Electronic databases and electronic storybooks in K-12 schools

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Electronic databases and electronic storybooks in K-12 schools

Abstract
This literature review describes and analyzes the use of CD-ROM in K-12 schools in particular areas. One area of interest was in how the CD-ROM storybooks foster learning, especially in the area of language arts. Data was gathered through journal articles and case studies. The literature is divided into three categories. 1. Advantages and disadvantages of CD-ROM in the K-12 setting. 2. Results of a survey of secondary media specialists, who used CD-ROM for reference, in Maine and Pennsylvania. 3. Several case studies involving the CDROM storybooks in language arts. The data revealed that library media specialists have an excellent opportunity to be of great value to their schools and community by adopting CD-ROM technology and implementing its use into the curriculum.
Electronic Databases
And
Electronic Storybooks
In K-12 Schools

A Graduate Review
Submitted to the
Division of Educational Technology
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Master of Arts in Education

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by
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Abstract

This literature review describes and analyzes the use of CD-ROM in K-12 schools in particular areas. One area of interest was in how the CD-ROM storybooks foster learning, especially in the area of language arts. Data was gathered through journal articles and case studies. The literature is divided into three categories. 1. Advantages and disadvantages of CD-ROM in the K-12 setting. 2. Results of a survey of secondary media specialists, who used CD-ROM for reference, in Maine and Pennsylvania. 3. Several case studies involving the CD-ROM storybooks in language arts. The data revealed that library media specialists have an excellent opportunity to be of great value to their schools and community by adopting CD-ROM technology and implementing its use into the curriculum.
Introduction

One of the many challenges to school library media specialists in the 90's is to provide adequate technology to students and staff. Compact Disc Read Only Memory (CD-ROM) technology is steadily appearing in school library media centers. CD-ROM strikes fear into the hearts of many (library-media specialists included). How will I ever learn to use it, what impact will it have on books? Are CD-ROMs nothing more than an expensive alternative to film projectors? Should the school library media center invest in CD-ROM technology, or is this another computer innovation being introduced into the school system?

History

CD-ROM, first announced in 1983, became commercially available in 1985 with the appearance of a cataloging resource called Biblio File. It entered the school market with the introduction of Grolier's Electronic Encyclopedia, which was announced in 1986 and became available along with Microsoft Bookshelf in 1987 (Berger, 1992).

It's capacity for storage is impressive: 600 megabytes of data that's 300,000 pages, one million catalog cards, one hour of sound or 15,000 graphic images (Berger, 1992). Students can search ten years of a magazine index at once, without being charged the price of on-line charges.

Research Issues

This review is divided into three parts. 1.) the advantages and disadvantages of using CD-ROM technology; how CD-ROMs are being used in
the secondary school library media centers for reference; and finally, the impact
CD-ROM storybooks will have on reading at the elementary level.

Review of Literature

Advantages of CD-ROM

The advantages of CD-ROM database use in schools are many (Powers, 1995). The primary advantage of CD-ROM databases is that they may be accessed easily by all levels of students. Adults and students alike need some instruction to begin using a CD-ROM but search software has become fairly user friendly. Most software allows the student to search a database using either keywords or Boolean logic (Powers, 1995). The latter method uses Boolean operators (or, and, and not) to enlarge or reduce the parameters of the search.

Using keywords a student may request information on, for instance, reading and retrieve many citations. With the use of Boolean operators, a student may search for example reading and whole language. The search can be further narrowed by specifying a time period. The operator or includes all the information on both areas of the connectors by it.

Another positive result of the ease of searching is that the student has more time to analyze the data retrieved (Powers, 1995). No longer must a student spend so much time following a paper trail that when he/she finally locates the material the student is no longer interested.

Schultz and Saloman (1990) reported that 83 percent of the students in a recent study at Central Michigan Library were pleased with CD-ROM databases because they felt it saved them time during there searches. Users also save time by
printing search results instead of copying citations from a printed index. CD-ROM makes it easier to create bibliographies on specific topics.

Advanced students need more sophisticated search techniques as the information they have to review increases, and issues become more complex. Advanced students may use Boolean logic to construct a very specific and in depth search (Mendrinos, 1990a).

Reluctant learners, who may find the task of searching print volumes and copying citations accurately a difficult task, find browsing through a CD-ROM databases for information and printing out a citation much more rewarding. Success brings about confidence; remedial students in one school were found to carry their searches farther (McIntyre, 1990).

The usefulness of CD-ROM technology cuts across all curriculum areas. Easy access to retrospective and current indexes of periodicals and newspapers will enhance an area of study (Jones & McKinney 1992). With many databases going to full text or supported by microfiche, a smaller school library can have access to many resources, allowing access to many other points of view that it might not otherwise.

With CD-ROM databases, teachers say a greater variety of sources are being used and those sources are more current (Waddle, 1989). CD-ROM database allows students access to materials they would not commonly find in most high school libraries. Often in searching electronically, the student is able to view an abstract of an article and is therefore able to make a decision before hunting the article.
The use of the CD-ROM database requires students to develop a number of skills, two of which are typing and spelling because they must use proper spelling, grammar and typing in order to find the correct information (Davis, 1991). Problem solving skills must also be developed in order to assemble, edit, refine or change material while locating data.

Electronic information sources foster cooperative learning on many levels: student to student; professional to professional; and student to professional (Bankhead, 1991).

Disadvantages of CD-ROM

The downside of the CD-ROM technology is cost. It is clear that the conventional library budget of the past is not adequate to support technology. There is no room in the "book or equipment budget" (Baumbach, 1990). Unlike storing journals or books, a large initial investment is required to purchase hardware, furniture, electrical connections, and software to set up the CD-ROM station. The first step is to define the scope of the school. Does CD-ROM fit the information needs of a specific setting? Perhaps printed materials or available online services are adequate (Bankhead, 1991).

Using the online mode of a local computer is connected to a remote database via modem, a telephone and the appropriate telecommunications software. Basically a person dials to a database and searches his/her topic using Boolean logic (Powers, 1995). While the initial costs for on-line searching are less
than for CD-ROM, the modem, the software, and the dedicated phone line, the cost per minute of use can be quite expensive.

Access to online services may make sense for databases that are rarely searched, but for more commonly used databases CD-ROM provides a cost effective option. In terms of being able to foresee the school library budget CD-ROM is much easier to identify. It is a fixed cost. Online costs, which can be open-ended must be estimated (Barlow, Karnes, & Marchiocini 1987). "Time is money" makes online searching much less comfortable for students and staff. Browsing is out of the question.

CD-ROMs are known for saving space for storing information—workstations take up space. Media specialists must consider not only the security of the workstations where they place them but also their accessibility to patrons and to the media center staff. Because of the limited number of workstations and the high demand for CD-ROM searching, patrons could become frustrated with the limited amount of resources (Brewer, Baumbach, & Bird 1992). Based on this, many media centers recommend that students sign up for a specific time; others may limit the amount of time spent on one search.

Networking systems are available for CD-ROMs. They are expensive. Hardware and software CD vendors acknowledge that networkability can be a problem. Some of the networks currently in use in schools are simply too primitive to accommodate CD software; in other cases, access is limited and deliverability can be as slow as molasses (Flanders, 1990).
Training staff requires time and organization. If the staff have some computer and online searching skills, the training need not be quite so intensive. Hands on practice seems to provide the most benefit (Reese, 1990). Sitting down and performing many searches provides a good feel for the software. The trainer may even make some of the same mistakes as a new user might which can prepare you for similar kinds of situations later.

When media specialists learn online searching, there are classes, workshops, or seminars—not so for CD-ROM products. Basically each media center ends up organizing training for staff members.

Students, staff, and faculty come in all sizes and shapes and computer skills. A staff developer must keep this in mind when instructing. Some type of organized classroom instruction is necessary. If the faculty does not understand CD-ROM database searching they will not incorporate its use into the curriculum (Reese, 1990).

There is a lack of standardized software. For a user to change from one database to another frequently requires changing the search software program as well as the database. When search screens and commands vary from software to software confusion sets in (Byrd, 1992).

Since all of this training will take time, how much time can a media specialist spend away from other duties of providing adequate resources, providing access to the library media center, guiding users in the selection of appropriate materials and developing policies?
If the media specialist is using CD-ROM for reference, another problem may be, particularly in a small media center, that a student may find a large number of appropriate citations to periodicals, but find many unavailable. This problem may be solved either by interlibrary loan, which may take time or back-up text microfiche (Katz, 1992).

Generally speaking, if a student is working on a historical treatment of a subject, CD-ROM will not provide enough of a long view; it will be necessary to use the print versions of indexes for citations before the 1970's (Baumbach, 1990).

Microfiche back-up in full text is available on CD-ROM (Byrd, 1992). This totally solves the problem of availability (to say nothing of storage). The media specialist must weigh the cost of full text against the cost of periodical subscription which may be discontinued; the savings in search time against the need for multiple CD-ROM stations.

Another potential disadvantage of using CD-ROM database is the currency and accuracy of the information. Printed databases are updated monthly; online databases, more frequently than that. However, CD-ROM databases are updated on average every three months (Baumbach, Bird, & Brewer 1993).

Survey of Secondary Media Specialists

The use of CD-ROM technology as a reference tool in the secondary media center presents another possible method of locating information (Mendrinos, 1990b).

A descriptive survey questionnaire was sent to library media specialists in selected secondary school library media centers in Maine and Pennsylvania.
These two states were chosen for this study because each state provides grants for implementing CD-ROM technology for retrospective conversion of secondary card catalogs.

Usable responses were received from 379 library media specialists or 79% of the population sample. Two groups were identified in the survey.

Group one consisted of library media specialists who used CD-ROM technology for references purposes, while group two consisted of library media specialists who did not use CD-ROM technology for reference purposes but who use it primarily for retrospective conversion.

According to Mendrinos (1990b) 80% of the secondary school library media specialists in the study were using CD-ROM for reference. Three quarters of this group plan to acquire more CD-ROM workstations.

Twenty percent of the library media specialists who did not use CD-ROM for reference said funding was the main obstacle. The majority of library media specialists who did not use CD-ROM for reference believed that it costs too much in relation to the total budget. The secondary school library media centers that used CD-ROM for reference had larger budgets than those not using CD-ROM for reference services.

Only 4.5% of the library media centers in this study were networking their CD-ROM workstations. There is a growing interest in networking as more become networkable and are utilized by students. The main problems cited were the slower response time on a network, the need for more networkable software (Mendrinos, 1990b).
There was a significant difference between the library's current budget for reference material and its use or nonuse of CD-ROM for reference. Eighty-four percent of the library media specialists who did not use CD-ROM for reference had a budget of less than $5,000. As the budget increased, CD-ROM use for reference seemed to increase.

There was a difference between library media specialists who used CD-ROM for reference and those who did not. Those who had positive attitudes towards CD-ROM reported that when given a choice of a variety of formats their patrons preferred to use CD-ROM products (Mendrinos, 1990b).

According to Mendrinos (1990b) 98% of the library media specialists who used CD-ROM for reference offered training. Through point-of-need or one-on-one instruction was offered by 98%, some 78% also offer formal classroom instruction to students. This formal instruction appears to lead to increased use of CD-ROM database.

The top two curricular areas in terms of using CD-ROM for reference use were English and social studies.

CD-ROM is a preferred and popular information technology for reference use in the secondary library media centers (Mendrinos, 1990b).

**Electronic Storybooks**

While names like Compton's Multimedia Encyclopedia or Grolier's Electronic Encyclopedia have become familiar words in the elementary school library media center. A recent development on the elementary scene is the CD-ROM storybook Many elementary school library media specialists are wondering
what impact these electronic storybooks will have on media centers. How are these products different from being electronic page turners (Truett, 1993)? What about the conventional book?

The basic limitations of conventional books include:

- difficult to reproduce
- expensive to disseminate
- difficult to update
- single copies cannot be easily shared
- bulky to transport
- easily damaged and vandalized
- embedded material is unreactive and static
- cannot utilize sound
- cannot utilize animation or moving pictures
- unable to monitor reader's activity
- cannot assess reader's understanding
- unable to adapt material effectively (Barker & Manji 1988).

Electronic storybooks take advantage of the interactive and multimedia capabilities of the computer/CD-ROM technology. These electronic books are targeted to children K-sixth grade. Books are directed toward both first and second language learning and the teaching of themes and whole language learning (Discis Knowledge Research, 1990).
These electronic storybooks are distributed on CD-ROM and read using a computer with a CD-ROM drive. The use of a mouse makes reading easy even for those unfamiliar with computers (Discis Knowledge Research, 1990).

All of the programs have several features in common (Parham, 1993). Stories are arranged like a picture book that allows the reader to turn pages as needed. All stories are illustrated, some with the text within the illustrations and others with the text and drawing on facing pages. Readers can choose to read the text on their own or activate a voice option that reads the text aloud. In most programs the text is highlighted as it is being read, allowing the listener to coordinate the processing of visual and auditory information (Parham, 1993).

But beyond this basic format there is a wide variety of features to enhance the reading/listening experience. The quality of narration is an important feature for children. Although all of the programs use clear natural voices, some narrations are more appealing than others. Children who tried these programs particularly enjoyed the voices that were animated and lifelike (Parham, 1993).

Most programs provide an option to read the story without a narrator, or to read only selected text. This gives children the opportunity to read the story on their own (Barker, 1992).

Almost all of the programs have a mechanism that highlights the text as it is being read, this helps the reader follow the text. The best set up lets the users choose to have words, phrases, or paragraphs highlighted (Barker, 1992).
As in any storybook, the illustrations are an important part of the reading experience. Many books on CD-ROM have chosen to duplicate the original printed material (Parham, 1993).

A number of programs enhance their illustrations by including animation buttons and hotspots, features that add a dimension to reading that cannot be manufactured by printed material (Truett, 1993).

Animation is used both as an instructional tool and as entertainment. Many times clicking on hotspots causes things to happen. Characters may play games or doors open, which can add to the context for better understanding of the text (Barker, 1992).

Hotspots (actually invisible buttons, hidden behind the illustrations) are areas on the screen that reveal information when clicked by a mouse, a feature that encourages children to explore the illustrations (Parham 1993).

Some programs have pop-up dictionaries, which allow the reader to look up highlighted words. This is useful when students encounter words they are not yet familiar with (Parham, 1993).

Some programs have a "goto" option which allows the user to go to a specific page. Another solution is an electronic bookmark, which saves the user's place and later allows them to re-enter the story where you left off (Parham, 1993).

While most of the programs can be used in the classroom without additional curricular materials, several companies have made major efforts to help teachers use these programs effectively, and in fact some are targeted for school use rather than home (Truett, 1993).
In programs, such as IBM's *Stories and More* and Computer Curriculum Corporation's *Bravo Books*, that provide on-screen writing opportunities for children, there is usually an option to have their writing read aloud. These programs use synthesized speech which is not as good as the digitized speech used in the main program (Parham, 1993).

For the most part, CD-ROM storybook software is easy to use (Parham, 1993). Many programs state that a minimum amount of RAM is necessary. Some require installation of files on a hard drive, and a number of MS-DOS-based programs require *Microsoft Windows*. A mouse is essential. Color monitors are recommended, but not absolutely necessary. Slower CD-ROM drives will slow down the speed of page turning and loading of new illustrations, but beyond that any drive that is compatible with your computer should do (Parham, 1993).

*Discis Knowledge Research Inc.* (1990) has introduced computer based "books" that encourage learning, promote improved understanding.

In order to find out if these claims were valid, this researcher was able to locate a few case studies involving the primary grades and electronic books. Research on the effects of CD-ROM based story books is virtually non-existent.

The first study by *DeJean* (1995) describes and analyzes the use of CD-ROM talking books in a third grade classroom over a four month period. One area of interest was how the teacher used the storybooks in day-to-day efforts to foster learning, especially in the area of language arts. Data was gathered through observation, the use of a video camera, and formal interviews. Data was gathered throughout the fall term of 1994 and into the winter of 1995.
The teacher was given two computers and approximately 45 CD-ROM storybooks to use at her discretion. Most of the books were produced by two companies, Broderbund Living Books and Discis Knowledge Research. While they are both similar in format the teacher described the Broderbund Living Books as being more simplistic in vocabulary than the Discis. The Discis storybooks were more challenging to the weaker readers due to a higher instance of difficult vocabulary and larger amounts of printed words on a page (DeJean, 1995). It was observed that the children tended to see them more as entertainment rather than as a tool for learning, especially in the case of the Living Books. This is not to say that the value of reading as not enjoyable.

In this case study by De Jean (1995) the CD-ROM narrative and non-narrative books fit into the normal curriculum of this particular teacher. Books were a crucial element in her overall curriculum, and the CD-ROM books were treated as equal partners to the existing hard covered books. An immense amount of planning, monitoring, and explaining is required for full implementation and use.

This study by DeJean (1995) represents the beginning of a three year investigation into the teachers' use multimedia, especially CD-ROM talking books in the primary classroom. This study shows not only the potential of technology but also the reality of practice.

In another study (Standish, 1992) investigated the use of CD-ROM based books to improve reading comprehension as a supplement to the regular reading program in a second grade classroom.
Variables that affected this study were the delay in the arrival of the Macintosh computers by a month and the two months that were required for the Physiological Corporation to resolve and finally ship the MAT6 (Metropolitan Achievement Tests) needed for the pre and post testing. These delays shortened the time of the study to the month of May. Of course during May many end of the year events occurred so less instructional time was available.

In order to evaluate the achievements made by students using the CD-ROM books as a supplement to their regular basal reading program, pre and post reading comprehension achievement tests were given to each student in the control and treatment classes. The pretest was given prior to the introduction of the CD-ROM books (Standish, 1992).

During the treatment phase of the study, each child in the treatment class received at least 15 minutes on the computer using Discis Books at least 3 days a week. The children in the control group did not have access to the CD-ROM based books. However they did have use of the computer in their classroom for normal drill and practice lessons.

The children worked in pairs reading the story silently. Words and pictures were investigated as needed. The children kept a record of the new words and meanings. The vocabulary investigated was available on screen through a pull down menu if not recorded immediately. Meanings of new vocabulary had to be written by the children. The children had to remember the definition and how the word was used in a sentence and then write an original definition.
The treatment group contained more children placed on a lower reading level than the control group. This group also contained four children with behavioral problems who were on behavioral modification programs. These behavioral problems could have affected the outcome of this research and the rate of learning of the students in the classroom.

It was expected that this study by Standish (1992) would prove that the reading achievement of the treatment second grade class was statistically significant as compared to the control second grade class. However this was not the case. No significant difference was found in reading achieved between the experimental and control group. Further research should be conducted in this area. A period of a year might show significant results. The limited time for this study was inadequate.

In another case study (Balajthy, 1994) a kindergarten teacher, two preservice teachers, and a college consultant on educational computer technology designed and developed a 10 day whole language integrated unit on the theme of Beatrix Potter's Benjamin Bunny. This project was designed as a demonstration of the potential for integrating the CD-ROM-based version of Benjamin Bunny. During the unit, children read, reread, summarized, and illustrated the story, generated big books and mini books retelling the story. The children also had a social studies /science lesson on cotton and the science project involved the planting of seeds. Minilessons on word identification and reinforcing letter sounds were incorporated into the unit.
At the conclusion of the project it showed that both students and teachers enjoyed and learned much from the Benjamin Bunny unit. Even after the unit concluded, the children remembered the CD-ROM story program and the big books with enthusiasm.

Although Balajthy (1994) stated that the storybook was helpful in the classroom context, he did not describe exactly how the features were used and how they contributed to a more fulfilling unit. Balajthy (1994) states that such technology has a "place" in the classroom, he did not indicate exactly what that place is for the CD-ROM storybook.

Rickman & Reinking (1990) investigated the effect of displaying texts on a computer screen that provided the meaning of difficult words by intermediate grade readers' vocabulary learning and comprehension.

Sixty sixth-graders read two passages containing several target words that had been identified as difficult. They were assigned to one of four treatment conditions. In two of the conditions they read the passage on printed pages accompanied by either a dictionary or a glossary of the target words. In the remaining two they read the passages on a computer screen that provided optional or mandatory assistance with the meanings of the target words.

The results indicated that the students who read the passages on a computer screen with computer assistance scored higher on a vocabulary test that measured the students knowledge of the target words. Students who read the passages on computer screen with mandatory assistance also scored higher on a test that measured comprehension. Students free to select which of the target
words they would investigate chose to do so more often when the computer
provided assistance. The findings of this study (Rickman & Reinking, 1990)
support the belief that computer technology will lead to important new options for
enhancing learning during reading. Electronic storybooks have that potential.

Research on CD-ROM storybooks is limited. There has been a small
amount of field testing conducted. Discis Knowledge Research (1990) describes
how, an elementary teacher incorporated Benjamin Bunny into her second and
third grade curriculum. The teacher stated that the books were especially effective
with her students with weaker reading skills and they were motivated and
stimulated to read. Also she noted that her students became more independent
readers because they didn't have to rely on the teacher for necessary assistance.

There is a temptation to take a traditionalist approach to electronic books,
faulting them on several accounts: They seem to keep children plugged into a
computer monitor and to suggest that the printed word is less interactive and
inviting than the electronic word. They leave less to the child's imagination. On
the other hand the rich and innovative nature of some programs demonstrates the
potential for CD-ROM storybooks is almost limitless.
Conclusion

For the child just beginning to read, books using CD-ROM offer a whole new set of tools for exploring the connection between the sound of the words and their graphic representations (Parham, 1993). The computer can, with the click of a mouse, spew out those endless repeated words, and phrases that children find so necessary when learning to read. The computer is also non-judgmental. It doesn't count the repetitions or record the errors. With text, sound, pictures, and video, it hits all the learning modes; and the interactively helps students to learn in-depth (McCarthy, 1993).

CD-ROM is a preferred and popular information technology for reference in secondary school library media centers. Online searching and the printed index still have their place in the reference department. Once students experience the ease of using a CD-ROM the line up at the station can be very rewarding.

The bottom line for any school library today is of course, cost. Can the outlay be justified in terms of results? The literature suggests it can.

First one must find a way to finance a CD-ROM station and software—whether through grant money, Parent Teacher Organization, gift or through a fundraising event. Training for faculty, administration, and students needs to increase for the CD-ROM technology to be effectively and efficiently used.
As Daniels (1990) notes "one of the newest technologies in library media centers shares a key concept with one of the oldest-CD-ROMs and books are both read-only systems." (p.3)

The technological future for libraries is changing constantly. Library media education programs have the responsibility to become more involved in teaching not only the mechanics of CD-ROM technology but also effective ways in which to integrate it into the school's curriculum (Mendrinos, 1990b). What lies ahead is exciting and will test our imagination, creativity, and inventiveness.
References


