROM, I consider this a very good question. The need exists for other educators to test and evaluate the CD-ROM in multiple dance education contexts.

There is a need to conduct more in-depth studies of how children learn through their use of multimedia technology in dance education. In what way is the content, interface, and activity design supportive of student and teacher needs? In what ways do we need to rethink the organization and practices of the classroom to facilitate this type
of instruction? And in what ways do we need to look at the physical classroom environment to support this type of instruction?

As this study concludes, there is a need for future research detailing the effects of the Discover Dance CD-ROM with other students of different ages, backgrounds, and levels of expertise in both technology and in dance. The field of dance would benefit from the continued examination of the integration and inclusion of dance education and technology in the K-12 dance education. Answers to these questions will be a valuable resource in creating effective environments for the integration of technology in the dance curriculum. Further study in other contexts will enhance the chances of this innovation becoming a reality.

**Concluding Thoughts**

This work in multimedia technology for dance education is still in its early stages. Focusing on these questions allows us to go beyond these limits. I hope others to will begin to think critically about the integration of technology in dance education.

On the downside, the CD-ROM does not expose students to dances of other cultures in any depth and the “virtual reality” of the medium may mislead students into thinking that they have indeed “experienced” African dance or Caribbean or East Asian dance. Likewise, the computer as a creative tool may inhibit those students who are inclined to be predominately physically expressive, by asking them to first create in their minds and on screen. That is, the CD may prevent and delay some dancers from direct and free expression on the dance floor, by asking them to “think too much.” On the upside, the same CD offers a wonderfully encouraging and inspirational environment.
one in which students, who are equally expressive intellectually as they are physically and emotionally, can explore and create a dance on screen before they execute it and make a dance and notate it after they do it. The virtual reality of the CD-ROM environment allows students to try out several possibilities of movement before they choose one they like.

I will conclude this writing with a comment from one of the workshop parents who writes in her parent questionnaire: “Ryan came home and danced for us! He loved choreographing on the computer and he loved dancing. You have helped to free something wonderful in my son’s spirit during these two weeks.” As this parent’s comment indicates, this new technology and teaching method for creating and making new dances has the capacity to stir children’s creativity and to free their thinking so that they can experience the freedom to think, feel, and move differently, expansively, and with abandon. As a student who participated in the workshop commented, “You can make dances in your mind before you put them in your body.” That is, the CD-ROM energizes and motivates students to become creators. It enables students not only to execute others’ dances but also to create their own dances, thereby showing that they have a vital place in dance as choreographers, critics, analysts, and performers, and their young age need not limit them to following instructions and dancing others’ creations, alone. The CD shows the students that they can do more than carry out a dance they have been taught. It also maximizes the variety of possible dances that students can create.

With regard to the dance education profession, the Discover Dance CD-ROM gives us a bigger picture of what teaching is all about: not only instructing and transmitting
knowledge and skills, but evoking within each student what he or she is capable of doing, being, and becoming as future dance professionals.
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Figure 1. The Alpha version of the Discover Dance CD-ROM Main Menu Interface.
Discover Dance Alpha version Styles of Dance Interface Design

Figure 2. The Alpha version of the Discover Dance CD-ROM Styles of Dance Interface.
Discover Dance Alpha version Elements of Dance Interface Design

Figure 3. The Alpha version of the Discover Dance CD-ROM Elements of Dance Interface.
Discover Dance Alpha version Fantastic Dance Interface Design

Figure 4. The Alpha version of the Discover Dance CD-ROM Fantastic Dance Interface.
Discover Dance Alpha version Motif Writing Interface Design

Figure 5. The Alpha version of the Discover Dance CD-ROM Motif Writing Interface.
Discover Dance Alpha version Quiz/Activities Interface Design

Figure 6. The Alpha version of the Discover Dance CD-ROM Quiz/Activities Interface.
Figure 7. Discover Dance Main Menu
Discover Dance: Dance Identity Map Interface Design

Figure 8. Dance Identity Map graphics and interface
Discover Dance WWWeb Dance Interface Design

Figure 9. WWWeb Dance graphics and interface
Discover Dance: Elements of Dance/Support Interface Design

Figure 10. Elements of Dance graphics and interface
Discover Dance Motif Writing Interface Design

Figure 11. Motif Writing graphics and interface
Your Research

What Levels do you need in your dance?

Discover Dance: Make a Dance Interface Design

Figure 12. Make a Dance student worksheet
Discover Dance: Meet the Choreographers Interface Design

Figure 13. Meet the Choreographers graphics and interface
Discover Dance: Fantastic Dance Interface Design

Figure 14. Fantastic Dance graphics and interface
Figure 15. Motif Writing graphics and interface
Today I worked with Annette. We began working on a new dance about snow. We began by thinking of all the things we like to do in the snow. The shape and patterns of the individual snowflakes.

Figure 16. Discover Dance Students’ Journal graphics and interface
Discover Dance: Quick Quiz Interface Design

Figure 17. Quick Quiz graphics and interface
Discover Dance: Activities/ Compare and Describe Interface Design

Figure 18. Discover Dance: Compare and Describe graphics and interface.
Figure 19. Ryan’s “Paranoid” dance Make a Dance score
Figure 20. Ryan's "Paranoid" dance Mini dance
Choreographer:

Subject: Mist
Fog

Title: Mist

These actions are in the dance:

These are the body parts in the dance:

These are the joints in the dance:

These are the shapes in the dance:

These directions are in the dance:

These pathways are in the dance:

These are the levels in the dance:

These dynamics are in the dance:

Figure 21. Margaret's Make a Dance Score for "Mist"
Dear kids in France,

This is I am sending you a dance score. The title of this dance is Storm. I am 11 years old. I live in Ohio. I am doing a workshop where we make dances. One thing you will need to know is the dance has a lot of turns.

From:
Choreographer: 

Subject: topics: universe, animals,

Title: 

These actions are in the dance:

These are the body parts in the dance:

These are the joints in the dance:

These are the shapes in the dance:

These directions are in the dance:

These pathways are in the dance:

These are the levels in the dance:

These dynamics are in the dance:

Figure 23. Kathy and John’s Make a Dance Score
Figure 24. Chris and Derek's "Shooting Stars" Mini Dance Score
Figure 25. Ryan and John's "Ouch" score
### The Laban Framework

<table>
<thead>
<tr>
<th>BODY—the parts of the body and basic movement actions; the ways the arms and legs can bend, stretch, reach, turn, and jump.</th>
<th>Basic Body Actions</th>
<th>Fall</th>
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<th>Contract</th>
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<th>EFFORT— the dynamics of movement in which the body can move, such as quick time, sustained time, strong weight, and light weight.</th>
<th>Weight Effort Factors</th>
<th>Light Weight Effort</th>
<th>Strong Weight Effort</th>
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APPENDIX B

MOTIF WRITING AND MOTIF DESCRIPTION COMPARISON
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232
<table>
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<th>scatter</th>
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<td>(one of 27 possible)</td>
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<td>a gesture</td>
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Appendix B: Motif Writing & Motif Description continued

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APPENDIX C

DISCOVER DANCE CD-ROM NAVIGATIONAL FLOW CHART
Web A and B represent the navigational structure seen in the Discover Dance CD-ROM.
APPENDIX D

WORKSHOP QUESTIONNAIRE
Discover Dance questionnaire

Questionnaire

Development of this software will be enhanced by your support. Thank you for taking a few moments to answer these questions. Your input is appreciated.

• Do you teach now? If so, what do you teach, where and what is the grade level and/or age of your students?

Faculty of Education – teacher education

• What kinds of dance or movement activities do you teach?

Creature/Modern

• How would you use this program in your current teaching program?

University students use for themselves & for them to work with children

• What additional information would you like to see in this software program?

Teacher's Guide – short, written document

• How can you envision Computer Assisted Movement Education assisting you in the future? Ask University Teacher Ed to watch a lesson

1) Self - run lessons 2) Part of the dance experiences created by university students 3) In library or resource room

• Please feel free to add your additional thoughts, comments, criticisms and suggestions.

Suggested dance ideas and music for children → starting points

• Optional: May we contact you for more information?

Name:
e-mail address:
Phone #:
Address:

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APPENDIX E

ORAL INSTRUCTIONS TO SUBJECTS
Oral Instructions to subjects

Hi, my name is Mila Parrish. I am a dance teacher and, I am also a Ph.D. student at Ohio State University. I would like to ask for your help in testing a Dance Education CD-ROM for children that I have made. I am interested in learning how technology can help kids your age learn about dance. The CD-ROM we will be using is called Discover Dance. I have spent the last three years developing the Discover Dance CD-ROM. I would like to find some students to volunteer to test the CD-ROM so I can know if my design is effective. In order to test the CD-ROM, we will meet this summer in the mornings for ten consecutive days Monday – Friday for two weeks, two hours per day. The research will occur at The Ohio State University, Department of Dance located at Sullivant Hall, 1813 N. High Street. We will be using the Dance Department’s computer lab and the dance studio.

During the two weeks, you will learn about dance in an interactive and interesting way. We will use the CD-ROM to help us make dances, talk about dances and share our dances with each other. There are activities that ask you to be a choreographer, a performer and an audience member. You will view some short dance movies, dance Internet sites, and record our ideas about dance using a notation system called Motif Writing. We will talk about how we use the computer and imagine the possibilities for its use in dance, and we will talk about issues surrounding dance making and performing as a group. We will record our experiences using the CD-ROM, making dances, sharing dances, playing dance movies and viewing interesting dance web sites in individual
journals. My findings from this research will lead to further development of new media in
dance education.

If you are interested in being a volunteer, you will have the opportunity to interact
with the CD-ROM. For you to participate in the dance CD-ROM testing you will need to
have your parents' consent. You will need to bring the parental consent form home for
your parents to read and sign. This allows you to participate in the project. Participation
in this project is voluntary and you can discontinue participation at any time. If you and
your parents wish to participate, bring the consent form back as soon as possible. Your
teacher, will collect them. If you have any further questions about the project, please feel
free to ask me now or after class.
Letter to Parents

Hi, my name is Mila Parrish. I am also a dance teacher and Ph.D. student at Ohio State University. I would like to ask for your child's help and participation in testing a Dance Education CD-ROM for children. I would like to work with 12-16 children from the 5th grade class. I am sending this letter through your dance teacher and Principal Rykowski to parents of the children who may be interested in this project. My professor and dissertation advisor Dr. Michael Parsons will be the principal investigator, overseeing this project.

This research explores the benefits of computer technology for dance education. Learning in the CD-ROM is build around dance as a creative, expressive and cultural form. There are individualized activities that support students' understanding of dance from a choreographer, performer and audience member's perspective. Students will learn about dance and culture in an interactive and interesting way. Students will discuss the use of computers in school and at home, ideas for a dance CD-ROM, experiences in their dance class (at Indianola and during the research), issues surrounding their choreography and performance as a group, twice during the research for 15-20 minutes. Also, students will write about their experiences making dances, sharing dances, using the CD-ROM, playing dance movies and viewing interesting dance web sites in their individual journals. Findings from this research will lead to further development of new media in dance education.

This research will occur during the summer at The Ohio State University, Department of Dance located at Sullivant Hall, 1813 N. High Street. We will be using the Dance Department's computer lab and the dance studio. We will meet in the mornings for ten days Monday – Friday for two weeks, two hours per day. The exact dates and times will be determined by the availability of the students. Students will be chosen for participation in the research based on their availability for the two weeks. I will try to accommodate as many students as are interested up to 16 students. You will need to provide transportation to and from OSU for their child to participate in this project. I would like to have your permission to videotape your child during our classes, discussions and interviews. All videotapes will be stored in my office and following the analysis of their contents they will be destroyed. Please keep in mind that I am studying the Discover Dance CD-ROM multimedia technology for children and not your child. In any presentation or publication resulting from this study, I will use a pseudo name for your child. I will not provide his/her real name.
I would like your permission to conduct this project with your child. Although I would like your help, please understand that you are under no obligation to grant me permission to observe and videotape your child's activities for this research. Please keep in mind that participation in this project is entirely voluntary for your child and for you, and your child can discontinue participation at any time. You can explain to your child what this project will involve, and ask him/her whether he/she would like to participate. Since I plan to start this project after being approved by the Behavioral and Social Science Human Subjects Institutional Review Board (IRB) of The Ohio State University, please sign the consent form and return to your child's dance teacher. If you would be interested in having your child participate in this project. I will let you know the start date as soon as possible.

If you have any questions about this project please feel free to contact me at the phone number or e-mail address below. I will be glad to talk to you about it.

Thank you very much.

Mila Parrish

Doctoral Candidate
The Department of Art Education
The Ohio State University

Dr. Michael Parsons,
Principal Investigator
APPENDIX G

PARENT QUESTIONNAIRES
Dear Parents,

The computer dance workshop has been a WONDERFUL experience for me. Each day I see creative, original and thoughtful dance making and discussion. Your children have been focused and ready to work from the moment they arrive. They have helped me to understand how to integrate the technology into their dance education experiences. Thank you for your support by allowing me to learn from them.

I am interested in knowing what the children are bringing home and sharing and discussing with you following our daily workshop. If you have time, can your answer these questions.

How long has your child danced? Where? Since 2nd grade. At school
How long have they used computers? Where? Since Kindergarten

What has your child shown, shared, or, discussed with you about the workshop?
James came home & danced for us.

What evidence do you see of their interest or lack of interest in the workshop?
He loved choreographing on the computer.
He loved dancing.

What have been their favorite activities? Why?
The dances, learning a new notation, using the computer.

Any other comments?
Mila, thank you! You have helped to free something wonderful in my son's spirit during these two weeks. May you be forever blessed.
Suzanne Hayes
APPENDIX H

DISCOVER DANCE EXIT EVALUATION
# Discover Dance Evaluation Form

<table>
<thead>
<tr>
<th>1. Interactive Media</th>
<th>Clear</th>
<th>Unclear</th>
<th>Accessible</th>
<th>Unaccessible</th>
<th>Useful</th>
<th>Not Useful</th>
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</thead>
<tbody>
<tr>
<td>a. Content</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>b. Images</td>
<td></td>
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<tr>
<td>c. Video Clips</td>
<td></td>
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<tr>
<td>Comments:</td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>2. Navigation System</th>
<th>Clear</th>
<th>Unclear</th>
<th>Accessible</th>
<th>Unaccessible</th>
<th>Useful</th>
<th>Not Useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Navigation buttons/icons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Audio</td>
<td></td>
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</tr>
<tr>
<td>c. Text</td>
<td></td>
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<tr>
<td>d. Main Menu</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>3. Interactive Games</th>
<th>Clear</th>
<th>Unclear</th>
<th>Accessible</th>
<th>Unaccessible</th>
<th>Useful</th>
<th>Not Useful</th>
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</thead>
<tbody>
<tr>
<td>a. Mini Dance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Dance Identify Map</td>
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<tr>
<td>c. Fantastic Dance</td>
<td></td>
<td></td>
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<tr>
<td>d. Quick Quiz</td>
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<tr>
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<tr>
<th>4. Interface</th>
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<th>Unaccessible</th>
<th>Useful</th>
<th>Not Useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Color composition</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>b. Texture</td>
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<td></td>
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</tr>
<tr>
<td>c. Background Decoration</td>
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<tr>
<td>Comments:</td>
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Discover Dance Evaluation Form

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<tr>
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<th>Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Uncertain</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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<tr>
<td>1</td>
<td>After using the Discover Dance CD-ROM, my knowledge about the dance increased considerably.</td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Visual imagery helps me to understand the material better.</td>
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<tr>
<td>3</td>
<td>Film clips provide a clear explanation.</td>
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<tr>
<td>4</td>
<td>Combination of multimedia information presents a comprehensive explanation of subject material.</td>
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<tr>
<td>5</td>
<td>The design interface supports the appearance of the teaching material well.</td>
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<tr>
<td>6</td>
<td>The interactive system stimulates me to find out more information about a certain subject material.</td>
<td></td>
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<tr>
<td>7</td>
<td>The presentation of multimedia information is interesting.</td>
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<tr>
<td>8</td>
<td>The program presents a clear navigation.</td>
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<tr>
<td>9</td>
<td>The navigation system gives an easy access to all areas in Discover Dance.</td>
<td></td>
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<tr>
<td>10</td>
<td>Self-study mode is an efficient learning method for using Discover Dance.</td>
<td></td>
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<tr>
<td>11</td>
<td>An instructor's assistance will be more helpful to learn the material in Discover Dance.</td>
<td></td>
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<tr>
<td>12</td>
<td>This CD-ROM is very useful in teaching dance education.</td>
<td></td>
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</table>

Other Comments:

1. What else would you like to see in this CD-ROM?

2. What are some of the ways you might use the CD-ROM in your teaching situation?

3. Could you use the CD-ROM to assist teachers who want to learn more about dance?
Two-week Classroom Instruction

How students used and interacted with the Discover Dance CD-ROM is central to this research; and although the CD-ROM is not available to most readers, I wish to provide a description of the progression of workshop activities detailing students' use.

The description of the two-week workshop contributes contextual details for the reader when examining the data analysis. It should be noted that daily activities were planned, but remained flexible to change depending on student interest, aptitude, and need. In the development of the two-week unit, emphasis was placed on guiding students through a logical progression of experiences supporting dance movement vocabulary, dance making, dance inquiry, and dance sharing. A Choreographer's cycle was designed to support the student complex and meaningful experiences in dance, simultaneously supporting and uniting their studio and computer-based work.

The following is a description of the instruction, detailing the progression of events over the two-week Discover Dance workshop. The balance of time spent between studio and computer lab activities is a ratio of the time spent in the two locations.

**Day 1:** The class began in the dance studio, with an improvisatory warm-up highlighting the 18 Motif Writing concepts, followed by a discussion and demonstration of Motif Writing. In the computer lab, students visited the Motif Writing section of the CD-ROM and created a Mini Dance using the 18 symbols explored in the warm-up. After all of the students printed their Mini Dance scores, we returned to the dance studio where students began to physically choreograph their Mini Dances. (Studio 6/8 and lab 2/8)
**Day 2:** The class began in the studio with a warm-up focusing on the concepts of Space and Shape. Following the exploration, each student showed their favorite new movement idea from our warm-up and practiced their dance from Day 1. Students then performed their dances for the class. They discussed their observations and recorded what they saw in their notebooks. In the computer lab, we began with a focus group discussion, followed by students' explorations of the Elements of Dance section focusing on Body, Space, and Shape Elements. (Studio 5/8 and lab 3/8)

**Day 3:** The class began in the computer lab with a warm-up focusing on the concepts of Relationship. As part of the movement exploration, students explored modes of support, moving toward and away, and contact with a partner. Using the Discover Dance CD-ROM, students looked at the Relationship category in the Elements of Dance section. Then, working with a partner, they decided on a theme for a new dance and created a Mini Dance score. The class then went to the dance studio to work on the students' new dances. (Studio 4/8, lab 4/8)

**Day 4:** Many students desired more time in the computer lab; we therefore began with free time using the CD-ROM. Free time was followed by a brief discussion of what the students had seen in the CD-ROM. In the studio, students continued to work on their partner dances. They were asked to consider a title and to further define the theme of their dance. Several groups wanted to make longer dances using the additional Mini Dances created during the morning’s free-time activity. The class concluded with impromptu visits by Kelly Smith, an MFA candidate at OSU and Bill Williams, a musician and father of one of the participants. Kelly created a dance made from two students’ (Ian and Fidel) Mini Dance score, and performed the dance for the class. We
ended our class with five minutes of guided improvisation with live accompaniment by Bill Williams on flute. (Studio 6/8 and lab 2/8)

**Day 5:** The class began in the studio with an exploratory warm-up focusing on the themes of Effort. This was followed by time to work on the student’s choreography. The class then discussed and defined what information is necessary to create and reconstruct a dance. Themes were listed on the board and students were instructed to prepare their dance scores to be sent to other children around the world—"Out of Ohio Dances". The students enthusiastically decided where to send their dances, stating "I’m sending my dance to France," or "New York City." The students added movement directions, notation keys and descriptions of style and personal information to dance scores. Students’ scores were placed in envelopes and handed in to the teacher to be mailed. In the computer lab, the students looked at the Elements of dance, focusing on themes of Effort, followed by free time on the computer. (Studio 5/8 and lab 3/8).

**Day 6:** The class began in the studio with students exploring themes of relationship, storytelling, and emotions revealed in the shaping of the body in dance. "Out of Ohio Dances" were delivered to the class. Excitedly, each student received a letter with a Mini Dance enclosed. Keeping these letters secret, the students read and reconstructed the dance. Next, they performed their new "Out of Ohio Dances" for one another. During the performance, the most original "Out of Ohio" choreographers recognized their own dance being performed, and the class discussed each choreographer’s observations. Then, the choreographer and the reconstructor performed their dances at the same time. This demonstration brought a lively discussion among the students, identifying the similarities, differences, and flexibility of Motif Writing.
In the lab, students viewed a video dance called “Mike’s Bike.” They played this dance numerous times on their monitors and then recorded their observations in their notebooks. Questions posed to the students included: (1) Describe the dance; (2) What do you think this dance is about? (3) Identify the movement ideas you see in the dance; (4) Give the dance a title. After recording their observations, the students met Kim Green, an MFA student in dance, who was the filmmaker / choreographer of “Mike’s Bike.” The students asked Kim questions about creating the dance and the video (Studio 6/8 and lab 2/8).

Day 7: The class began in the computer lab where students were informed that they would make their final dance over the next three days and should begin to consider the topic for their dance. The students were eager to visit sections of the CD-ROM, which they had not seen yet. They were asked to go to the “Meet The Choreographers” section and identify, remember, and share the interesting aspects of what they had seen in the dances. Students then went to the “Make a Dance” section and answered 10 choreographic questions about their final dance. Their answers were printed and brought to the studio. In the studio, the students’ warm-up focused on expressive body shape, timing, and transitions. The students worked on their final dances, and several wished to return to the computer lab to create a Mini Dance to work from, in order to organize the abundance of materials that they selected earlier in “Make a Dance.” (Studio 4/8 and lab 4/8).

Day 8: The class began in the computer lab with free time to work on journals, make Mini Dance scores, or research on-line. The students went to the Fantastic Dance section of the CD-ROM where they viewed several Fantastic Dances, selected one Fantastic
Dance to analyze, and saved a printed response. The class then went to the studio to work on their final dances. The students were eager to share their dances and receive feedback. After they worked independently for 10-15 minutes, they found a partner for whom they performed their dance and vice versa, and gave and received feedback from each other.

(Studio 4/8 and lab 4/8)

**Day 9:** The class began in the lab with free-time activities, as I sensed the students’ desire for time to write in their journals, notebooks, the CD-ROM, and to work on their dances. Free-time activity was followed by a focus-group discussion. The class then went to the studio to finish their dances. At this time, the students were asked (when they were ready) to have their dance videotaped, so that I could study them later. Rosie Hernandez and Aaron Wilson came to watch the students’ choreography. The visitors were introduced and the students were eager to share their work with them. Near the end of class, the students grew distracted so I led a group improvisation with Rosie and Aaron joining the class. (Studio 5/8 and lab 3/8)

**Day 10:** The class began in the dance studio with a dance sharing for family and friends. Students described their work and performed their dances. Audience members and fellow students asked questions to the performer / choreographer about their work and shared their observations. Following the performance, each student brought their family members to the computer lab to share their journals, notebooks, printed assignments, the CD-ROM, and the “cool computers” they had been using for the past two weeks. (Studio 5/8 and lab 3/8)