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CD-ROM TECHNOLOGY:  
HOW IT IS UTILIZED IN K-12 SCHOOL LIBRARY MEDIA CENTERS

by  
Amy Jo Hufana

A Thesis

Submitted in partial fulfillment of the requirements of the  
Master of Arts Degree in the Graduate Division  
of Rowan College of New Jersey  
1996

Approved by \_\_\_\_\_

Date Approved May 1996

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## ABSTRACT

Amy Jo Hufana

CD-ROM Technology: How It Is Utilized in K-12 School Library Media Centers, 1996. Thesis Advisor: Regina Pauly, School and Public Librarianship.

The purpose of this study is to investigate how CD-ROM technology is utilized in school library media centers in Cape May County, New Jersey and in other locations throughout the United States. A survey has been conducted to supply information about many aspects of CD-ROM use, including the types of hardware and software used, the extent of use of different types of programs, the responsibilities of library media specialists in utilizing and managing CD-ROM resources, and the amount of use by teachers, students, and others. Library media specialists from Cape May County and other locations in New Jersey have responded in person or by mail. School librarians from 23 other states have responded via electronic mail through the Jupiter e-mail system at Rowan College and through LM\_NET, an Internet listserv for school library media specialists.

An overview of the author's experience with CD-ROM in a school library media center is described and other case studies of CD-ROM use are provided. A review of the literature provides background on many aspects of CD-ROM use, including other surveys that have addressed CD-ROM use, planning and management issues, integration of CD-ROM resources into school curriculum, and pros and cons of CD-ROM use. The results for each question on the survey are given. Out of 92 respondents, 86 indicated that they use CD-ROM technology in their library media centers, with hardware varying from stand-alone CD-ROM stations through CD-ROM networks accessible outside the library. The results of the survey indicate that CD-ROM technology is becoming common in K-12 school media centers, that it is being utilized at all grade levels in a variety of ways, and that media specialists are involved in all aspects of CD-ROM use, including planning, management of resources, training, and collaboration with teaching staff.

## MINI-ABSTRACT

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## CHAPTER 1

### Introduction

#### Overview: CD-ROM Technology in Schools

CD-ROM technology is becoming a common element in school library media centers; as libraries automate, many are incorporating CD-ROM, laserdisc, and on-line technology into their automation plans. CD-ROM technology first became commercially available in 1985, when it was introduced by Sony and Philips (Duggan, 1990). In 1988-89, only three percent of school libraries were using CD-ROM, but by 1993-94, approximately 43 percent of school libraries, or 15 million U.S. public school children, had access to CD-ROM technology (Berger & Kinnell, 1994). The key to the success of CD-ROM technology lies in the amount of information CD-ROMs can hold -- a single disc can hold 600 megabytes of data, "equivalent to approximately 330,000 typewritten pages, 6,000 enhanced graphic images, 72 minutes of audio, 60 minutes of full-motion video, or any combination of the above" (Ekhami, L. and P., 1993, p. 38). The multimedia capabilities of CD-ROM make it a versatile teaching tool. For example, many students are motivated to use multimedia encyclopedias, which incorporate pictures, video clips, animations, and sound, over the traditional paper version. A study published in 1994 found that a group of approximately 325 discs were suitable for schools out of over 5,000 CD-ROMs on the market at the time (Berger & Kinnell, 1994). CD-ROMs can be used in the school library for many purposes, whether for use with students (direct instruction, research projects, curriculum-based programs, storybooks, etc.), or for professional uses such as cataloging, ordering, and research.

The educational media specialist or school librarian is often required to be a master teacher, as described in Phi Delta Kappan's special section on "the school library for the nineties" (Barron and Berger, 1992), integrating the resources of the traditional library

collection with the current technology and curriculum, and helping teachers and classes to utilize multimedia effectively. Not all school libraries currently have CD-ROM technology available, although the number is growing now that CD-ROM drives are becoming a common built-in feature in new computers. School libraries have varying degrees of technology; computer equipment may range from single CD-ROM stations to complex networks with multiple CD-ROM drives. The school librarian is, in many cases, responsible for the implementation of CD-ROM technology in addition to traditional responsibilities in the library.

#### Purpose of the Study

This thesis will focus on the following question: How is CD-ROM technology being utilized in K-12 school library media centers? It will look at factors that affect the use of CD-ROM technology in school libraries, and will compare the use of different types of programs across different age groups and demographics. It will also study the role of the school librarian or media specialist in implementing CD-ROM technology. The method of study will include a survey of school libraries in New Jersey and elsewhere, via letter and/or electronic mail. On-line participants outside New Jersey may answer the survey through LM\_NET, an Internet mailing list or listserv for school librarians; local librarians will receive the survey by mail, with a stamped return envelope provided. Surveys will also be provided for interested members of the thesis class. The study will compare these findings with information found in the available literature, and with the expectations of the author.

#### Elements to Be Investigated

This study is intended to provide information concerning many aspects of CD-ROM use in the library media center. What kind of equipment and networking capabilities do

schools have? What types of CD-ROM programs are they using? Are CD-ROMs being used more for direct instruction, supplementing the curriculum, professional use, independent student research, or free-time activities? Is the librarian responsible for training staff members? For training and supervising students? For evaluating and purchasing programs? Can CD-ROMs be borrowed or checked out? What are some of the problems encountered by school librarians concerning CD-ROM technology? Conclusions about these issues and others will be drawn based on the literature presented and the results of the survey.

### Definition of Terms

For the purposes of this paper, variations of the terms "school library" and "media center" along with the terms "school librarian" and "media specialist", may be used interchangeably.

Some other terms:

CD-ROM -- Stands for "Compact Disc Read-Only Memory". A computerized format for storing large amounts of information on discs, which may include text, graphics, sound, and video.

Electronic mail or e-mail -- A system for transmitting, receiving, storing, and forwarding textual information and messages in electronic form. Mail is directed to particular individuals or groups of individuals.

Internet -- The collection of all the connected networks in the world available on-line using a modem.

Listserv -- An on-line automated mailing list; allows user to subscribe to a network and join a group or mailing list of people with similar interests.

Modem -- Computer equipment that allows your computer to talk to another computer via a telephone line.

### Parameters of study

Although much literature and useful information was found on the subject of CD-ROM use in public libraries, the survey will be directed primarily toward school libraries serving grades K-12 (although an e-mail survey on the Internet might have the potential of reaching a broader audience). There is an ample amount of literature available on the subject of CD-ROM in school libraries for the purpose of this study, and limiting the survey to K-12 schools is intended to keep the amount of data collected within a manageable range. Some correlations will still be made between school, college, and public libraries based on surveys described in the literature.

The literature reviewed for this study has been limited to works published in 1990 or later (with one exception); these works will be used to represent the "current" use of CD-ROM technology. Due to the constantly changing nature of CD-ROM technology, even articles five years old or less can contain outdated or inaccurate information. Current literature is necessary for locating information on new developments and the ever-growing number of educational CD-ROM programs. Although much literature is available that describes or evaluates specific CD-ROM programs, this study will not focus on specific programs, but rather on the types of programs most used in school libraries.

CD-ROM technology referred to in this study will pertain to those products designed primarily for IBM-PC and Macintosh computer equipment. This study will not include laserdiscs or other compact disc formats, such as audio discs or CD-I.

### Conclusions

The survey being conducted for this study should provide a base of information on how CD-ROMs are being used in school libraries. It is anticipated that the representative sample of schools contacted through the survey will show that a large percentage of schools are currently using CD-ROM technology. Much of the literature on the subject

pertains to high schools, and a large percentage of the CD-ROM programs currently available are geared to the secondary level; therefore, it is assumed that most of the high schools surveyed will indicate that they have CD-ROM technology available in their libraries. The survey will also be directed to Special Services districts in New Jersey in order to compare their experiences with those of the author (as described in Chapter 2); it is expected that the results will show that CD-ROM technology is being successfully used with special education students. The results of the survey will be compared to existing literature on the subject, and should support the premise that CD-ROM technology is becoming wide-spread in K-12 schools. There are pros and cons to using CD-ROM versus print or on-line materials, and the survey results should point out some problems that librarians have in utilizing CD-ROM technology. It is also anticipated that the survey will show that school librarians are taking the lead in schools in implementing CD-ROM technology, and that they are working with teachers and students to integrate technology into the school curriculum.

## CHAPTER 2

### Case Studies

CD-ROM technology can be used for many purposes in education, and at many levels of complexity. Some school libraries use single CD-ROM drives which require discs to be changed manually; others have networks that can provide CD-ROM access to many workstations at one time. CD-ROM programs are available to suit many different grade levels and subjects, although the majority of programs available are geared toward the high school level (Berger & Kinnell, 1994). Whether they are used for research, instruction, or entertainment, CD-ROMs are becoming common in the K-12 school setting. This chapter will present some examples of how CD-ROM technology is being utilized in school libraries.

#### Personal Experience

As the author of this study, my knowledge of CD-ROM technology is based on experiences as an educational media specialist at Cape May County Special Services School District, located in Cape May Court House, New Jersey. The district serves special needs students from throughout the county, including a broad range of physically disabled, learning disabled, multiply handicapped, and emotionally disturbed students. The school district provides services for ages 0-21, with an Early Intervention Program for infants, a Preschool, Elementary School, Middle School, and Alternative High School. The Special Services Library (also known as the James J. Coulter Media Center) serves the entire district, with a staff of two media specialists, two library assistants, and one audio/visual assistant.

As a media specialist at the Special Services Library, I have been involved in the process of setting up computer stations and selecting CD-ROM software for the library, along with our computer coordinator and library staff. Our hardware consists of two

stand-alone CD-ROM stations positioned at opposite ends of the library counter and one in the technical services room for use by staff. Each station has a Macintosh IISI computer, an external CD-ROM drive, an external hard drive, a laserdisc player and TV, and an Imagewriter II printer. CD-ROM programs can be used in the library, or they can be checked out for a week at a time to classrooms or the computer lab; the number of classrooms equipped with CD-ROM drives is growing, thanks to the district's technology plan. Positioned at each station is a daily log where teachers can sign up to reserve a CD-ROM station for a specific block of time; students and staff are asked to record their name and the name of the program used each time they use the station. As long as the stations are not reserved in advance, students and staff can walk in and use them as needed; many high school students come to the library with passes from their classroom teachers and use the CD-ROM programs independently after they have received initial training from library staff. Some of the library's student workers help with changing CD-ROM discs as needed and assisting students and staff with using specific programs. There are cards with brief instructions for using different CD-ROM programs at each station.

As a guideline for selection of CD-ROM programs, we try to choose programs that are information- or literature-based. Much to the chagrin of students, we do not purchase games, but we do select interactive programs that provide information in an entertaining way or develop problem-solving skills, such as Oceans Below or different versions of Carmen San Diego. At the preschool and elementary level, the most frequently used programs are Broderbund's Living Books series, which are simple to use and require no reading or keyboarding skills, and Discis-based programs such as National Geographic's Wonders of Learning series. At the middle school level, Living Books are still popular, but students also use interactive titles such as Where in the U.S.A. is Carmen San Diego and reference sources such as Street Atlas U.S.A. and Grolier Multimedia Encyclopedia. At the high school level, the CD-ROM stations are used for assignments and research



projects by language arts, social studies, science, and math classes, and by individuals for "edutainment" purposes. Severely handicapped students from preschool through high school use the programs that require little or no reading with the assistance or supervision of a staff member, and some have learned to operate the mouse despite their physical or mental limitations. Some elementary teachers bring small groups or whole classes on a regular basis to read and "play with" stories on CD-ROM as a language activity. Teachers who use the library for research projects use the CD-ROM programs as a motivator for students or as a reward for work well done. Teachers and staff members also use the CD-ROM stations for research and reference; the most-used title for staff is Wilsondisc's Education Index, which is used by staff members for locating educational information for college courses and work-related research.

The Media Center does not generally use any type of projection system for CD-ROM stations, although a video projector is available that can be used to project CD-ROM programs onto a larger screen. The district also has an LCD panel that can be used with an overhead projector for computer presentations. Due to space limitations, neither of these methods is convenient on a daily basis. The average size group that is accommodated at one station is four students with a staff member; we occasionally fit classes of up to eleven around a CD-ROM station, but most often, only one or two students use a station at a time.

CD-ROM has proved to be great motivator in getting students interested in research skills and literature. They will rush to use the CD-ROM encyclopedia over the print version, and will come back again to try new programs that interest them. "Can we use the computer today?" is a standard question asked when my scheduled classes are entering the Media Center, and most of the students will want a turn at using the mouse and operating the program used. The CD-ROM programs draw the attention of all types of students; even mentally disabled, physically disabled, and autistic students can learn to point and click with the mouse to operate certain programs independently. The middle school and high

school students who want nothing to do with reading books will spend time accessing CD-ROM programs, absorbing information from the multimedia presentations (although they will usually look for visuals and video clips rather than written information whenever possible). CD-ROM has proved to be a successful tool for getting students into the Special Services Media Center, providing information in a multi-sensory experience (sight, sound and motion) that holds their interest.

#### Selected Examples: CD-ROM in School Libraries

CD-ROM technology offers a diversity that allows schools to use it for many different purposes and at many grade levels. Below are some examples of how CD-ROM technology has been utilized in different settings, including elementary, middle, and high schools.

One elementary school librarian posted a message on LM\_NET describing how she uses CD-ROM stations as centers or learning stations for students (Akers, 1996). For example, if the subject of the lesson is dinosaurs, she might set up CD-ROM stations for locating information about dinosaurs, electronic catalog stations for locating books on dinosaurs, a filmstrip station for independent viewing, a station with dictionaries or reference materials, and a production center for hands-on projects. Akers uses Compton's Multimedia Encyclopedia on CD-ROM with younger classes, such as first and second grades, and asks them to look for information in the picture search area so as not to be overwhelmed by the amount of text in the articles.

Students at Istrouman Middle Magnet School in Baton Rouge, Louisiana, have taken over the job of teaching other students and faculty members to use CD-ROM programs in the library media center, as described in "Kids Teaching Kids to Use CD-ROM" (Dearman, 1993.) A simple, four-page manual was devised and field-tested by a group of teachers, parents, secretaries, and students. Students and staff sign up for instructions and time

blocks to access information, then are instructed by a group of students already trained in the use of CD-ROM, using step-by-step directions given in the manual for loading and operating one specific CD-ROM program. Participants are then given computer "buddy cards" that allow them to access different CD-ROM programs using instructions provided, with assistance from their student mentors when needed. This teaching program freed up time for the media specialist to perform other necessary tasks while utilizing the time and talents of students.

The Rosholt School District in central Wisconsin began their automation process in 1985, when they began to use word processing and graphics programs. They gradually added an on-line services, a circulation system, a union catalog, and finally CD-ROM resources, as described by Helen Adams in "Media Magic: Automating a K-12 Library Program in a Rural District" (1994). Decisions were made by committees of faculty, administrative, student and community representatives, and a long-range library automation plan was put in place in 1987. The CD-ROM resources were networked, except for electronic encyclopedias where network licensing was too expensive, and were made available in both the K-8 and the 9-12 resource centers. Students could access a menu that included a magazine index, SIRS, NewsBank, and an on-line union catalog. Inservices for faculty training in small groups were offered on using both CD-ROM and on-line services and incorporating them into the curriculum. The author saw a close connection between the school's technology plan and the Library Media Program Long Range Plan; she wrote, "There are many similarities between implementing automation in a library resource center program and integrating technology throughout the curriculum, and the teacher-librarian is well equipped to assist fellow faculty members" (p. 28). Concerns with technology included lack of local technical support, the cost of replacing and upgrading equipment and software, the need for continued staff development, and the changing role of the teacher-librarian. The author saw the teacher-librarian as "a facilitator and trainer, modeling

technology use and information accessing for students and faculty. The teacher-librarian assists faculty with the integration of appropriate technologies into the curriculum" (p. 28).

In a case study on networking CD-ROMs (Bard, 1993), the author found that developing technology in a high school setting "takes vision, planning, funding, stamina, and a sense of humor" (p. 185). The author described the automation process of Thomas Jefferson High School for Science and Technology in Fairfax County, Virginia, a specialized school with approximately 1,600 students and 131 staff members. The school added three stand-alone CD-ROM workstations, along with a library circulation and on-line catalog system and an on-line reference service, in 1988. They soon found that students were waiting in line to use the CD-ROMs, and that the process of changing discs, managing the workstations, and adding new CD-ROM titles to the collection was creating logistics problems. They developed a plan for a school-wide CD-ROM network or LAN with eight CD-ROM drives and implemented the plan in 1991. Some of the problems encountered included difficulties with loading programs onto the network, network crashes, and computers that couldn't handle the networking specifications of some of the new programs. They worked out their problems, provided training for staff and students, and by 1992, were planning to add dial-in services, more CD-ROM drives, and more network connections to classrooms.

A rural area in Pennsylvania gained access to CD-ROM reference databases through a cooperative program with Mansfield University Library (Garretson, 1994). Six local junior/senior high schools were provided with the necessary equipment and software, dial-in access to a CD-ROM network of six reference databases, and training for librarians and teachers. Interlibrary loan services and delivery were provided by the University. One goal of the program was to measure the effects of the system on the science education of high school students in the program. A questionnaire distributed to students using the network was answered by 199 first-time users and 70 who had used the network before; a

majority of the searches recorded were done by science students. Their answers showed a 93% success rate in locating information, and an 87% satisfaction rate with search results. Final evaluations of the program did not show full participation by the science teachers and their classes, perhaps because of early technical problems, but those who used the system were enthusiastic about the program. The partnership between the university and the schools proved to be successful in enhancing the information resources available to rural students, and in helping the students to effectively utilize those resources.

## CHAPTER 3

### Review of the Literature

CD-ROM technology is a fairly recent development and is constantly changing, as is the entire field of computer technology. The literature reviewed for the purposes of this study covers the time period from 1989 to 1995; however, even literature that is two years old may be outdated when dealing with technology. The list of CD-ROM titles available for IBM-PC and/or Macintosh computers is always growing, and there is a definite trend toward producing programs that will run on either platform. The literature presented here provides information on surveys that have been done concerning CD-ROM technology in libraries, planning and management of CD-ROM, curriculum integration, and some pros and cons of using CD-ROM technology in educational settings, with a look into the future.

#### Surveys

A survey is "the means by which society keeps itself informed, a way of bringing under control situations of increasing size and complexity, of obtaining perspective and standards of comparison (Line, 1982, p. 9). In his book, Library Surveys, Line describes different types of surveys and offers details on planning surveys, collecting data, and the analysis, interpretation and presentation of survey results. In the library world, surveys are used to systematically collect data "concerning libraries, their activities, operations, staff, use and users, at a given time or over a given period" (Line, p.12). The survey conducted for this study addresses many of these elements in looking at how CD-ROM is used in school libraries. Berger and Kinnell (SLJ, 1994) quoted one survey called "Technology in Public Schools, 1993-94" which showed a significant increase, from 3 to 43 percent, in CD-ROM use in schools since 1988-89. Another survey done in 1993, which was quoted by Berger & Kinnell in their book, CD-ROM in Schools (p. 65), predicted that in the next

few years, CD-ROM technology would be found in 85% of high school libraries, 99% of large research libraries, 97% of college libraries, and 89% of public libraries. Little information was found in the literature, however, on surveys that addressed the use patterns of CD-ROM in school libraries across different age groups, particularly at the elementary level.

In researching the topic of CD-ROM use, most of the surveys found in the literature concerned college libraries rather than K-12 schools. They examined factors of CD-ROM use that could also be applied in studies of high school students who use CD-ROM research databases: age, frequency of use, level of computer skills, type of instruction provided. One study looked at factors related to frequency of use of ERIC on CD-ROM by university students (Belanger & Hoffman, 1990). A mailed questionnaire was used to survey education students at Concordia University in Montreal, gathering data on gender, age, level of familiarity with computers, and level of study. They found that men were more likely to use ERIC on CD-ROM than women and that there were significant relationships between the frequency of CD-ROM use, the age of the users, and their familiarity with computers; they did not find a significant relationship between level of study and CD-ROM use. Another survey used data on the number of students signed up to use CD-ROM stations to identify use patterns at the Biological Sciences Library of Ohio State University between 1987 and 1991 (Leach, 1994); they found that more than half of the users were short term users, with all use occurring within a one-month period. Over one third of those surveyed used the databases on only one day. These results suggested that more point-of-use instruction was needed for CD-ROM users, with basic operating instructions and search strategies, and more training and updating was needed for library staff.

In a ten-year anniversary report on CD-ROM in libraries published in the May-June 1995 issue of On-line, a group of librarians, academics, and corporate users were surveyed

via the Internet to measure the impact CD-ROM has had on information professionals and their libraries since 1985. Their responses pointed out many of the advantages of CD-ROM over other technologies, but also many of the problems. The report traced the history of CD-ROM from its introduction in 1985 through the present, comparing the benefits of CD-ROM versus on-line services, and looking at issues such as CD-ROM networking problems, budgeting and funding issues, and circulating CD-ROM collections.

### Planning and Management of CD-ROM Technology

Educational institutions mentioned in the literature are at varying stages of progress in utilizing CD-ROM technology. Some use stand-alone CD-ROM stations, where one disc at a time is loaded and used; some, particularly high schools and higher education, use networks that can connect the media center to other libraries, to classrooms, or to the entire school district or institution. CD-ROM use at any of these stages requires a good deal of planning, time management, and training for the library staff. In an article entitled, "The Promised LAN: Networking Resources in the Media Center" (Mather, 1995), suggestions for planning and implementing a LAN were given, based on the author's experience with setting up a network in a high school library. Mather wrote, "The question of a LAN, or Local Area Network, vs. stand-alone terminals was never really an issue for us: we knew that an entire class had to be able to access many of the same resources simultaneously. A network was the most effective, cost efficient answer" (p. 44). The author offered ten tips for success: "1--Develop a district technology plan. 2--Plan to grow. 3--Choose a location carefully. 4--Create a maintenance plan. 5--Protect yourself against hackers. 6--Have a backup plan. 7--Expect new library use patterns. 8--Be prepared to assess student use of the LAN. 9--Set a reasonable timeline. 10--Most important, keep a sense of humor" (p. 45-46).

In their book, CD-ROM in Schools, Berger & Kinnell included a chapter on planning



and managing CD-ROM in the school library media center. They stressed that "having a management strategy in place that includes CD-ROM will ensure that the instruction goals of the library media center will remain a priority and that student learning will continue to be the heart of the program" (p. 27). They looked at many aspects of management, starting with needs assessment and development of a long-range planning document. Also included were a list of questions to consider in establishing policies and procedures for CD-ROM use, and a list of specific administrative duties involved in managing a CD-ROM program. Some of the other issues discussed include staffing, security, workspace considerations, product issues concerning ownership, disc return, and pricing, documenting use, public relations, and budgeting. The chapter as a whole provided an in-depth look at the fine details involved in managing CD-ROM technology; it would be a good source of information for school librarians at any level of CD-ROM administration.

Ekhami & Ekhami offered several steps for implementation of CD-ROM technology in their article, "Implementing CD-ROM? Do it right!" (1993). They suggested winning the support of administration and school leaders, welcoming input from all staff members, and identifying the members of "the opposition" in order to win them over or neutralize them. They advised that you must know your system, select reliable vendors, evaluate the compatibility of programs with your system, and be willing to upgrade your system if needed. They suggested that monitoring usage and performance is critical in justifying budget increases, and that the duties of the media specialist and the technology director must be clearly specified. They state that students should be aware of policies and procedures, and that an UNDELETE utility program or recovery procedure should be available. This article was based on a survey of problems faced in twelve local school districts that used CD-ROM technology, and it offered some unique suggestions that were not found in other sources.

Another article by Leticia Ekhami (1994) looked at issues in setting up CD-ROM

procedures and policies, then presented ways to incorporate those policies into signage systems to remind users of rules while providing positive public relations. Signage systems such as bulletin boards, printed guides, posters, and flyers were suggested, with examples provided from several different school libraries. It was suggested that having a "visual guidance" system would alleviate some of the problems associated with CD-ROM use in elementary and middle schools.

One aspect of management discussed in the literature was the circulation of CD-ROMs. School libraries must decide whether CD-ROM discs can be borrowed, by whom, and for how long. Information pertinent to developing a policy for circulation was provided by two separate articles about the development of a circulating CD-ROM collection at Geauga County Public Library in Ohio (Leavitt, 1995, and Lubelski, 1995). The articles described the planning process, beginning with a survey of patrons to determine their level of interest. They found that 77% of respondents either owned a computer with a CD-ROM drive or planned to buy one within twelve months; of those patrons, 89% had IBM-PC's and 11% were Apple Macintosh users. A collection development policy was drafted, and selection of CD-ROMs for the collection was based on survey results, review sources, and recommendations. Cataloging, packaging, security, and promotion were considered, and a disclaimer and "trouble report form" were packaged with each disc that was circulated. This program showed that CD-ROMs could successfully be circulated in a public library setting; the same guidelines could be adapted in a school library setting.

The selection and evaluation of CD-ROM titles for school libraries is an important part of the management process; it may be the responsibility of the librarian or of other staff members, such as computer teachers and administrators, depending on the policies of the individual schools. The participation of staff and students in the selection and evaluation process can help in making choices that will benefit the entire school population. Berger &

Kinnell (1995) outlined the evaluation process for schools, beginning with identifying products through directories and reviews, identifying curriculum needs, talking with staff and networking with colleagues (the authors suggest joining listservs such as LM\_NET). Previewing discs and open testing by library users were suggested, and an evaluation form was provided (pg. 49) that focused on installation and start up, navigating within the program, searching and results, scope and content of the program, relevancy to the curriculum, and "bonus questions", or whether or not supporting curriculum materials were provided. Lists of CD-ROM directories, magazines and journals that cover CD-ROM, electronic sources, and conferences were provided to help readers with the selection and evaluation processes.

### Into the Curriculum

CD-ROM programs are available for use with students from preschool through high school levels, but the majority are geared toward the secondary level (Berger and Kinnell, 1994), including many reference and research titles. Berger and Kinnell found that 72% of the educational CD-ROMs were suitable for use in four curriculum areas: social studies, science, reference, and language arts. Examples of the uses of CD-ROM and laserdiscs in implementing curriculum were given by Peggy Healy Stearns (1994), including programs for social studies, science, math, health, reading, language arts, and foreign languages. Laserdisc and CD-ROM players and software were found to make teaching easier, and to make learning more exciting and interactive through features such as graphics and video footage, multiple voice tracks in different languages or degrees of complexity, problem-solving activities, and built-in dictionaries and reference tools.

The importance of information literacy as a life skill needed from elementary school through graduate school, at home or on the job was described in an article on CD-ROM and at-risk students (Mendrínos, 1992). The author found that while some educators were

skeptical of the value of technology in teaching critical thinking, her research showed that "high tech tools are the means for inciting a quiet revolution in the library media center environment. Information literacy is a process of critical, lateral, and branching thought strategies to seek, gather, retrieve, analyze, synthesize, evaluate, and apply information from all formats to solve problems . . . This information literacy process is stimulated and perpetuated by the use of high-tech tools" (p. 29). Berger & Kinnell (1995) stated that "information skills should be taught within curriculum areas. A skill is meaningless if taught out of context" (p. 68). They found that technology allowed the student to become an active participant in the learning process, and advised that both the media specialist and the teacher should be involved in the instruction planning process. Some elements of instruction that they endorsed included basic computer literacy, content and structure of different databases, search strategies, and evaluation of search results. Tips for instruction included involving the learner in the presentation, letting students access the keyboard in demonstrations and lessons, designing instruction to provide group cooperation and collaboration, and allowing time for learners to assimilate new information.

Students with special needs have also been found to benefit from using CD-ROM technology. In an article entitled, "Through the Technology Maze: Putting CD-ROM to Work", (Bankhead, 1991), the author found that "two of the most exciting results of students' use of electronic indexes we have seen is an increase in achievement and a decrease in frustration" (p.49); this was particularly true for advanced and at-risk students. The author found that for at-risk and learning disabled students, electronic indexes provided a new equality with other students; the process of locating information was simplified by the electronic index, and search results could be printed out with all the necessary information without having to copy information by hand. One-on-one inservice was described as the most effective way to learn to use a CD-ROM product, and the author stressed hands-on experience and cooperative learning for students, teachers, and

professionals.

Another study of at-risk students and CD-ROM (Mendrinós, 1992) found that "special education, learning disabled, and average students are not only more motivated but more productive using CD-ROM technology for reference" (p. 29). CD-ROM use was found to increase efficiency in accessing information, and students were said to be more specific in defining their searches. The division of topics into subtopics within the electronic indexes was also found to help students with special needs and learning disabilities locate information. Special education students and staff were found to have higher expectations when using CD-ROM technology; described as "a group of former library non-users" (p. 31), mainstreamed and special education students were capable of operating CD-ROM products independently and overcoming previous barriers. The author found that "there is a definite connection between training and curriculum use. Teachers who have been trained are more comfortable with the technology, opening up windows of opportunity between library media specialists and classroom teachers" (p. 31).

### Pros and Cons

Berger and Kinnell (1995) offered arguments for and against teaching CD-ROM use in schools. They promoted teaching CD-ROM use because students need to learn to utilize the unique features of CD-ROM, because of the prevalence and accessibility of CD-ROM, and because instruction decreases computer anxiety in students. Arguments against teaching CD-ROM in schools included the CD-ROM producers' claims that programs are "user-friendly" and do not need to be formally taught, students' resistance to instruction when they prefer to learn on their own, and lack of time on the part of both students and staff. After considering both sides of the argument, the authors concluded that students need CD-ROM instruction in order to locate information effectively (p. 65-68).

In an opinion column in School Library Journal, one educational media specialist

found CD-ROM to be no substitute for on-line services, including the Internet. The author, Mary Z. Cox, pointed out some advantages and disadvantages of both CD-ROM and on-line services, but felt that CD-ROM restricted students to the information on the disc, whereas on-line access provided "vitality and immediacy" (p. 60), giving students experience in creative thinking, synthesis, and analysis when dealing with large quantities of information. Online networks were said to provide "a classroom without boundaries", allowing students to communicate with their peers worldwide and to access the most current information and resources.

Author David Macaulay, whose book, The Way Things Work, was recently adapted for CD-ROM, had mixed feelings about CD-ROM technology when interviewed for School Library Journal (Olson, 1995). He saw advantages in having "two more avenues of communication [sound and motion] available to you which you did not have in the book" (p. 24), but he also saw that the entertaining aspects of CD-ROM, such as movies and animations, overwhelmed the information presented. In looking at his other books, he felt that most were not suited to CD-ROM format, that digitizing them would be a disservice to the books. Macaulay asked some questions that educators need to ask: What are our main goals? How does this new technology help us achieve those goals? Do these tools actually help improve the ability of the school to educate its students? He advised staying focused and looking at the content of CD-ROMs rather than the glitz.

In a monograph presented in Chapter 1 of Duggan's CD-ROM in the Library: Today and Tomorrow (1990), Eddy Hogan mentioned many positive aspects of CD-ROM, but found problems with multiple and remote access to CD-ROM databases in libraries. He suggested that libraries work toward a user-centered model with dial-up or network access to CD-ROM technology, a concept which has become more common in libraries in recent years. Another problem found with CD-ROM was the existence of competing technologies and platforms, such as CD-I; however, technological developments since 1990 have

increased the standardization of CD-ROM products, with many discs now being produced that will work on multiple platforms.

### The Future of CD-ROM

A survey of CD-ROM and multimedia trends in 1995 (Nicholls, 1995) found that about 12,000 CD-ROM titles were commercially available in mid-1995; based on the growth of the CD-ROM industry thus far, it was predicted that 18,750 titles would be available by 1997, and 23,473 by 1998, with major growth in the area of home and entertainment titles. The quality of CD-ROM design was described as reaching "a new level of sophistication and maturity", and prices were found to be falling. Expensive databases that require frequent updating were found to make up only 25% of the the CD-ROMs available. One trend that was found to be on the rise was the circulation of CD-ROMs by libraries. It was suggested that libraries, particularly smaller libraries and school libraries, were being left behind with obsolete workstations and would need significant hardware upgrades to keep up with the CD-ROM industry. CD-Recorders were said to be the upcoming technology, becoming more affordable and more commonly available in the past year.

When questioned about the future of CD-ROM, participants in a survey conducted for Online's 10th anniversary report (Hearther, 1995) had varied opinions on whether CD-ROM, online services, or both would be "the wave of the future". Many expected CD-ROM technology to be incorporated into new technologies that are up and coming, such as cellular technology that will incorporate telephone, television, and computer. CD-ROM was expected by most to be a major factor in technology for years to come, weathering the changes in technology due to cost-efficiency and ease of use. As it was phrased at the conclusion of the article, in the future of technology, "The only constant will be change itself."

## CHAPTER 4

### Methodology

#### The Survey

In order to collect information on how CD-ROM technology is used in K-12 school libraries, a survey was designed that encompassed various factors concerning the schools being surveyed, such as school population, equipment, types of CD-ROM programs used, and management issues. The survey was constructed at the beginning of the thesis process in order to provide focus for the rest of the study. The content of the survey reflected questions raised by the author and others based on personal experience with CD-ROM technology, and questions drawn from the literature described in the previous chapter.

The survey consisted of one sheet of paper, front and back, as shown in Appendix A; it was accompanied by a cover letter explaining its purpose. Personal information at the top of the form was optional, including the names of the library, librarian, school district, city, state, and phone number. Questions 1 and 2 pertained to the population and grade levels of the school. Questions 3 through 6 and 10 pertained to the hardware used, including questions on networking. Question 7 through 9 pertained to aspects of CD-ROM use, including circulation of CD-ROM discs, group size, and student use. Questions 11-15 dealt with the responsibilities of the media specialist and others in selection, evaluation, and supervision of CD-ROM resources, handling of discs, and training CD-ROM users. Question 16 dealt with how CD-ROM technology was used in the school library, asking librarians to rank the following uses: for direct instruction by librarian or teacher, student research, staff or professional reference, supplementing curriculum, free-time activities, or other purposes. Question 17 pertained to the types of CD-ROM programs used most often, again asking the respondent to number the items by rank: reference databases, magazine indexes, encyclopedias, interactive learning games, storybooks, games, and other types.



This question also asked for examples of specific programs in each category. The last question asked the respondent to name one problem encountered with CD-ROM technology. A space was left at the end for comments and sharing information.

### Distribution of Surveys

Copies of the survey were first critiqued and proofread by friends and thesis classmates, and a copy was given to advisor Regina Pauly with Chapter 1 of the thesis. When it was critiqued and corrected, copies of the survey were then handed out to interested classmates to be returned by hand or by mail (a stamped, self-addressed envelope was provided). The survey was distributed to Cape May County public school librarians by mail, including all schools at the elementary, middle, and high school levels. Some librarians and teachers from other schools were contacted by phone if the survey for that school was not returned after a month. The survey was also mailed to seven Special Services school districts throughout New Jersey, in order to compare the author's experience with CD-ROM in special education to those of other special school district librarians. By the end of March, twelve surveys had been returned by classmates, twenty-seven had been returned from Cape May County school librarians, and three had been returned from Special Services schools.

A message was posted on LM\_NET, an Internet listserv for school library media specialists, on January 15, 1996, asking for persons interested in answering the survey to reply through LM\_NET to the author's Rowan College e-mail address. Seventy school librarians replied, with 65 responses received in the first week out of a total of 490 LM\_NET messages posted by e-mail. The responses came from many different states, along with two from Canada and one from Australia. The survey was sent via e-mail to all seventy respondents over a three-week period in February. Two respondents suggested that their names should be used in the "subject" area of the e-mail message to draw their

attention, since the e-mail containing the survey could easily be passed over or missed amongst the large quantity of LM\_NET messages received daily. Following this example, each survey was personalized, with the person's first name used in the "subject" area (ex. "Hi, PEGGY!"), and in the opening message. Throughout February and March the survey responses were received and printed out; some surveys were undeliverable due to errors in addresses and were resent after the addresses were checked and corrected. By the end of March, fifty e-mail surveys had been returned.

#### Tabulation of Survey Results

The information provided by the survey respondents was entered into a database and spreadsheet using Microsoft Works, version 3.0, on a Macintosh computer. The database was used to organize information, record comments, and create charts; the spreadsheet was used to calculate totals and percentages based on the data provided by the survey, and to create graphs depicting the results for different questions in the survey. A list of specific programs named by survey respondents was kept, and the number of people who mentioned each program on the list was tallied. This data is presented and discussed in the next chapter.

## CHAPTER 5

### Survey Results

The survey results presented in this chapter represent a total of 92 surveys answered, including 42 paper copies from throughout New Jersey that were returned by mail or in person and 50 e-mail copies that were answered by LM\_NET members. In Cape May County, 27 out of 29 surveys were answered, for a return rate of 93.1%. Three Special Services school districts in New Jersey answered the survey out of seven that received it by mail; data for Cape May County Special Services School District was provided by the author, making a total of 50% of Special Services districts represented in the survey results. Out of the original 70 respondents who volunteered to answer the survey on-line, 50 answered the survey by the end of March for a return rate of 71.4%. Altogether, including surveys passed out in the thesis class, a total of 92 surveys were answered and returned out of approximately 118 that were distributed, for an overall return rate of 78%.

The fifty e-mail surveys represent a sampling of CD-ROM users from across the United States and beyond; responses came from twenty-three states, and also one each from Australia and Canada. Some of the schools represented by the e-mail surveys are parochial or private schools, while the surveys distributed on paper represent only public schools; some respondents chose not to provide the school name and/or location.

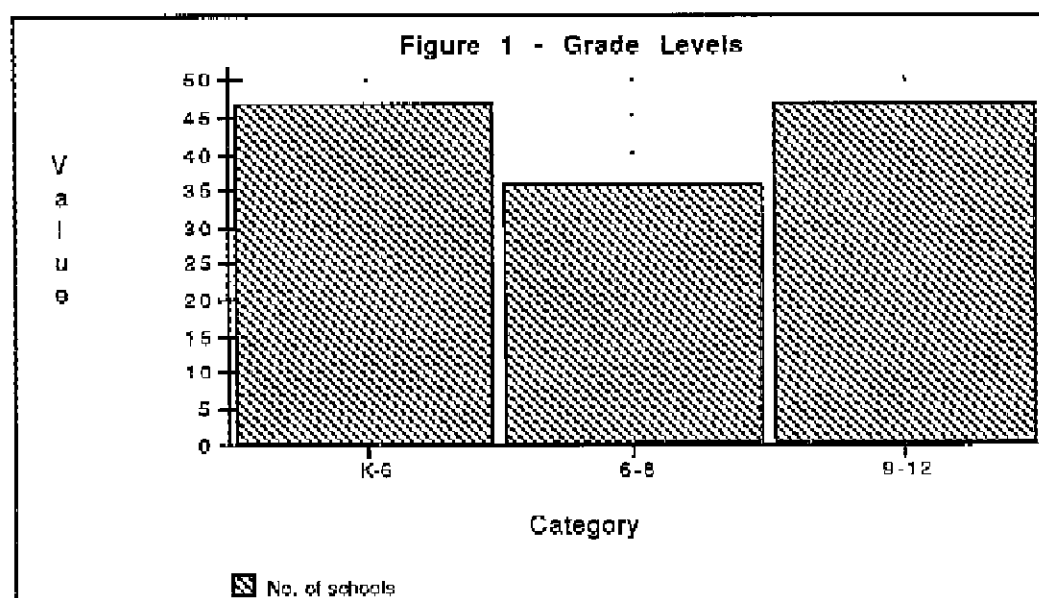
Results for each of the eighteen questions included in the survey are shown below. The results for some of the questions were simple to tabulate, while others were more complex and required some interpretation on the part of the author and/or the survey respondent. Some of the questions seemed straightforward when the survey was written, but proved to be confusing for those answering the survey. Problems encountered when tabulating results for a specific question are discussed after the results for that question.

Survey: How is CD-ROM Technology Used in K-12 School Library Media Centers?

**1. Grade levels served by your library media center:**

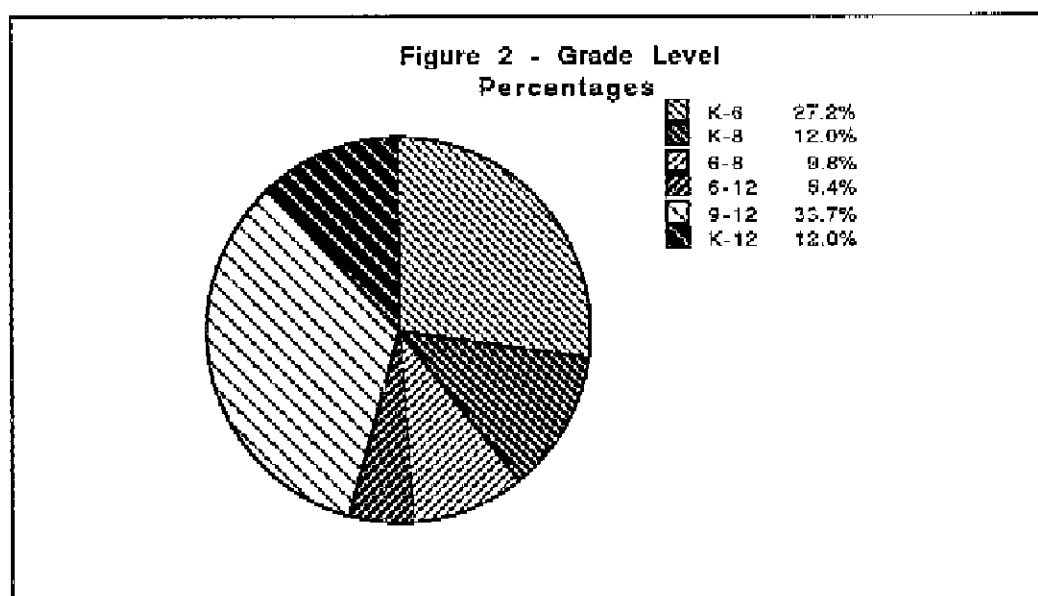
Pre-K K 1 2 3 4 5 6 7 8 9 10 11 12 Other \_\_\_\_\_

Answers for this question were first categorized as elementary (K-6), middle school (6-8), or high school (9-12). Some schools covered a narrower or wider range of grades than represented by the given categories, such as a school serving grades 3-5, which was counted in the K-6 category. Thirteen of the schools surveyed included preschool classes along with elementary grades; these were included in the K-6 category, but not as separate schools. Some schools were placed in more than one category; for example, schools serving Kindergarten through 12th grade were placed in all three categories. The results showed that the survey represented a total of 47 elementary schools, 36 middle schools, and 47 high schools, as shown in Figure 1 below.



These results showed a total of 130 elementary, middle, and high schools as reported by 92 survey respondents, representing a fairly even distribution across the different grade level categories.

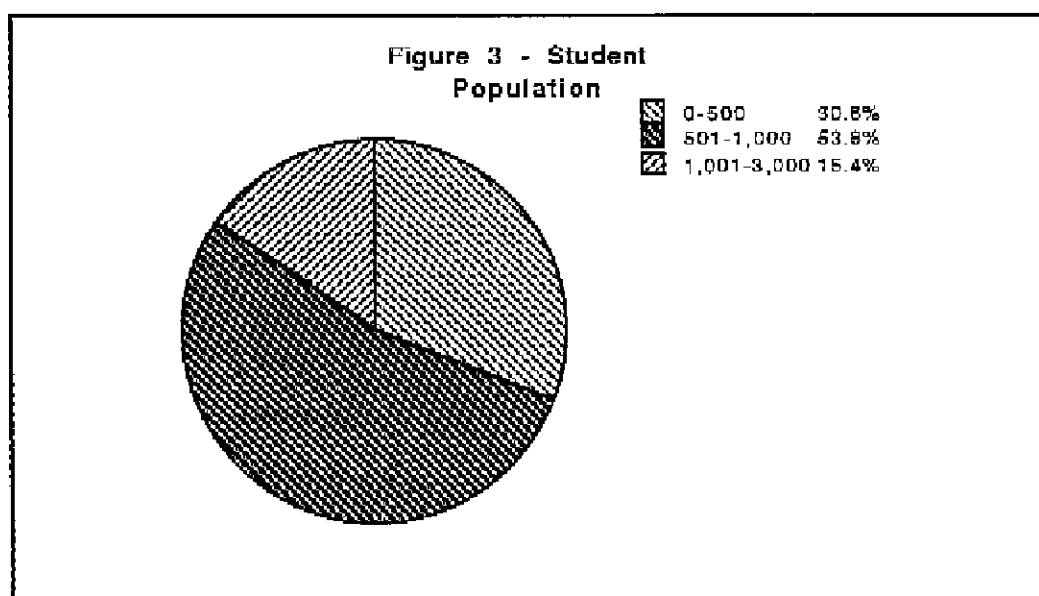
In order to better represent the total percentage of schools surveyed at each level, the results for this question were retabulated into six categories: K-6, K-8, 6-8, 6-12, 9-12, and K-12. The percentages of schools surveyed in each of these categories are shown in the graph below (Figure 2). Arranging the data in this way showed that the majority of schools represented in the survey were actually high schools serving grades 9-12 (33.7%) and elementary schools serving grades K-6 (27.2%).



**2. Aproximate number of students served by your library media center:**

**0-500                      501-1,000                      1,001-3,000                      Other \_\_\_\_\_**

The results for this question were fairly simple; answers were placed in the given categories to provide an overall view of school size (roughly small, medium, or large). The category "Other" was eliminated since none of the respondents reported having over 3,000 students in their schools. Over half of the schools surveyed (53.8%) had between 500 and 1,000 students, 30.8% had 500 students or less, and 15.4% had over 1,000 students as shown in Figure 3.

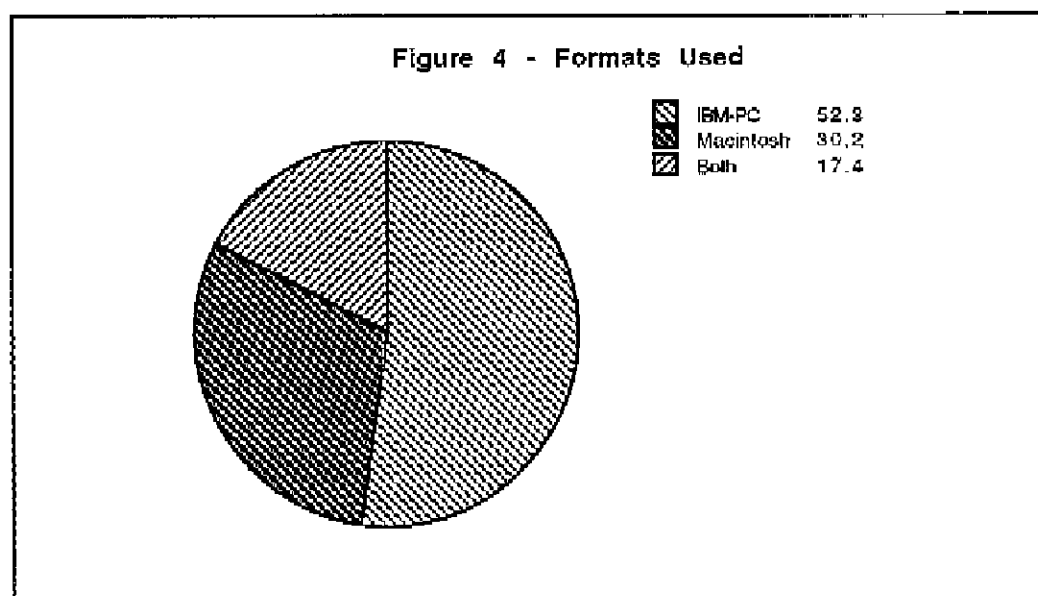


**3. Do you use CD-ROM technology in your library media center?    yes    no**  
**(If no, stop here. Thanks for responding and returning the survey!)**

Only six survey respondents answered "no" to this question: two of the four Special Services Districts, and four Cape May County elementary schools. The schools surveyed by e-mail all indicated that they used CD-ROM in their media centers; this was expected since the on-line respondents were all media specialists who volunteered to participate in the survey and could be considered to be computer-literate as members of LM\_NET. A total of 86 schools out of 92, or 93.5% of those answering the survey, indicated that they use CD-ROM, as compared with 85.2% of Cape May County schools that responded and 85% of of the 40 respondents from New Jersey, including Cape May County, Special Services districts, and others received from classmates and friends. The six respondents who indicated that they didn't use CD-ROM technology did not answer the survey beyond this point, and will not be counted in the statistics for the following questions.

4. What format do you use? IBM-PC Macintosh MPC Other \_\_\_\_\_

Of the 86 respondents using CD-ROM in their libraries, 45 use IBM-PC, 26 use Macintosh, and 15 use both IBM-PC and Macintosh computers. No one reported using the MPC format, and two answers written in as "Other" ("Compaq" and "Gateway") were included with the data for the IBM-PC format. The graph below shows the distribution of use based on the percentage of use in each category: "IBM-PC", "Macintosh", or "Both IBM & Macintosh" formats.



5. What type of CD-ROM drive(s) do you use? single multiple

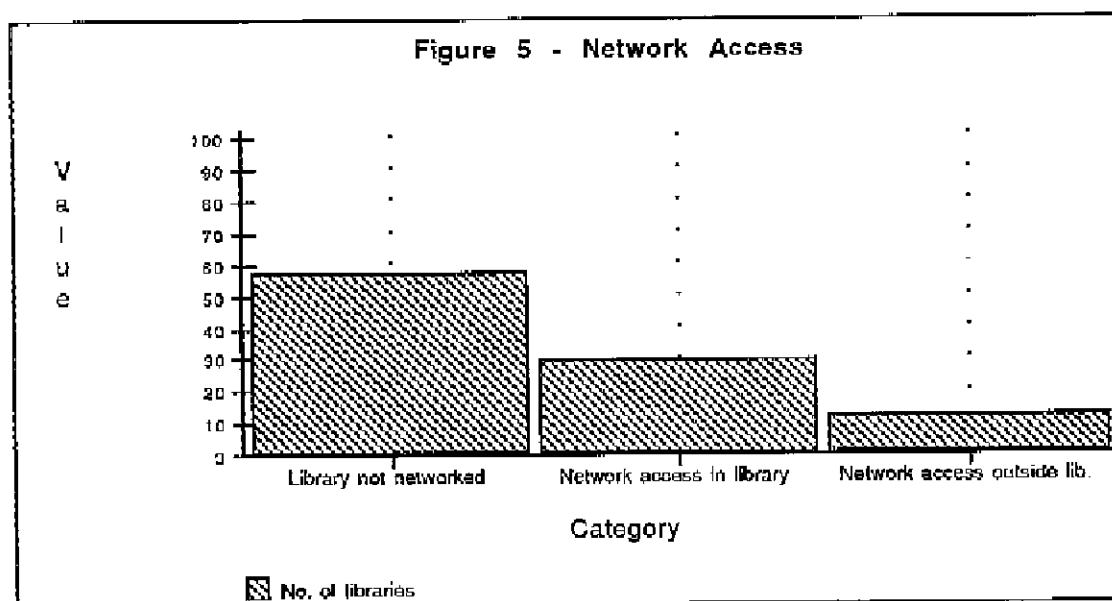
Of the 86 respondents using CD-ROM, 54 reported using single drives, 13 reported multiple drives, and 19 use both. This terminology proved to be confusing for some respondents. It was intended to indicate internal or external CD-ROM drives holding one disc at a time and accessed by only one computer as "single", and drives that load more than one disc at a time as "multiple"; CD-ROM networks usually have multiple drives so that more than one CD-ROM program may be accessed at a time via the network. However, some respondents replied that they used multiple drives but were not networked,

and one said that a single drive was networked. Many users indicated that they used both single drives and multiple drives; for example, they might use the built-in single CD-ROM drive on a computer as a stand-alone drive while accessing a multiple CD-ROM drive through a network using the same computer.

6. Are your CD-ROM drives networked?      yes      no

If "yes", can the network be accessed outside the library?      yes      no

Of the 86 respondents using CD-ROM, 29 reported access to a CD-ROM network, and 57 were not connected to a network. Of those who reported access to a network, 11 reported that the network could be accessed outside the library media center, and three were planning to add outside access. Figure 5 illustrates the network capabilities of schools surveyed. The second part of this question assumed that the network would be based in the library and accessed elsewhere, but some respondents indicated their networks were based in computer labs or other locations outside the library.





### **7. Can CD-ROMs be borrowed or checked out?**

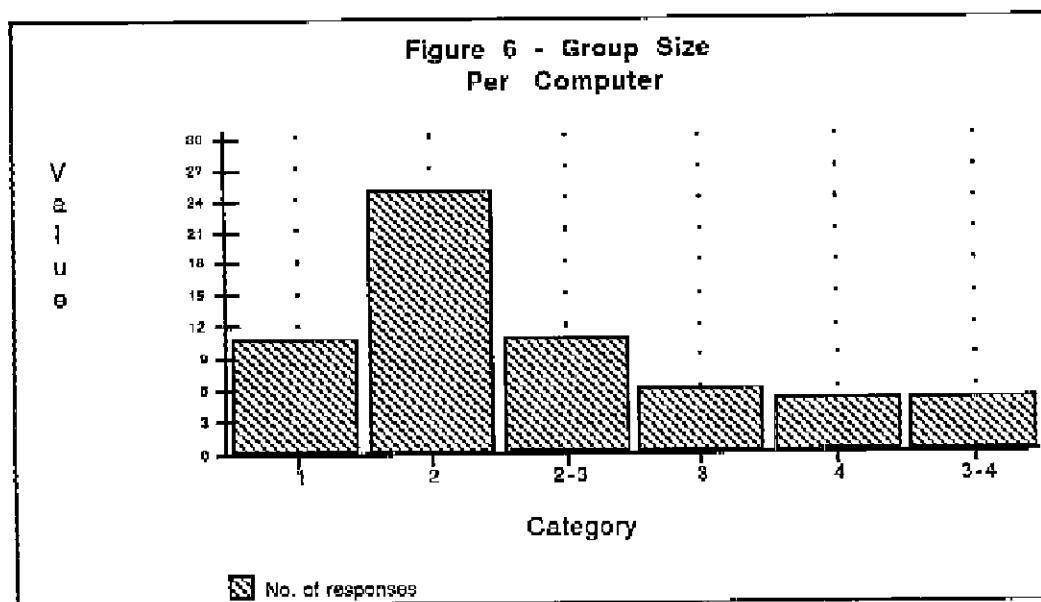
This question was meant to refer to the borrowing of CD-ROM discs, although it would also be possible to loan the necessary hardware. Out of 85 respondents who answered this question, only 24 allowed CD-ROMs to be borrowed; 9 out of those 24 limited borrowing privileges to teachers or staff, and 1 allowed borrowing by parents.

### **8. Do students use CD-ROM stations independently?    yes    no**

Only 6 respondents answered "no" to this question out of 83 answers provided; 77 responded that students used CD-ROM stations independently, or 92.8% of those answering. Two elementary schools limited independent use by age or grade, and one junior high school limited independent use to stand-alone Macintosh stations.

### **9. What is the average group size that can use one CD-ROM station?**

The answers to this question were varied; some respondents answered with a single number such as "2" or "4", and some gave a range, such as "2-5". The majority of answers fell into the range of 1 to 4 users per CD-ROM station; this included 71 out of 83 respondents, or 85.5% of those answering the question. The most common answers given are shown in Figure 6 on the next page. A few respondents indicated use by larger groups, such as 10, 11, or 25 students at a time, and one gave the group size as "1 - whole class" but did not estimate the size of the class. Another wrote in the "comments" space at the end of the survey that she had trouble accomodating a class of 22 - 30 students with one CD-ROM station. A projection system (as mentioned in Question 10) would allow larger groups to view the information on the computer screen more easily.



**10. Do you use any type of projection system, such as an LCD panel or video projector?**

yes                      no

**If yes, what type?** \_\_\_\_\_

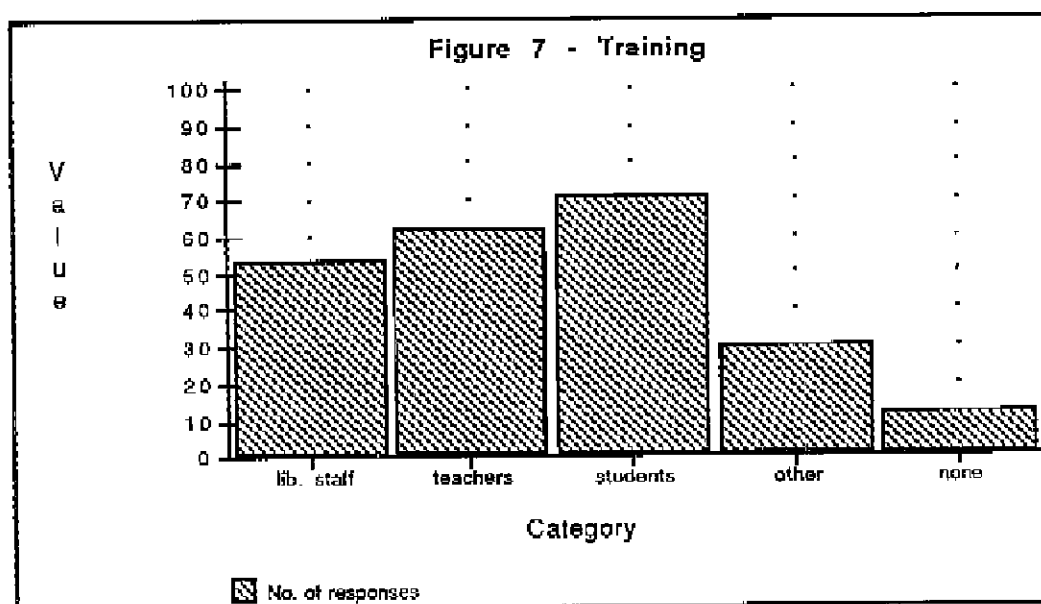
Out of 86 responses, 60 indicated that projection systems were not used (69.8% of responses). Of the 26 respondents who answered "yes", some did not name a specific type, and some named more than one type or brand. Thirteen respondents mentioned LCD panels, 6 mentioned video projectors, and 7 mentioned some form of TV connector or video converter.

**11. As librarian, are you responsible for training any of the following groups in the use of CD-ROM technology?**

**library staff      teachers/staff      students      other** \_\_\_\_\_

A majority of respondents, 74 out of 86 (86%), answered that they provided CD-ROM training for at least one of the given categories: 53 provide training for library staff, 62 train teaching staff, 71 train students, and 30 train other library users. A total of 29 respondents marked all four categories. People included in the "other" category included

support staff, administrators, board members, parents, parent volunteers, local community college students, and the general public. Some reported working with computer lab staff or business teachers. Twelve respondents were not responsible for training anyone to use the technology in their library media center. Several said that they were not required to provide CD-ROM training, but would help anyone who asked. A few answered that teachers and students already know how to use CD-ROM and don't need training.



12. Do you order the CD-ROM products used in the library?      yes      no

If yes, what selection tools do you use? \_\_\_\_\_

Seventy-five respondents (78.1%) answered "yes" to this question and 10 answered "no". Sixty-seven named at least one selection tool they used, with journal reviews of CD-ROM software as their top choice overall; 47 respondents mentioned reviews in general or named specific journals, such as School Library Journal, Tech Connection, Booklist, Book Report, Media & Methods, and Electronic Learning. Other selection tools mentioned (the numbers in parentheses indicate the number of times mentioned) include: recommendations from librarians and colleagues (23), previews and demonstrations (17), catalogs (16),

teacher requests (10), LM\_NET (7), student requests (2), recommended or "top ten" lists (2), advertisements (2), and curriculum (2).

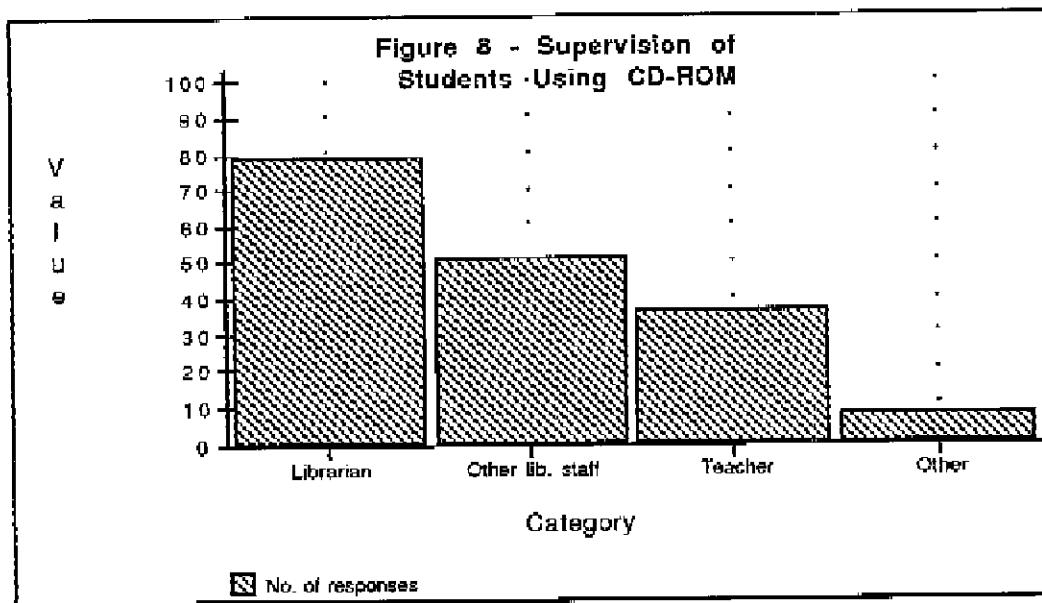
**13. Do teachers participate in selection and evaluation?      yes      no**

Fifty-seven respondents answered "yes" and 27 responded "no" on the question of teacher participation, indicating that approximately two-thirds (66.3%) of the respondents work cooperatively with teachers in selecting and evaluating CD-ROM products to be used in the library media center. Some respondents qualified their answers with phrases such as "occasionally", "rarely", "students also", or "they can but they don't". Some indicated that CD-ROMs were purchased by computer teachers or for computer labs and classrooms. Two mentioned providing previews for staff members, two provided lists of CD-ROM products, and seven mentioned teacher recommendations; some worked with English, science, or computer teachers.

**14. Who is responsible for supervising students using CD-ROM stations?**

**librarian      other library staff      teacher      other \_\_\_\_\_**

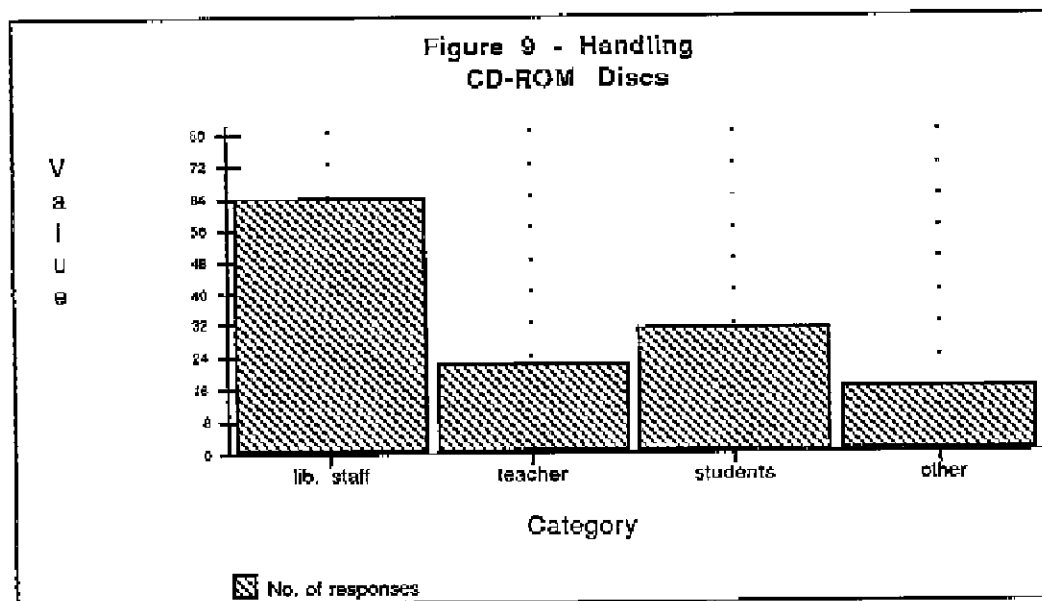
Out of 83 respondents who marked at least one answer for this question, 79 reported that librarians supervised students (95.2%), 51 reported that other library staff supervised students (61.4%), 37 responses indicated teacher supervision (44.6%), and 8 indicated supervision by others (9.6%). The category "other" included support staff and student aides; one respondent wrote of a "team effort" with staff. Figure 8 on the following page shows the number of responses for each category.



**15. Who is responsible for handling or changing the CD-ROM discs?**

Library staff    teacher    students    other \_\_\_\_\_

Sixty-four respondents indicated that library staff members were responsible for the handling and changing of CD-ROM discs in the library media center; most marked more than one category for this question. Results are shown in Figure 9 below.

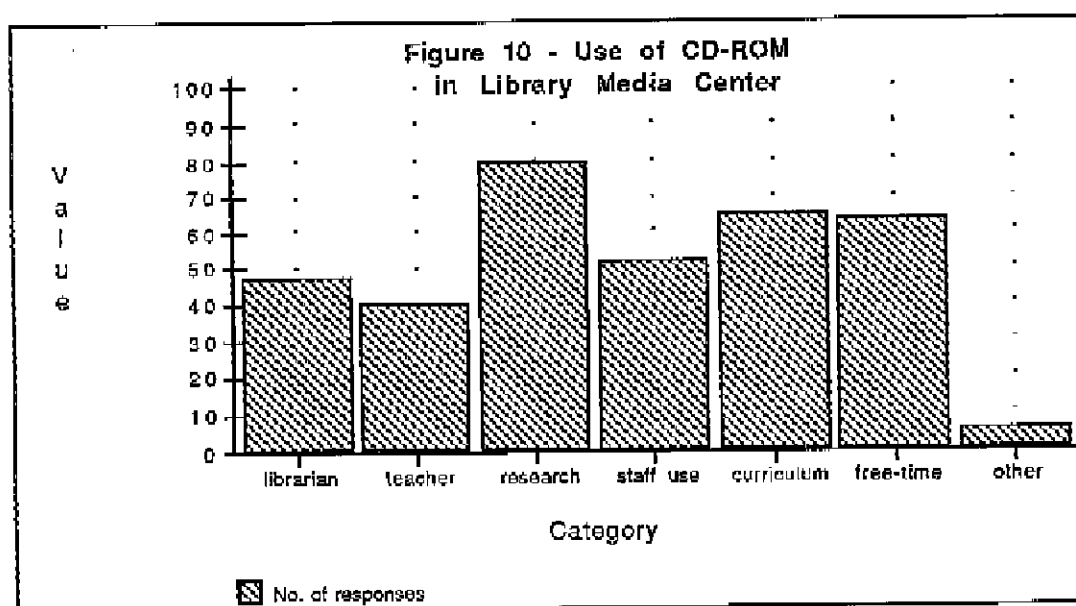


Thirty-one reported that students handled the CD-ROM discs, while only twenty-two reported that teachers handled them. Sixteen reported that "others" handled or changed the discs; answers included computer staff, student aides, and parent volunteers. Several respondents with library networks reported that a computer coordinator/technician handled the discs.

**16. CD-ROMs are most used for: (please number uses below by rank)**

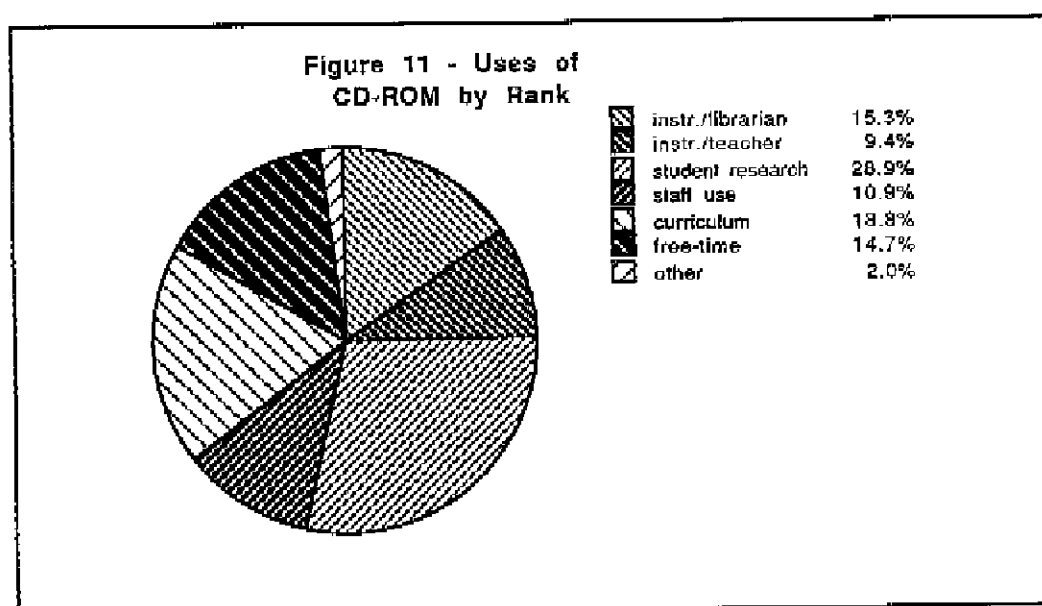
- |                                     |                                  |
|-------------------------------------|----------------------------------|
| ___ direct instruction by librarian | ___ direct instruct. by teacher  |
| ___ student research projects       | ___ staff/professional reference |
| ___ supplementing curriculum        | ___ free-time student activities |
| ___ other _____                     |                                  |

This question was answered in a variety of ways; some ranked all or some of the choices, while others checked off answers without ranking them. The number of total answers in each category was totaled, and a separate tally was kept for those responses that ranked the choices in order of use in order to show which were most used by those respondents. Figure 10 shows the total number of responses given in each category.



The categories of CD-ROM use that were selected most often by respondents were student research projects, supplementing curriculum, and free-time use by students. "Direct instruction by librarian" was chosen more often than "direct instruction by teacher", and "staff/professional reference" was chosen more often than either of the instructional choices. Uses mentioned in the category "other" included word processing, cataloging, and drawing programs.

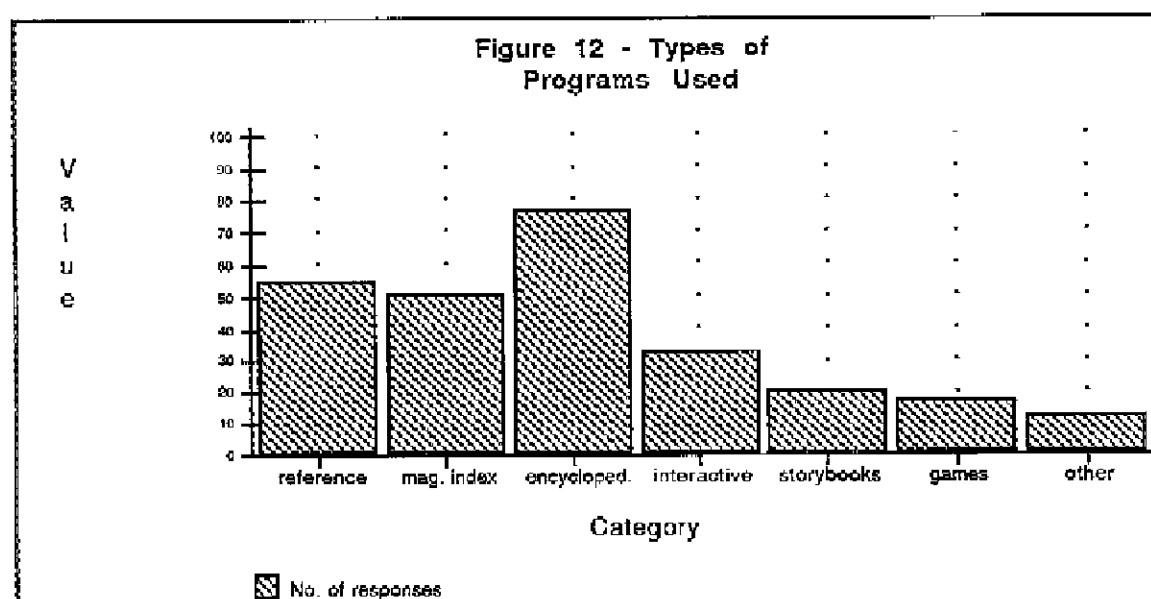
Sixty-eight respondents ranked their choices to indicate which uses were most common in their libraries. The ranked choices were assigned a point value from 1 - 7 so that the choice indicated as the most common use was assigned seven points, the next choice was assigned six points, and so on. Adding the values for each category in this way provided a total of 1,526 points assigned. Figure 11 below shows the percentages of that total represented by each category; it shows that "student research" was the top use of CD-ROM in library media center (28.9%), followed by "supplementing curriculum" (18.8%), "instruction by librarian" (15.3%), and "free-time activities" (14.7%). The results shown by rank differ slightly from the results based on all responses in that the category "instruction by librarian" is given more importance in the ranked scores.



17. What types of programs are used most often in your library? (please number types below by rank and give examples of programs most used if possible)

- \_\_\_\_\_ reference databases
- \_\_\_\_\_ magazine/journal indexes
- \_\_\_\_\_ encyclopedias
- \_\_\_\_\_ interactive programs
- \_\_\_\_\_ storybooks/literature-based
- \_\_\_\_\_ games/problem-solving
- \_\_\_\_\_ other

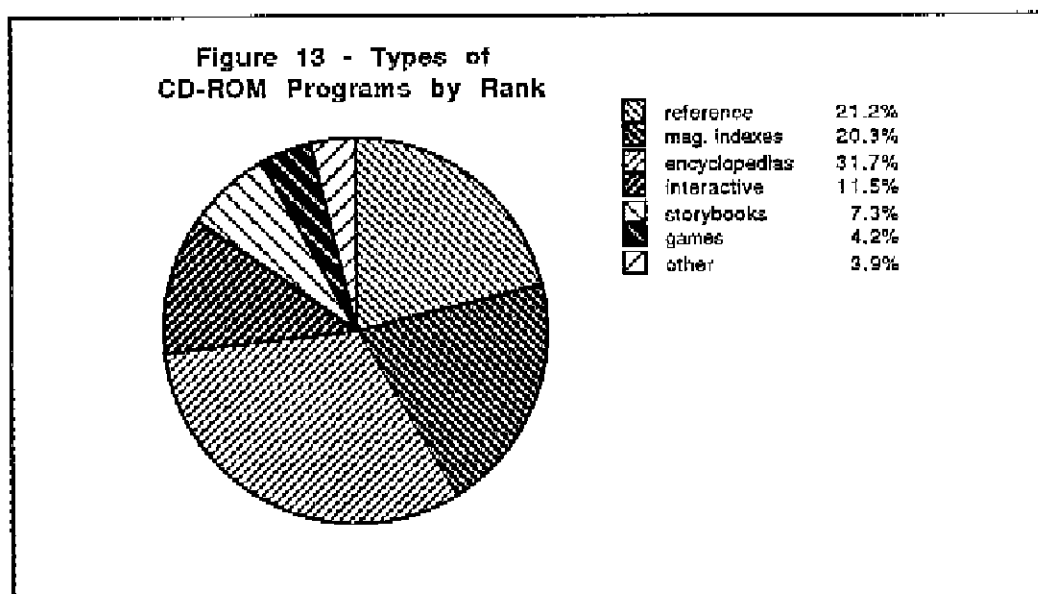
As in Question #16, not all respondents chose to rank their choices; some marked one or two categories while others marked several. For this reason, the data was again tabulated both by the number of total responses marked and by rank. The results, when calculated by either method, were very similar. Figure 12 shows the total number of responses marked for each category.





There was some variation in how the terminology used for the categories was interpreted; for example, what some called "interactive learning programs", others called "games". The same was true for "magazine indexes" and "reference databases". Encyclopedias, reference databases, and magazine indexes were the most commonly used types, as shown in the graph below. Many respondents indicated that they do not use CD-ROM games in the library media center. High school libraries were most likely to use reference databases and magazine indexes, while elementary schools were most likely to use storybooks and literature-based programs. Almost all schools used CD-ROM encyclopedias; those that did not were either high schools that used only reference databases and magazine indexes, or schools that used CD-ROM for other purposes such as cataloging.

When the ranked choices were assigned point values as in Question #16, the results were virtually the same as those based on the total number of responses, as shown in Figure 12. Encyclopedias were again the top choice, followed by reference databases and magazine/journal indexes. Figure 13 shows the distribution of use across the categories according to ranked scores.



Many respondents wrote in specific CD-ROM titles for categories they marked for this question; some titles could be found listed under different categories by different users, such as SIRS, which was listed under "reference" by 18 respondents and under "magazine index" by 4 others. Forty-two different programs were listed as "reference databases"; the most common were SIRS, Discovering Authors, Newsbank, SIRS Government Reporter, and Microsoft Bookshelf. The magazine/journal indexes mentioned most frequently were InfoTrak, Readers' Guide Abstracts, EBSCO's Magazine Article Summaries and Middle Search, and Newsbank. In the area of encyclopedias, The Grolier Multimedia Encyclopedia was the most commonly mentioned, followed by World Book's Information Finder, Encarta, and Compton's Multimedia Encyclopedia. Twenty-five interactive learning programs and nine games were named, with some titles found on both lists; Carmen San Diego was the only program mentioned more than twice (although specific versions were not specified); Oregon Trail, Mammals, Amazon Trail, and Thinkin' Things were each mentioned two times. Broderbund's Living Books series was the most popular in the "storybook" category; Big Anthony's Mixed-Up Magic, Scholastic's Wiggleworks, and Discs Books were each named once. Eighteen programs were each mentioned once in the category of "other"; some were not CD-ROM products, and some had been mentioned in other categories. Included were the Accelerated Reading Program, Art Gallery, and Alliance Plus cataloging.

**18. Name one problem you have encountered in using CD-ROM technology.**

Not everyone wrote an answer to this question; some wrote positive statements about problems solved. The problem most often mentioned involved printing or selecting text to be printed; the process was found to be different from program to program, and directions were often inadequate. Not having enough time to master programs was mentioned by five

respondents, and five mentioned difficulties with installing and using programs. Another problem commonly mentioned was not having enough memory or RAM to run programs; hardware was found to be outdated or slow. A few mentioned malfunctioning hardware or software. Eight respondents reported not having enough stations, while others found lack of funds to be the main problem. Three answered that not being networked was a problem, and four found that switching discs on stand-alone computers was time-consuming. Seven reported that network management was complicated, especially regarding changing networked discs. Student "hackers" who moved files around were a problem for three respondents, and students who print large quantities of information from CD-ROM and won't use print sources or write down information were mentioned six times. Stolen CD-ROM discs were a problem in two schools, and keeping track of software. Adults and students who do not know how to use CD-ROM, or those who don't handle discs responsibly were a problem for some. Three respondents found that it was hard to keep up with the rapid changes in technology.

### **Comments**

Twenty-five respondents wrote comments describing aspects of their use of CD-ROM in the library media center. Some wrote that they were just starting out with CD-ROM; a few wrote about further problems or concerns. Many gave details about their library programs, equipment, and future plans concerning CD-ROM. Most of the comments were positive statements about using CD-ROM in the library that gave insight into the way library media specialists regarded CD-ROM use.

## CHAPTER 6

### Conclusions

#### Overview of Survey Results

The results of the survey indicate that CD-ROM use is widespread in school library media centers. As expected, the library media specialists surveyed are at varying stages of technological development; more are using stand-alone CD-ROM stations than networks, but many expressed wishes or described plans for upgrading or adding to their CD-ROM technology. Media specialists were found to be highly involved in all aspect of CD-ROM use: training and/or instruction of CD-ROM users, ordering CD-ROM products, supervising CD-ROM stations, handling discs, and working with teachers in choosing and using CD-ROM programs for educational purposes. Some media specialists described themselves as "beginners" or credited other staff members for helping them implement CD-ROM technology; many were affected by budget constraints, unable to afford new equipment or expensive programs. Most library media specialists were found to be enthusiastic about CD-ROM technology and its benefits in the library setting; for example, the respondent who commented, "The library at this point has the position of modeling the use of this technology. Teachers are beginning to use it and are getting excited about it."

Students were found to be motivated and knowledgeable users of CD-ROM technology in library media centers; the most common use of CD-ROM technology indicated by the survey results was use by students for research projects. Students were found to use CD-ROM stations independently in most library media centers, and were also found to be involved in CD-ROM training, supervision of others using CD-ROM, and handling of CD-ROM discs. On the down side, students were found by some survey respondents to be too dependent on CD-ROM for research purposes or too knowledgeable about computers when they became "hackers". On the whole, CD-ROM technology can be

said to be a motivational factor in getting students interested in research and technology.

Teachers and staff were generally found to be users of CD-ROM technology in most library media centers; they were involved to varying extents in using CD-ROM for instructional purposes, especially to supplement curriculum areas. Many survey respondents reported that teachers participate in CD-ROM training (72.1%), supervision of students using CD-ROM stations (44.6%), and handling or changing CD-ROM discs (25.6%). The fact that two-thirds of the survey respondents reported that teachers are involved in selecting and evaluating CD-ROM products for the library media center indicates that teachers are willing to use CD-ROM products and are knowledgeable about different programs that can enhance teaching in their respective subject areas. Respondents commented that some teachers are more knowledgeable than others in the area of technology, and that some do not wish to use technology or participate in selection. This is probably true in most schools; as CD-ROM technology becomes more common in school libraries and classrooms, more teachers who have not previously used CD-ROMs will be exposed to them and eventually learn to use them in the educational setting.

### Demographics

CD-ROM technology was found in most public schools in Cape May County (85.2% of those answering the survey), but was more common in high schools than in elementary schools. This parallels the results for the state of New Jersey, including Cape May County and elsewhere; based on the sample provided by the survey, CD-ROM use is common in school library media centers throughout New Jersey. It was hoped that Special Services school districts in New Jersey would also show a high rate of CD-ROM use, but these results were inconclusive, since half of these districts did not participate in survey, and two out of four who responded did not use CD-ROM technology in the library media center. The use of CD-ROM technology with special education students is perhaps a

subject that should be further explored, as it has been found successful by this author and in the literature discussed earlier.

Surveys sent by electronic mail represented a broad range of schools across the U.S., with two from other countries; these schools varied widely in size, geographic location, and technological capabilities, but they showed many similarities with each other in their answers and comments, and echoed many of the same feelings and opinions as the author. No major differences were found in comparing CD-ROM use patterns shown in these surveys with those from New Jersey respondents. More than half of the e-mail respondents worked with high school students, perhaps indicating that CD-ROM is utilized more in high schools than in other grade levels, or maybe just showing that high school librarians are likely to be active participants in listservs such as LM\_NET.

School size was not found to be a limiting factor in CD-ROM use, although schools with student populations of 500 or less were found less likely to be networked than larger schools. Grade levels served by schools definitely influenced the type of programs that were used; high schools (grades 9-12) used primarily reference databases, magazine indexes, and encyclopedias, while elementary schools were the primary users of CD-ROM storybooks. Encyclopedias were shown to be the most commonly used type of program across all grade levels; games and interactive programs were less common, but were also used at all levels. Several respondents commented that they do not use CD-ROM games in the library media center; some CD-ROM programs were considered to be interactive programs by some and games by others.

CD-ROM technology can be used for many purposes, but as shown by the survey, the most common uses were student research, supplementing curriculum, and free-time activities. The use of CD-ROM for direct instruction by either librarian or teacher was shown to be less common, perhaps because few CD-ROM programs provide sufficient supporting materials for this purpose or because of the limitations in group size when using

CD-ROM technology. Many respondents indicated that CD-ROM technology was relatively new in their schools; therefore, librarians and staff members might not have the expertise or access needed to use CD-ROM as a tool for direct instruction. There was no distinct pattern of use shown across different grade levels in schools surveyed for any of the given categories; students of all ages were found to use CD-ROM for research and free-time activities.

### Closing Remarks

As this study comes to an end, there are certain implications and conclusions that can be made. In hindsight, there are elements of the survey that might have been changed or clarified to make it more valid, such as certain terminology that may have caused confusion for respondents. It probably could have been simplified or shortened in order to make it easier for the many librarians who took the time to answer. But as the survey results stand, they draw a clear picture of the involvement of library media specialists in utilizing CD-ROM technology and helping others to gain access to it. The people who answered the survey were helpful, informative, and generally enthusiastic; their attitudes toward school libraries and technology were overwhelmingly positive. The number of respondents was much higher than initially expected, and the author would like to thank all those who participated and offered encouragement in their comments.

Based on the survey results, CD-ROM technology can be expected to remain in use in school libraries for a long time to come. The selection of CD-ROM products available for schools is always increasing, and so is the quality of programs that can be used as teaching tools. As school library media centers develop their CD-ROM collections, more will probably begin circulating their CD-ROM discs, at least within the school setting. One of the biggest challenges for all involved in the schools will be keeping up with the changes and new developments in the technology. Perhaps on-line technology will

overtake CD-ROM in popularity, or maybe a new technology will take its place in the schools, but CD-ROM is currently a popular learning tool in school libraries and will likely stay that way.



## APPENDIX A: SURVEY FORM

Survey: How is CD-ROM Technology Used in K-12 School Library Media Centers?

School Library Name \_\_\_\_\_

Librarian(s) \_\_\_\_\_

School District \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Phone \_\_\_\_\_

Please answer the questions below by circling or marking answers. Mark as many answers as necessary when given multiple choices. Feel free to write in answers or comments.

1. Grade levels served by your library media center:

Pre-K K 1 2 3 4 5 6 7 8 9 10 11 12 Other \_\_\_\_\_

2. Approximate number of students served by your library media center:

0-500 501-1,000 1,001-3,000 Other \_\_\_\_\_

3. Do you use CD-ROM technology in your library media center? yes no

(If "no", please stop here. Thanks for responding and returning the survey!)

4. What format do you use? IBM-PC Macintosh MPC Other \_\_\_\_\_

5. What type of CD-ROM drive(s) do you use? single drive(s) multiple drive(s)

6. Are your CD-ROM drives networked? yes no

If "yes", can the network be accessed outside the library? yes no

7. Can CD-ROMs be borrowed or checked out? yes no

8. Do students use CD-ROM stations independently? yes no

9. What is the average group size that can use one CD-ROM station? \_\_\_\_\_

10. Do you use any type of projection system, such as an LCD panel or video projector?

yes no If yes, what type? \_\_\_\_\_

11. As librarian, are you responsible for training any of the following groups in the use of CD-ROM technology?

library staff teachers/staff students other \_\_\_\_\_

12. Do you order the CD-ROM products used in the library? yes no

If yes, what selection tools do you use? \_\_\_\_\_

13. Do teachers participate in selection and evaluation?                      yes                      no
14. Who is responsible for supervising students using CD-ROM stations?  
       librarian                      other library staff                      teacher                      other \_\_\_\_\_
15. Who is responsible for handling or changing the CD-ROM discs?  
       Library staff                      teacher                      students                      other \_\_\_\_\_
16. CD-ROMs are most used for: (please number uses below by rank)  
       \_\_\_\_\_ direct instruction by librarian                      \_\_\_\_\_ direct instruction by teacher  
       \_\_\_\_\_ student research projects                      \_\_\_\_\_ staff/professional reference  
       \_\_\_\_\_ supplementing curriculum                      \_\_\_\_\_ free-time student activities  
       \_\_\_\_\_ other \_\_\_\_\_
17. What types of CD-ROM programs are used most often in your library? (please number types below by rank and give examples of programs used if possible)  
       \_\_\_\_\_ reference databases (SIRS, ERIC, \_\_\_\_\_)  
       \_\_\_\_\_ magazine/journal indexes \_\_\_\_\_  
       \_\_\_\_\_ encyclopedias \_\_\_\_\_  
       \_\_\_\_\_ interactive learning programs \_\_\_\_\_  
       \_\_\_\_\_ storybooks/literature-based \_\_\_\_\_  
       \_\_\_\_\_ games/problem-solving \_\_\_\_\_  
       \_\_\_\_\_ other \_\_\_\_\_
18. Name one problem you have encountered in using CD-ROM technology.  
       \_\_\_\_\_  
       \_\_\_\_\_

Thank you for participating in this survey. Please use this space for comments or attach any pertinent information you are willing to share!

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## APPENDIX B: CD-ROM PROGRAMS CITED

Advantage Learning Systems, Inc. (Producer). (1994). Accelerated Reading Program

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Amy Jo Hufana is an Educational Media Specialist at Cape May County Special Services School District in Cape May Court House, N.J., working with middle school and high school special education students in the Special Services Library (also known as the James J. Coulter Media Center). She works with CD-ROM resources and computers in the library, along with teaching classes and performing other library duties. Ms. Hufana has been employed by the district for thirteen years, first as Teacher of the Handicapped for six years and then as Media Specialist. She currently resides in North Cape May, New Jersey with her husband and son.