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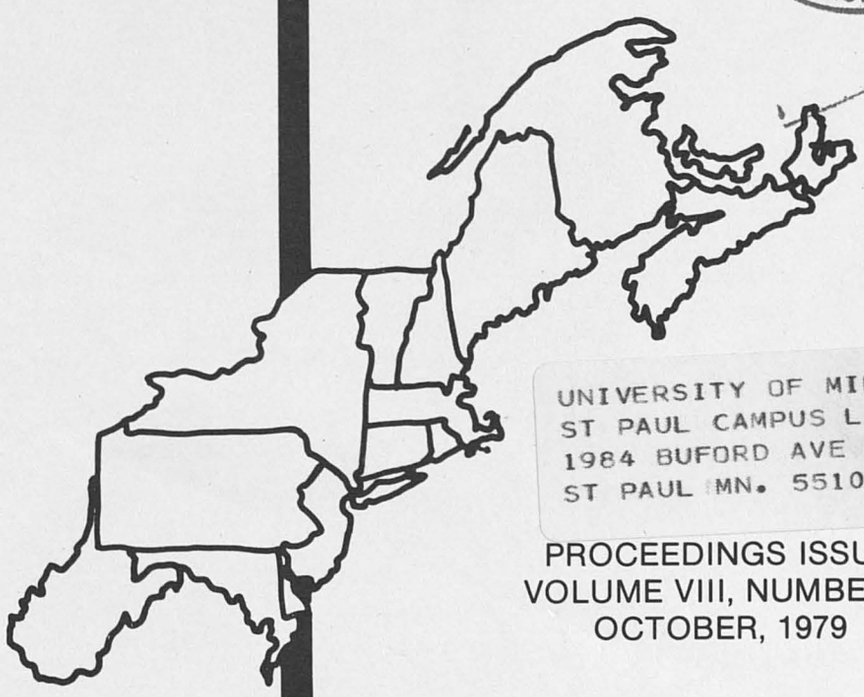

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FISCAL IMPLICATIONS OF CHANGING SCHOOL ENROLLMENTS

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Two topics dominate discussions of public elementary and secondary education. The first is declining enrollments and the second is fiscal problems, especially those problems associated with such catch words as equity, taxpayer revolt, and tax reform. In this paper, we analyze the relationship between these two topics by examining enrollment change and fiscal characteristics in 504 Pennsylvania school districts. Our purpose is to provide a descriptive base for further research on the fiscal problems raised by changing school enrollments.

BACKGROUND TO THE PROBLEM

The 1950's and 1960's were years of expansion for the nation's public elementary and secondary schools. Between 1950 and 1970 total enrollment increased by more than 80 percent. School administrators were scrambling to provide adequate supplies, equipment, facilities, and personnel to service the educational demands of the "baby boom" children. By 1970 the situation began changing. Nationally, elementary enrollments peaked in 1969 and decreased by 9.2 percent between 1970 and 1976 (Fishlow, 1978). Secondary enrollments increased until 1976 but have now begun the inevitable decline. Between the fall of 1970 and the fall of 1975, there was

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a decline in student enrollments in 37 of the 50 states. Today, the overall decline in public school enrollments is still occurring and, on the basis of children already born, it will continue through 1985.

Enrollment declines have created a new management atmosphere for many school officials. No longer are they confronted with the problems of expansion: overcrowding, crash construction programs, broadened curriculum, and split sessions. Instead, these officials are now trying to provide quality education programs while at the same time handling excess space, school building closings, and pressures for budget limitations. They are involved with managing decline, rather than managing growth.

Of all the issues associated with enrollment decline, the fiscal issues are perhaps the most crucial because they are related in one way or another with all aspects of educational programming. As a consequence, these issues quickly became matters of state as well as local policy.

To many legislators and citizens, for example, enrollment declines would seem to alleviate the financial pressures experienced by school districts during the growth years of the 1950's and 60's. Yet, it is not easy for most school districts to reverse their expenditure patterns. Inflation, teacher tenure and seniority laws, and indivisible school inputs all make expenditure retrenchment difficult. In addition, fewer students mean a loss of state funds under most state school aid formulas. For many districts, this loss of income may be greater than possible expenditure savings associated with few students. For some school districts, this situation may be complicated by political pressures as citizens expect stable or perhaps even smaller local tax contributions to school budgets as enrollments drop off.

As we will see even though enrollment decline dominates, there are a significant number of districts which are growing rapidly. These districts are experiencing the problems of expansion while the media, policymakers, and even local citizens who are not aware of differences among districts are focusing on the overall pattern of decline.

OBJECTIVES

Understanding these and other issues and developing effective state and local policies for dealing with them require an examination of the fiscal characteristics of school districts experiencing differing degrees of enrollment change. The following discussion summarizes a preliminary descriptive analysis of enrollment change and fiscal characteristics in 504 Pennsylvania school districts between 1970-71 and 1976-77. Specifically, we describe enrollment change in Pennsylvania school districts, and then relate that change to district fiscal characteristics such as wealth, tax effort, revenue sources, and expenditure patterns. Finally, we pose some questions for further research based on our findings.

DATA

The 504 operating school districts in Pennsylvania in 1976 constitute

the universe of units analyzed in this paper. Since the objective of this study was to analyze changes between 1970 and 1976, it was necessary to construct comparable units in the two periods. The majority of school consolidations occured in Pennsylvania before 1970. However, between 1970 and 1976, 96 districts were consolidated into 24 districts. It was possible to aggregate the 1970 data for these 96 districts into 24 pseudo-districts which correspond to the 24 districts in 1976. After spending considerable time checking in detail other name and boundary changes, we are confident that the 504 districts can be compared without these jurisdictional changes distorting the results.

The enrollment figures reported here refer to the head count of students enrolled as of October 1 of the school years 1970-71 and 1976-77. These figures are used for official reports by the Pennsylvania Department of Education, and correlate highly with other enrollment measures such as "average daily membership" and "full-time equivalents" which are sometimes seen in school district data summaries.[1] The financial data reflect expenditures of each district during the school years 1970-71 and 1976-77, and revenues for the 1976-77 school year. Revenue data for 1970-71 were unavailable. We limited our study to the period between 1970-71 and 1976-77 because complete data for more recent years are not available for analysis.[2]

ENROLLMENT CHANGE, 1970 TO 1976

Total enrollment in Pennsylvania's 504 public school districts decreased by 7.9 percent between 1970 and 1976, from 2,341,654 to 2,155,865 students. In 358, or 71 percent of the districts, there was a decline in enrollment. Thirty-three of these districts declined by more than 20 percent. It is also important to note that while the overall picture was one of enrollment decline, 146, or 29 percent, of the districts experienced growth. In fifteen of these districts, enrollment grew by more than 20 percent. The arithmetic average of the percentage change in total students for the 504 districts was -4.8 percent with a standard deviation of 11.4 percent.

The difference between the aggregate figure of -7.9 and the average of -4.8 implies that some of the larger districts were decreasing at a greater than average amount. This was the case in a limited but significant way. The Philadelphia School District was by far the largest district in the state with 260,787 students and declined by 11.5 percent, 1970 to 1976. The Pittsburgh School District was second largest with a 1976 enrollment of 59,849; it declined by 17.6 percent during the same period. The next largest district had only 16,800 students. In fact, the decrease of students in Philadelphia and Pittsburgh represented one quarter of the decrease found in the entire state.

In order to minimize the effects of Philadelphia and Pittsburgh, we will report change figures which are averages of changes for each of the 504 school districts, unless noted otherwise. For example, total elementary students (grades K-6) in the state decreased from 1,252,747 in 1970 to 1,077,644 in 1976, a percent change of -14.0. However, the average changes for 504 districts was -9.8. In the latter number, Philadelphia and Pittsburgh carry the same weight as any other districts. In

the former, they are weighted by their size. We will focus on the latter.

The changes in elementary enrollments portend a continuation of the general picture of declining enrollments into the early 1980's. Predicting beyond that date is difficult. Although demographers are divided on what to expect (Davis and Lewis, 1970; Fishlow, 1978), a new baby boom is unlikely. While total enrollments may return to 1970 levels late in this century, decline and stability are much more likely to characterize public elementary and secondary education in the coming decade than is growth, particularly growth at the pace witnessed during the 50's and 60's.

Trends in population migration are probably more important in explaining the variability in enrollment change among school districts than is a differential fertility rate. For the nation one trend is for net movement from the northeast and midwest to the south and west. Another important trend is the movement from urban to rural areas since 1970 (Beale, 1978). If these current migration trends continue, we can expect population declines in states like Pennsylvania. Further, metropolitan and urban areas will lose population compared to nonmetropolitan and rural areas. Future school enrollments should reflect these differences in migration patterns.[3]

One way to summarize this discussion of enrollment change in Pennsylvania school districts, and to highlight the fact that there was indeed variability of change among the districts, is to look at Table 1. The 50 districts with the greatest enrollment declines, decreased on the average of 22.9 percent. At the other extreme the 50 most rapidly growing districts average an increase of student numbers of almost 18 percent. Thus, even though decline dominates, policies for funding school programs must be sensitive to this great variability among districts.

ENROLLMENT CHANGE AND FISCAL CHARACTERISTICS

In developing appropriate responses to the overall pattern of enrollment change, school policymakers need to understand how enrollment changes are related to other school district characteristics. In the remainder of this paper, we describe the relationships between enrollment change and the fiscal characteristics of Pennsylvania school districts, and then outline some of the research and policy implications suggested by these relationships.

School revenues come from three major sources, local, state and federal. The information in Table 2 suggests that in Pennsylvania local and state revenues are the more important. On the average school districts in the 1976-77 school year received 52 percent of the revenues from local sources, 44 percent from state sources, and 4 percent from federal sources.

Not only are federal revenues per pupil a small component of the overall revenue picture for all school districts, but there also appears to be no systematic relationship between federal revenues per pupil and enrollment change. Column 4 in Table 2 illustrates that districts in each decile of enrollment change are receiving close to the overall average of $65 per pupil from federal sources.

For state and local revenues, there does seem to be a systematic

Table 1

Enrollment Change in Pennsylvania School Districts by Decile

Decile of Enrollment Change	Number of Districts	Average Percent Change in Total Enrollments, 1970-71 to 1976-77
1	50	-22.9 percent
2	51	-16.0
3	51	-11.9
4	50	- 9.4
5	51	- 7.3
6	50	- 4.8
7	50	- 1.8
8	51	1.8
9	50	6.4
10	50	17.8
Statewide Average	504	- 4.8 percent

Table 2

Enrollment Change and Revenues Per Pupil in Pennsylvania School Districts

Decile of Enrollment Change	Average Local Revenues Per Pupil 1976-77	Average State Revenues Per Pupil 1976-77	Average Federal Revenues Per Pupil 1976-77	Average Total Revenues Per Pupil 1976-77
1	$1176	$586	$87	$1849
2	1029	631	63	1723
3	894	658	66	1618
4	788	754	56	1598
5	747	722	67	1536
6	703	735	64	1503
7	750	737	57	1544
8	661	776	66	1503
9	703	743	58	1504
10	786	715	62	1562
Statewide Average	$ 824	$706	$65	$1594

relationship with enrollment change. On the average, districts experiencing higher enrollment decline between 1970-71 and 1976-77 provided higher levels of local support per pupil and tended to receive less state revenue per pupil in 1976-77 than those districts with lower enrollment declines or increases. Local revenues per pupil declined from $1,176 to $703 over the first six deciles of enrollment change, and crept up from $703 only in the seventh and tenth decile. State revenues per pupil, on the other hand, generally increased over the first eight deciles of change beginning at $586 in the first decile and then dropped off in the last two deciles. We would like to be able to compare districts on the relative change in the importance of the various revenue sources between 1970 and 1976 but 1970 revenue data were not available by district for 1970.

The value of property in school districts is a significant factor in the school district revenue picture. Along with local tax effort, it is one determinant of local school revenues. In addition, it is an important component affecting the distribution of state revenues to school districts.[4]

Table 3 shows total 1976-77 local tax effort, measured as mills on market value, exerted by Pennsylvania school districts.[5] When local tax effort is related to enrollment change, it is apparent that those districts which have been experiencing the highest average percent decline also exerted the greatest local tax effort in 1976-77. Mills on market value ranged from 26.54 for the decile of highest decline to 21.4 for the decile of greatest enrollment increase. School districts in the top five deciles of change, representing approximately one half of Pennsylvania's school districts, exerted total local tax effort above the statewide average of 23.83 mills.

Table 3

Enrollment Change, Local Tax Effort, and Market Value Per Pupil in Pennsylvania School Districts

Decile of Enrollment Change	Average Total Local Tax Effort, 1976-77 (Mills on Market Value)	Average Market Value Per Pupil, 1976-77
1	26.54 mills	$42.820
2	26.59	38,310
3	24.78	34,038
4	24.43	30,473
5	23.86	29,740
6	22.89	28,817
7	23.94	29,588
8	22.00	36,068
9	21.93	29,909
10	21.40	38,092
Statewide Average	23.83 mills	$33,791

The relationship between 1976-77 average market value per pupil and average percent change in enrollments is similar to that for local tax effort (Table 3, column 3). Over the first six deciles of change, average market value per pupil declines systematically from $42,820 to $28,817. Of the remaining four deciles, only the eighth and tenth show average market values per pupil above the state average of $33,791.

To this point, we have looked solely at the revenue side of the school district ledger for the 1976-77 school year. The picture is one of higher tax effort, higher local revenues per pupil, and lower state aid per pupil for those districts experiencing high decline compared to those districts experiencing less decline and growing districts during the first half of the 1970's. Our findings to this point are similar to those from other states with one major exception. In a recent study, declining districts in Michigan, Missouri, South Dakota, and Washington were found to have higher per pupil wealth, higher tax effort, higher per pupil state aid than growing districts (Odden and Vincent, 1978). In Pennsylvania, state aid was less to districts with greater declines.

Table 4 and 5 illustrate the expenditure side of the picture. Table 4 shows 1976-1977 average expenditures per pupil for a number of expenditure categories: total expenditures and expenditures for administration, instruction, operations and maintenance and transportation. The data show that total expenditures per pupil decreased from $1,775 for the decile highest decline to a low point of $1,430 in the sixth decile. In the remaining four deciles, total expenditures per pupil increased slightly but never approached the statewide average of $1,520. All other expenditure categories, except transportation, reflect a similar pattern. Overall, transportation expenditures per pupil increase as the level of enrollment decline decreases.

Declining districts were spending more per student in 1976. How is enrollment change related to change in expenditures between 1970-71 to 1976-77? The data in Table 5 show that expenditures per pupil increased on average for all expenditure categories and for all deciles of enrollment change during this period. For the state as a whole, the average percent change in expenditures was greatest for transportation and operations and maintenance activities: 125.6 percent and 101.7 percent respectively. The average percent changes were substantially less for administration -- 63.3 percent, and instruction -- 57.2 percent. The average percent increase in expenditures tended to be greater in total and for all expenditure categories, except operations and maintenance, for those school districts experiencing higher enrollment declines. In the operations and maintenance category, the average percent change in per pupil expenditures drops slightly over the first six deciles of change and then increases somewhat from the low point over the last four deciles of change.

IMPLICATIONS AND SUMMARY

How to finance public elementary and secondary schools has been a topic of debate probably since there has been such a thing as a public school. Since education is the single largest item in the total budgets of the state and local areas in Pennsylvania the issue has renewed urgency in an era of increased general concern with public expenditures as exemplified by

Table 4

Enrollment Change and Average Expenditures Per Pupil in Pennsylvania School Districts, 1976-77.

Decile of Enrollment Change	Administrative Expenditures Per Pupil	Instructional Expenditures Per Pupil	Operation and Maintenance Expenditures Per Pupil	Transportation Expenditures Per Pupil	Total Expenditures Per Pupil
1	$70	$955	$216	$ 59	$1,775
2	62	887	198	68	1,651
3	60	826	179	76	1,542
4	54	786	175	82	1,518
5	56	774	174	75	1,450
6	53	748	159	88	1,430
7	58	749	158	88	1,458
8	58	742	157	98	1,441
9	55	748	160	93	1,433
10	60	739	162	115	1,499
Statewide Average	$59	$795	$174	$ 84	$1,520

Table 5

Enrollment Change and Average Percent Change in Expenditures Per Pupil in Pennsylvania School Districts, 1970-71 to 1976-77.

Decile of Enrollment Change	Administrative Expenditures Per Pupil	Instructional Expenditures Per Pupil	Operation and Maintenance Expenditures Per Pupil	Transportation Expenditures Per Pupil	Total Expenditures Per Pupil
1	$76.2	69.7	110.8	196.2	84.6
2	69.4	63.4	104.2	169.0	77.2
3	68.6	57.5	98.8	134.2	68.8
4	60.0	55.0	98.1	115.8	71.2
5	62.6	59.9	97.5	112.0	70.9
6	56.8	53.4	96.9	121.1	67.2
7	63.8	52.0	98.4	100.6	66.3
8	62.5	54.3	103.4	103.1	67.8
9	57.7	54.4	101.1	104.7	63.5
10	54.9	52.5	107.8	99.5	69.4
Statewide Average	63.3	57.2	101.7	125.6	70.7

Proposition 13 in California. In addition to total expenditures for education, another important consideration is equity in funding. Equity, particularly among school districts, has been an important aspect of recent court cases in Texas, California, and elsewhere challenging the fairness of the property tax as a basis for funding schools. Equity was one of the considerations in the development of Act 59 passed by the Pennsylvania legislature in 1977. And now we find that these complex fiscal issues are further complicated by the dramatic overall decline in school enrollments.

This description of school district fiscal characteristics and enrollment changes in Pennsylvania suggest some interesting research and policy questions. One such question with some possible answer is the following: Why is the average percent change in total expenditures higher for those districts experiencing higher rather than lower enrollment declines between 1970-71 and 1976-77? Is it because these school districts have received relatively more federal and state revenues over that period? Probably not. Federal revenues are generally too small a component of the overall school district revenue picture to have an effect one way or another. State revenues, comprised mostly of state instruction aid, have probably accrued more to growth districts than to decline districts since market value per pupil and state aid are inversely related.

Is it because many school inputs are indivisible? Possibly. Since declines are usually spread throughout a district, it takes a very large decrease in students to allow for a decrease in teachers. A decline of a few hundred students may seem large, but when such a decline is distributed among all the classrooms in a district, the decline may average only two or three students per room. These smaller numbers make reducing a staff difficult without major reorganization. The problem is even more difficult with regard to school buildings. It takes a large loss to justify closing a building, notwithstanding probable community resistance. If the number of buildings cannot be reduced, many operating costs stay constant.

Is it because preferences have shifted, and taxpayers in declining districts are demanding more and better quality education than taxpayers in growth districts? This possibility is suggested by the high levels of wealth per pupil, tax effort, and local revenue per pupil in 1976-77 for districts experiencing decline relative to those districts experiencing growth.

Another possibility is that we are observing an arithmetical artifact. In districts with declining enrollments total expenditures may have remained relatively constant or increased at the inflation rate. Then dividing these expenditures by fewer students has produced greater expenditures per pupil in 1976-77 compared to 1970-71. On the other hand, districts with rapid enrollment increase may have had to increase total expenditures drastically during the period. But because they have so many more pupils now, their per pupil expenditures may be relatively low.

These possible answers to this one question regarding higher expenditure changes in the more rapidly declining districts need to be directly addressed by systematic research. There are also a host of other questions. For example, are the relationships presented here for the entire state different if urban school districts are analyzed separately from rural school districts? Does school district size interact with enrollment change to

affect expenditure patterns? Perhaps answers to these questions will clarify some of the peculiar patterns observed for specific expenditure categories: for example, why is the average transportation expenditure per pupil in 1976-77 possitively related to enrollment change, but, change in transportation expenditure for 1970 to 1976 negatively related to enrollment change?

Answering questions such as the ones above may help in addressing broader state level school finance questions. For example, why were declining districts in Pennsylvania receiving less state revenue per pupil in 1976-77 than districts experiencing enrollment increases when findings from other states show opposite results? What does this inverse relationship mean, if anything, for the ability of different districts to implement quality education programs? Should the state school aid formula adjust for enrollment declines? If so, what form should these adjustments take?

The analysis presented has raised more questions than it has answered. However, it does represent a descriptive base for further study. And this further analysis is necessary since the general public, but paricularly local and state policy makers need a thorough understanding of the relationship between enrollment change and fiscal impacts if they are to manage change effectively, change in which decline dominates rather than growth. And this understanding must include the fact that not all districts are declining. Indeed some districts are increasing at rates reminiscent of the 1960's. Some of the districts with rapid enrollments are in rural areas for which rapid growth is a relatively new experience.

FOOTNOTES

[1]The county and state enrollment totals reported here are slightly below those reported in official Pennsylvania Department of Education publications because we present numbers only for students enrolled in school districts, while the official reports include students, mainly special education students, enrolled by regional administrative bodies called Intermediate Units (in 1976) and by county school boards (in 1970). The difference in total enrollment is always less than 2 percent and does not affect the conclusions drawn here. Again, all references in this paper are to all school districts. Generally, students attending Area Vocational and Technical schools are enumerated in one of the 504 school districts included in the analysis. There are, however, 14 full time voactional-technical schools in the state and their enrollments are excluded from this analysis.

[2]The 1970 enrollment data were not published by school district, but were provided to us by the Pennsylvania Department of Education, Bureau of Information Systems. The PDE also furnished 1976 enrollment data and 1976-77 financial data on computer tape. The 1970-71 expenditure data were coded from "Our Schools Today: Public School Financial Statistics Report," Volume 11, Number 7, 1970-71.

[3]For a detailed discussion of enrollment change by various locational categories such as metropolitan status of county and degree of urbanness of

the district see Moore and Alter, 1979. Results from that analysis show that changes in enrollments support recent findings of a revival of population growth in nonmetropolitan and the more rural areas (Beale, 1975; Beale, 1978).

[4]Under the subsidy formula in effect for the 1976-77 school year, state basic institution aid varies directly with enrollments and inversely with school district market value per pupil (Pennsylvania Department of Education, 1976). In 1977, the Pennsylvania legislature enacted new state school subsidy legislation (Act 59). One important change resulting from this legislation was the inclusion of personal income as well as market value as a measure of school district wealth (Pennsylvania Department of Education, 1977).

[5]Local tax effort was defined in 1976 as the ratio of total local taxes collected divided by market value. Pennsylvania school districts rely upon a wide array of local tax sources. Local taxes provided 51.6 percent of general fund revenue for all school districts during the 1976-77 school year. The most important of these taxes, of course, was the real property tax. Although the relative proportion varied from district to district, in the aggregate the property tax constituted almost 80 percent of all local tax dollars in 1976-77. Most other school taxes were generated under Act 511, The Local Tax Enabling Act of 1965. Act 511, Pennsylvania's "Tax Anything Law," permits school districts, as well as boroughs, cities, and townships, to levy and collect a host of different taxes including earned income, per capita, real estate transfer, mercantile or gross receipts, business privilege, occupation privilege, occupation, amusement or admissions and mechanical devices taxes. The Pittsburgh and Philadelphia school districts are excluded from Act 511, but these districts have significant tax resources at their disposal under other Pennsylvania tax codes.

REFERENCES

Beale, Clavin L. The Revival of Population Growth in Nonmetropolitan America. Washington, D.C. USDA, June 1975.

_____. "Population Trends in the Northeast." Journal of the Northeastern Agricultural Economics Council. Volume VII, No. 2, October 1978.

Davis, Russell G., and Gary M. Lewis. "The Demographic Background to Changing Enrollments and School Needs." In Susan Abramowitz and Stuart Rosenfeld (eds.). Declining Enrollments: The Challenge of the Coming Decade. National Institute of Education. March 1978, pp. 19-45.

Fishlow, Harriett. "Demography and Changing Enrollments." Chapter II In Susan Abramowitz and Stuart Rosenfeld (eds.). Declining Enrollments: The Challenge of the Coming Decade National Institute of Education. March 1978, pp. 47-80.

Leppert, Jack and Dorothy Routh. "An Analysis of State School Finance Systems as Related to Declining Enrollments." In Susan Abramowitz and Stuart Rosenfeld (eds.). Declining Enrollments: The Challenge of the Coming Decade. National Institute of Education. March 1978, pp. 187-208.

Moore, Dan E., and Theodore R. Alter. "Population Changes and Community Services: The Case of the Public Schools." Paper prepared for presentation at the Annual Meetings of the Rural Sociological Society, Burlington, Vermont. August 1979.

Odden, Allan, and Phillip E. Vincent. "The Fiscal Impacts of Declining Enrollments: A Study of Declining Enrollments in Four States -- Michigan, Missouri, South Dakota and Washington." In Susan Abramowitz and Stuart Rosenfeld (eds.). Declining Enrollments: The Challenge of the Coming Decade. National Institute of Education. March 1978, pp. 209-255.

Pennsylvania Department of Education. "Pennsylvania Public School Finance Program, 1976-77." Bureau of Information Systems, Division of Education Statistics. Harrisburg, 1976.

_____. "Act 59 Subsidy Primer: How Our Schools Are Financed." Harrisburg, 1977.