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library collections surveyed need new and updated materials. The outdated
collections are unable to support curricular goals or student needs.
Appendices include the data collection form and inventories showing total
items in each Dewey category for each school. (Contains 15 references.)
(Author/MES)

An Investigation of Five Middle School Library
Collections in the Areas of Science and Technology

A Master's Research Paper submitted to the
Kent State University School of Library
and Information Science
in partial fulfillment of the requirements
for the degree Master of Library Science

by

Beth E. Titer

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Abstract

The mean and median age of science and technology materials in the five middle school library collections located in Springfield (Ohio) City School district were calculated. The percentage of books 10 years old or older were calculated. Science and technology were chosen due to the rapid amount of change in these areas. Three broad Dewey categories in the 300s, 500s, 600s and three narrower areas of astronomy, space, and the solar system; general biology and ecology; and human anatomy, physiology, and hygiene were investigated. The mean age of books ranged from 13.5 years to 34.9 years; the median age ranged from 10 years to 32 years old. The percentage of books 10 years old or older at each of the individual middle schools ranged from 45.8% to 87%. The findings reveal that the middle school library collections surveyed need new and updated materials. The outdated collections are unable to support curricular goals or student needs.

Master's Research Paper by

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Introduction

In a time when the buzz words in school libraries are technology and connectivity, school library print collections are deteriorating. The process has been slow and steady. The biennial survey of school library expenditures by *School Library Journal* for 1995-1996 shows book budgets have not increased from the median of $4000.00 reported in the 1993-1994 survey (Miller and Shontz, 1997). Since the first survey of school library expenditures in 1982-83, subsequent surveys have documented the slow erosion of school library collections. The 1982-83 survey revealed the median expenditure for books was $2023.00 (Miller and Moran, 1983); by the 1993-94 survey the median expenditure for books had risen to only $4000.00 (Miller and Shontz, 1995) and have remained constant to the most recent survey in 1995-96. This is an increase of $1977.00 over twelve years or an average of $164.75 per year.

Obviously school library budgets are not keeping pace with inflation; the cost of print materials are increasing while library budgets are remaining constant and losing purchasing power. The impact on library collections means that there are not enough new materials being added to collections to offset materials being removed due to age, condition, or loss. Evaluation of school library collections can provide information on the quality of the collection and illustrate how budget reductions/ freezes have impacted the collection.

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Literature Review

Collection evaluation is defined as "an assessment of the utility and appropriateness of a library's collections to its users or programs" (Mosher, 1984). Doll and Barron (1991) state that the purpose of collection evaluation is "...to determine the quality of the collection." Since Jewett first described the results of his comparison of holdings of notable American library collections to the Smithsonian in order to justify the library budget (Mosher, 1984) there has been collection evaluation.

Various methods have been developed to evaluate collections. These methods fall into two broad categories: collection-centered methods and use-centered methods (American Library Association, Resources and Technical Services Division, 1989). Collection-centered methods include checking lists, catalogs, and bibliographies; direct examination of the collection by an individual or team; compilation of comparative statistics which include size, growth rate, expenditures, and overlap with other collections; and application of collection standards. Use-centered methods include circulation studies; in-house use studies; surveys of user opinions; shelf availability studies; analysis of interlibrary loan statistics; simulated use studies which include citation studies and document delivery tests. Many studies conducted in the school library setting tend to be collection-centered, specifically using the compilation of comparative statistics (Loertscher, 1988; Bertland, 1991; Doll and Barron, 1991). Doll (1997) discusses various methods of evaluating school library media collections including size, checking against lists, and age.

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Evaluation, as stated by Van Orden, is "the process of determining worth or value" (Van Orden 1988, 254.) By evaluating the collection the media specialist gathers information regarding the collection and is then in a better position to answer the following questions:

1. Is the collection responsive to changes in the school's program?
2. Does the collection support curricular and instructional needs?
3. Is the collection meeting the needs of users?
4. Does the collection provide access to materials from outside the school?
5. Does the collection include formats preferred by users?
6. Does the collection hinder or facilitate the media program?
(Van Orden, 253-254).

It is not possible to address all of the above questions at once; small parts of the problem can be addressed more easily than the overall problem.

A number of techniques are available to evaluate a collection; each has its own advantages and disadvantages. Checking lists, catalogs, and bibliographies is one method to evaluate a collection. This method compares the library's collection holdings against a specified list. The lists used include standard catalogs, specialized bibliographies, basic subject lists, current lists, reference works, periodicals, lists designed to meet a specific objective, citations in textbooks or curriculum guides, or catalogs from jobbers, publishers, and producers (Van Orden, 256). The nature of the evaluation determines the type of list chosen for comparison. Among the advantages of this type of evaluation are: the wide range of lists available; many lists are selective and include informative annotations; lists of this nature are frequently updated; lists can be compiled to meet the needs of the specific collection; the procedure of searching lists is a comparatively easy way to evaluate a collection; most lists are compiled by competent professional librarians or subject specialists (Van Orden, 257). There are also disadvantages associated with using list checking as an evaluation method including: available lists are the ones already which were used to select

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materials; recommended materials may be out of print; cost of the list itself might outweigh the benefit of its use; not every subject or need can be covered by a single list; bibliographies which cover materials for all ages may have limited usefulness for evaluating a collection established to serve a specific age group; lists are arbitrary compilations and are not necessarily standards of quality; the approach does not give credit to titles in the collection that may be equal to or better than those recommended in the list (Van Orden, 257).

Direct physical examination of the collection on the shelf by an individual or team reveals the size, scope, and depth of a collection. An individual or team examines the materials based upon their age and physical condition to identify items needing repair, removal, discarding or replacement. The direct physical examination method has several advantages: the examination can be accomplished quickly; libraries engaging in or considering cooperative sharing can identify strengths and weaknesses of the collection; review of the collection on a systematic and on-going basis assures that the collection is responsive to the curriculum and user needs; review helps establish criteria for decisions about relegating, repairing, binding, replacing, and discarding materials. Disadvantages of utilizing the direct physical examination are: materials being circulated must be checked upon return; the process is time consuming and requires trained staff; resources accessible through cooperative efforts are not considered (Van Orden, 259).

Compiling statistics is another method of evaluating a collection. Various types of statistics can be collected about:

1. Size: total number of volumes or titles; number of titles in various formats, subjects, or classification.
2. Volumes added within a given period of time: number of volumes by format, subject, or classifications; cataloging statistics; comparison to circulation statistics.
3. Expenditures for materials: by format, classification, or genre; percentage of total budget; amount per user or category of user.

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4. Circulation statistics and use: by format or classification; by categories or users; by imprint date of material; comparison to acquisition statistics by subject or genre; number of reference works removed from the shelves or reference questions answered within a given period.
5. Unfilled requests and filled requests: by format or subject.
6. Interlibrary loan requests: by format, subject, or user.
7. Rate of growth: percentage of increase in total size of collection.
(Van Orden, 260)

One advantage of statistics is the ease of compilation if records have been kept; another advantage is that statistics are easy to understand and compare if the application is clearly defined. Statistics relate directly to the users in the case of requests filled or not filled. Statistics also have the following disadvantages: lack of standard definitions of the content or quality of a unit; difficulty in counting nonprint items and sets of materials; significance may be difficult to interpret; possible inaccuracy or inconsistency in data collection and recording. As well, statistics are usually inapplicable to a library's goals and objectives.

The collection is compared to "quantitative and qualitative recommendations listed in standards, guidelines, or similar publications" when the standards method of evaluation is utilized (Van Orden, 264). The standards or guidelines can come from a state organization, such as a state Department of Education, or from a national organization such as the American Association of School Librarians. Such standards and guidelines have the advantage of being relevant to media-center and school goals and objectives; will generally be widely accepted and considered authoritative; and can be used in persuasive ways to solicit support. Likewise disadvantages of comparing against standards is that the recommendations may be stated so generally that a high degree of professional knowledge and judgment may be needed to interpret the statements;

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knowledgeable people may disagree about the application of the statements; minimum standards may be perceived as sufficient (Van Orden, 265).

For many years the trend was to judge a collection based upon the number of volumes held, and to go strictly by the numbers regardless of the quality of the materials. With *Information Power: Guidelines for School Library Media Programs* (American Association of School Librarians 1988, 72) it was recognized that other factors must also be considered when evaluating the collection.

> Adequacy of the collection's size is best determined through an evaluation of how well the collection and the information services are meeting the needs of the users...An overriding concern must be for the recency of the information contained in the materials. The collection must include works by contemporary authors and producers and meet the interests and needs of today's students (American Association of School Librarians, 72).

The underlying question became not how many volumes makes a good collection but is the collection meeting the needs of users, and is it supporting the curriculum. The age of the collection serves as a basic indicator of whether a collection is able to meet the basic needs of the user and is able to support the curriculum.

During the 1990-91 school year the Birmingham (Alabama) City School system undertook a system wide assessment of their school libraries' collections (Bell, 1992). The purpose of the assessment was to determine the age of materials and whether those materials met curricular needs. After initial accreditation in 1976 by the Southern Association of Colleges and Schools only limited funding had been available to school libraries in the district. Funding levels were only able maintain the initial collections developed during the accreditation period but did not allow the collections to be built and expanded. Collections deteriorated as schools were closed, and collections were shifted and merged.

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In order to conduct a system wide assessment a survey formula was developed to ensure

consistent data collection and reporting. Where currency was of noted importance four areas were

targeted: reference, social science, science, and applied science. Determination of the percentage

of the collection 10 years old or older was one goal of the survey. A minimum sample of 200

books in each of the categories was used to calculate the age. The second part of the assessment

was to determine the amount of circulation of materials by category (Dewey number, fiction,

biography, etc.) and the number of unfilled requests during a two week period that were due to a

lack of available materials. This second part of the assessment was intended to illustrate the

inability of the collections to support curricular needs.

The results of Birmingham City Schools system wide assessment found that in the

elementary and middle schools 75% of the books in the 300s, 500s, 600s, and reference were 10

years old or older. In the high schools over 80% of the books in the assessed categories were 10

years old or older. The circulation statistics portion of the assessment revealed over 4,000 unfilled

requests due to lack of materials or the lack of current materials.

A similar collection assessment was sponsored by the Louisiana Association of School

Librarians to determine the average age of books in Louisiana school libraries and to identify the

areas of the collection librarians deemed the most important to keep current (Perritt, 1993). A

comparison was also made between the average age of books in schools with and without

automated circulation systems.

The results of Perritt's study show the average age of books in the collections surveyed was

23.51 years. As for differences between the average age of collections in libraries with and

without an automated circulation system, schools with an automated circulation system had an

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average age of 20.17, only 3.34 years lower than the average age of books in collections without an automated system. The 500s were indicated as the most important and the 600s second as areas important to keep current. (Perrett, 1993)

Morrison, Fox, Guarin, and Shannon (1993) gathered general information statewide about school library collections in Illinois and specifically gathered information about school science collections. Specific areas of the sciences were targeted. Astronomy, space, and the solar system consisting of the Dewey categories of 520-523, and 629; general biology and ecology consisting of the Dewey categories of 333, 363, 574, and 591; and lastly human anatomy, physiology, and hygiene consisting of the Dewey categories of 611-613. These areas of science were chosen specifically because of the great number of changes and advances which have occurred in these areas in the past twenty-five years. Data were reported by total number of books, number of books published before 1970, and number of books published from 1990-1993 in each Dewey category. Overall the study found school libraries to have outdated book collections in the three identified areas of science education.

Research Objectives

1. To determine the mean and the median age of books in three broad Dewey categories consisting of the 300s, 500s, 600s and three narrower areas consisting of astronomy, space, and the solar system; general biology and ecology; and human anatomy, physiology, and hygiene in the five middle school library collections. The five school libraries are Clark, Franklin, Hayward, Roosevelt, and Schaefer Middle Schools in the Springfield (Ohio) City School district.

2. To determine the percentage of books ten years old or older in three broad Dewey categories consisting of the 300s, 500s, 600s and three narrower areas consisting of astronomy, space, and the solar system; general biology and ecology; and human anatomy, physiology, and hygiene in the five middle school library collections.

3. To provide a statistical profile of the five middle school which will be used to determine if there is a need for increased funding for print collections in the areas of science and technology.

Methodology

Using a simple tabulation form (see Appendix- Forms) copyright data were gathered for each middle school library collection in the areas of science and technology. Specifically the Dewey categories of 300, 500, 600. Data were gathered in the Dewey categories as a whole (all of the 300's, 500's, and 600's) and narrower areas within each category covering highly specific topics. The narrower topics consisted of areas of science and technology which have undergone rapid change within the past twenty years. These areas consist of the following topics: astronomy, space, and the solar system; general biology, and ecology; human anatomy, physiology, and hygiene; and are encompassed by the following Dewey call numbers: 520-523, 629; 333, 363, 574, 591; 611-613. Each of the narrower topics is part of the science curriculum and is a focus area within the middle school curriculum.

The population is the collections of Clark, Franklin, Hayward, Roosevelt, and Schaefer Middle School Libraries. The holdings information is taken from the end-of-year inventory statistics (see Appendix B) for 1997-1998 compiled by each school library in the study. Based upon the holdings within each Dewey category the sample is determined and copyright information is gathered from each school library collection.

The average age of books in each area of the collection examined is calculated by determining the mean or arithmetic average of the copyright dates; the median age is also determined.

The methodology is based upon a group of studies conducted by Morrison, Fox, Guarin, and Shannon (1993), Perritt (1993), and Bell (1992). Each of the studies determined the age of the collection for each Dewey division (Perrett, 1993; and Bell, 1992) or specific Dewey subject

(Morrison, Fox, Guarin, and Shannon, 1993). Determination of age is a common theme in each of the studies (Morrison, Fox, Guarin, and Shannon 1993; Perritt 1993; Bell 1992). Age is chosen as a method of evaluation because it is a recognizable unit that can be easily ascertained and understood by professionals and laymen alike. For purposes of this middle school library study a combination of the studies done by Morrison, Fox, Guarin, and Shannon (1993), Perritt (1993), and Bell (1992) has been developed.

The average age of the library collections in each of the areas containing materials in science and technology (Dewey disciplines 300, 500, 600) is calculated. The average age of the library collections in three narrower topical areas is also calculated. In addition the median age is determined for comparison. For the purpose of this study Van Orden's use of "collection" to refer to the resources, mainly print items, housed in a single room of a school will be used (Van Orden,. 10).

The percentage of the collection ten years old or older will be calculated for each broad and narrow Dewey category. Science and technology areas were chosen due to the rapid amount of change and progress which occurs in these fields.

Limitations of the Study

The study analyzes the condition of five middle schools in only one district; similar conditions may or may not be found in other districts within Clark County, Ohio or within Ohio in general.

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Results and Discussion

Among the five middle schools the mean age (Table 1) ranged from a low of 13.5 years to

a high of 34.9 years. Both the high and low means were from the same collection at Franklin

Middle School. Franklin's library was automated during the Summer of 1998, and in the process

a very radical weeding of the collection was conducted. The end result can be seen in the figures

in Table 1, the mean age of the books was less then 17.3 years in all the surveyed categories with

the exception of the 300s. The narrow topic areas also reveal a low average age when compared

with the majority of the other middle schools. The other middle school to post low mean ages was

Hayward Middle School; the mean ages were less than 18.8 years. Hayward's library has been in

the process of automating since January 1997 and the process is not yet complete. Clark,

Roosevelt, and Schaefer Middle Schools all posted mean ages at 20.9 years or more. Both

Roosevelt and Schaefer libraries are automated and have been so for more than five years; Clark

Middle school has not yet automated.

TABLE 1

Mean Age of Books in Five Middle School Libraries by Dewey Category
(Mean Age in Years)

Category/ Mean	Clark	Franklin	Hayward	Roosevelt	Schaefer
300	25.3	34.8	17.3	20.9	23.5
500	26.9	15.4	18.4	26.0	28.7
600	26.1	17.3	18.4	24.3	22.7
Astronomy/ Space	26.4	15.4	16.5	24.6	24.6
Biology/ Ecology	22.4	14.7	14.1	22.0	22.0
Anatomy/ Physiology/Hygiene	24.4	13.5	18.8	21.9	21.9

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Collectively the five middle schools had a combined mean ages ranging from 19.3 years to 24.2 years. The overall mean age for materials among the middle schools was 24.2 years for the 300's, 23.8 years for the 500's, and 22.4 years for the 600's. The narrow topic area of astronomy and space had a mean age of 23.3 years; biology and ecology had a mean age of 19.3 years while anatomy, physiology and hygiene had a mean age of 21.4 years. The mean age reveals collections which are outdated. The results are similar to those found in Perritt (1993). In Perritt's study the mean ages for the middle schools in the Dewey categories of 300, 500, and 600's were 23.74 years, 25.28 years, and 22.45 years respectively.

The median age, listed in Table 2, of materials in the six sample groups ranged from 10 years to 32 years among the five middle schools. Franklin and Hayward again displayed some of the lower median ages; most less than eighteen years. An exception was the median age of the anatomy, physiology, and hygiene materials at Hayward which had a median age of 22 years. These low median ages reflect the lower mean ages listed for the two schools in table 1. The majority of the middle schools, Clark, Roosevelt, and Schaefer, had median ages of 21 years or older in each of the sample groups surveyed. The only exception was Roosevelt which had a median age of 17 years in the area of biology and ecology.

TABLE 2

Median Age of Books in Five Middle School Libraries by Dewey Category
(Median Age in Years)

Category / Median	Clark	Franklin	Hayward	Roosevelt	Schaefer
300	29	17	14	21	25
500	31	11	17	31	32
600	29	16	18	27	23
Astronomy/ Space	31	13	13	29	28
Biology/ Ecology	24	12	10	17	24
Anatomy/ Physiology/Hygiene	27	11	22	25	24

Over 75.7% of the books in the 600 Dewey category are 10 years old or older (Table 3);

64.7% and 74.5% of the 300 and 500's, respectively, are 10 years old or older. The percentage of

books 10 years old or older at each of the individual middle schools ranged from 45.8% to 87%.

TABLE 3

Percentage of Books 10 Years Old or Older in Five Middle School Libraries
by Dewey Category

Category / Percentage	Clark	Franklin	Hayward	Roosevelt	Schaefer	Combined All Schools
300	153/216 70.8%	100/181 55.6%	94/176 54.7%	166/247 67.2%	156/214 72.9%	669/1034 64.7%
500	204/252 81.0%	79/163 48.5%	137/217 63.1%	190/228 83.3%	214/246 87.0%	824/1106 74.5%
600	206/261 78.9%	99/155 63.9%	124/175 70.9%	187/235 79.6%	189/238 75.7%	805/1064 75.7%
Astronomy/ Space	141/175 80.6%	34/63 54.0%	37/65 56.9%	98/125 78.4%	112/147 76.2%	422/575 73.4%
Biology/ Ecology	89/128 69.5%	35/70 50.0%	49/107 45.8%	78/115 67.8%	71/107 66.4%	322/527 61.1%
Anatomy/ Physiology/Hygiene	37/48 77.1%	11/24 45.8%	25/36 69.4%	39/48 81.3%	27/36 75.0%	139/192 72.4%

Conclusion

Information Power (1988) cites the recency of information contained in library materials as a major concern but the library materials in the surveyed libraries have the possibility of being upwards to almost 35 years old. Thirty-five years ago man had not walked on the moon, Skylab and the space shuttle were only pencil drawings, global warming was not yet a "big" issue, there did not exist the danger of AIDS, and the world had not experienced the "energy crunch." Yet students are given assignments or are interested in these and other areas of science and technology. The collections are not able to support either the assignments or a student's natural curiosity about events or issues they hear about on the news or read about in their textbooks.

Similar to the findings of Bell (1992), Perritt (1993), and Morrison, Fox, Guarin, and Shannon (1993) the collections surveyed are in need of new and updated materials while the outdated materials are weeded from the collections; the outdated collections are unable or barely able to support the needs of students; and the resources are not available in the library collections to support curricular goals. Without additional funding for print materials the collections will continue to deteriorate despite efforts by school librarians to shore up their collections through alternative means of funding their budgets.

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Appendix A
Copyright Data Collection Form

School _____Category _____

Pre-1960 _____

1960 _____	1980 _____
1961 _____	1981 _____
1962 _____	1982 _____
1963 _____	1983 _____
1964 _____	1984 _____
1965 _____	1985 _____
1966 _____	1986 _____
1967 _____	1987 _____
1968 _____	1988 _____
1969 _____	1989 _____
1970 _____	1990 _____
1971 _____	1991 _____
1972 _____	1992 _____
1973 _____	1993 _____
1974 _____	1994 _____
1975 _____	1995 _____
1976 _____	1996 _____
1977 _____	1997 _____
1978 _____	1998 _____
1979 _____	

Appendix B

Middle School Inventories 1997-1998
Excerpts

School Name	Dewey Category	Total Items
Clark Middle School	300	520
	500	694
	600	832
	Astronomy/Space	255
	Biology/Ecology	146
	Anatomy/Physiology/Hygiene	48
Franklin Middle School	300	342
	500	270
	600	258
	Astronomy/Space	70
	Biology/Ecology	73
	Anatomy/Physiology/Hygiene	24
Hayward Middle School	300	539
	500	475
	600	329
	Astronomy/Space	76
	Biology/Ecology	92
	Anatomy/Physiology/Hygiene	41
Roosevelt Middle School	300	651
	500	569
	600	639
	Astronomy/Space	153
	Biology/Ecology	127
	Anatomy/Physiology/Hygiene	58
Schaefer Middle School	300	476
	500	659
	600	623
	Astronomy/Space	203
	Biology/Ecology	119
	Anatomy/Physiology/Hygiene	39

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