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ABSTRACT

Few reliable data exist to provide an accurate estimate of the money invested in staff development or inservice programs in the United States for elementary and secondary school personnel. There are, however, some indicators by which costs of staff development programs at the federal level can be inferred. The problem of accurately gauging staff development costs is compounded by the lack of agreed-upon reporting standards and the lack of consistent definitions of what constitutes staff development and inservice education. This paper presents a statistical analysis of the staff development costs reported by four major studies and the implications resulting from that analysis. The statistical analysis focused on two purposes: (1) to explore the degree of correlation between reported staff development cost factors for each of the four studies individually, as well as across all four studies; and (2) to develop appropriate regression equations, based on the calculated correlation coefficients for each of the four studies. One goal of this investigation was the identification of predictive cost factors related to staff development. In this investigation four combinations of factors were found to have sufficiently strong correlations for regression equations to be determined. Implications of the findings for state legislative policy are discussed. Ten tables are appended. (IAH)

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REGRESSION ANALYSIS: A NOVEL WAY TO EXAMINE STAFF DEVELOPMENT COST FACTORS

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REGRESSION ANALYSIS: A NOVEL WAY TO EXAMINE STAFF DEVELOPMENT COST FACTORS

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Section I

We have little reliable data that provide an accurate estimate of the money invested in staff-development or in-service programs in the United States for elementary and secondary school personnel. One of the problems in determining such costs are the various definitions of staff-development or in-service education. Some use the definition of "In-service education as anything that you can get away with."

The need for effective staff-development has emerged from the concept that encourages an investment in human resources, so eloquently described by Theodore W. Schultz, 1979 Nobel Laureate for Economics. Schultz's concept of developing human capital--that is, the importance of investing in humans rather than in machinery--still stands as a landmark concept. How does Schultz's theory relate to staff development? Staff development means that a school district invests in its total staff to perform education services at a high level of quality. And to ensure that quality in this age of knowledge explosion and declining resources, staff development has become a necessity.

National Indicators

There are some indicators by which we can infer costs of staff-development programs at the federal level. C. Emily Feistritzer and Rhonda J. McMillion (1979) identified nineteen discretionary and two state formula programs funded at the federal level as

having components exclusively for educational personnel development. Their analyses of data revealed that in fiscal 1978 approximately $222,000,000 was spent at the federal level on activities, programs, and projects involving personnel development. For fiscal year (FY) 1979, the amount appropriated at the federal level would be $356,312,000 and for 1980, $340,475,000.

Another source of both awareness training and implementation training is the National Diffusion Network (NDN) of the U.S. Department of Education. It supported 124 national curriculum projects in 1981. Reporting on the NDN for that year, Shirley Boes Neill estimated that the NDN projects cost $66 million.

Congressional appropriations for science education to the National Science Foundation were increased to $156 million for fiscal year 1989 (Aldredge 1988). From virtually no budget in 1983 to $156 million in 1989 illustrates how politics impact staff development activities at the national level. Strategic planning (the current enthusiasm of educational consultants) is hardly worthwhile under such fluctuating fiscal commitments.

While not directly related to the NSF efforts, congressional legislation for FY 1986, FY 1987, and FY 1988 from Title II, PL 98-337, Education for Economic Security Act, also appropriated $100 million, $45 million, and $80 million for in-service teacher training collectively in mathematics, science, foreign language, and computer sciences. However, these amounts do not approach the efforts made by the U.S. Department of Education to conduct preservice or in-service programs in special education.

The U.S. Department of Education and the National Science Foundation are but two federal agencies that sponsor major thrusts in school-based staff development. The Department of Energy sponsors a multimillion-dollar teacher in-service educational program, and the National Institute of Education has had budgets in excess of $50 million. A rather small proportion of their budgets supports staff development in the schools. The Department of Health and Human Services provides specific in-service teacher training. The Department of Defense supports a worldwide effort for staff

development associated with its overseas dependent schools, grades K-12, which are staffed by civilian educators. No questions about it, the federal contribution to public school teacher staff development easily approaches one billion dollars or about $470 per teacher in the United States.

One published study in the literature provides a model by which staff development costs may be computed and reported. This comprehensive study was carried out by B. H. Fennell and associates (1980) for the Province of Alberta, Canada. The purpose was to assess the costs of teacher professional development and in-service training related to the implementation of new instructional programs. The group computed expenditures by local school boards and the costs to the Province's budget for in-service training during the 1977-1979 school years. Four kinds of expenditures on teacher professional development for in-service education were reviewed.

The first was direct expenditure by school authorities. During the 1977-1979 school years, $7.8 million was invested for all school jurisdictions in Alberta as direct costs. The second type, indirect costs (discussed on pages 7 & 8), accounted for $24,361,000 during the 1978-1979 school year. Expenditures of the Alberta Education Department, the third kind of expenditure, amounted to $1,176,000 for the same time period. Expenditures by teachers in the Alberta Teacher Association, amounting to $7,622,000, comprised the fourth kind. The total costs for the 1977-1979 school years were estimated at $40,948,000.

There were 23,867 teachers included in this study, the per-teacher total cost was $1,715 for in-service training and professional development. It will be apparent that this sum far exceeds the estimates which we will report. Using Fennell's data, the direct amount invested per teacher in Alberta was $375 per year for the 1977-79 academic years, with indirect costs adding $1,340 more.

Direct costs included advanced study and bursaries, training, travel and subsistence, and dues and fees. The indirect costs include convention and professional

development days, attendance at in-service seminars and institutes, released time pay for substitutes, program implementation, and estimates of allocations by individual teachers for in-service activities.

Cost Reports on Specific Staff-Development Programs

Funding levels for teacher in-service education vary widely across the country and there are no agreed-upon reporting standards. In Chicago, the school board has allocated approximately one percent of the educational fund to in-service education each year (Conran & Chase, 1982), while in Lake Washington (a school district in the State of Washington) more than $500,000 was allocated in 1982 to its staff-development program with the amount approaching $1 million in 1987 (Youngs & Hager, 1982; Costello, 1986).

Gail V. Bass (1978) reported that 15 percent of a $6.6 million alternative-school federal grant to Minneapolis was spent on in-service training. She reported that a similar federal project involving the city of Alum Rock spent 5 percent on in-service and curriculum development. The Minneapolis schools distributed a memo stressing the importance of in-service to make the project successful. Bass's study offers both empirical and inferential evidence that the support for staff development is an administrative value decision. As Margaret A. Thomas (1978) observed, with funded projects, the principal especially is the critical decision-maker on in-service expenditures.

Phillip J. Runkel et al. (1980) provided one of the more detailed examples of a cost analysis to be found in the literature for a staff-development program, but again it covered a project with a limited scope. His analysis was based on the cost of maintaining a cadre of specialists to assist only an organizational development (OD) as one model of teacher in-service training. Runkel furnished an example of a detailed assessment of costs to provide staff-development services. The example given was for a district with 1,000 to 1,500 professional staff members and a student body of 20,000 to 30,000. The estimated costs of maintaining a cadre of organizational specialists for one

year amounted to $27,900. This included salaries for a part-time coordinator and part-time secretary, fringe benefits, substitute costs, consultants, supplies, and materials.

Patrick McIntyre (1976) examined costs, benefits, and liabilities associated with an in-service education program designed by the Teacher Corps. In terms of dollar costs to the local school districts, he reported that the average teacher contract for an in-service project was $2,521. In five schools, approximately 100 contracts had been negotiated resulting in a total cost approaching $250,000. The bulk of these costs were "indirect" in nature, since none of the schools had budgeted any sum approximating that expenditure.

Lillian V. Cady and Mark Johnson (1981) reported that in Washington State, during the 1979-80 academic year, school personnel who were enrolled in off-campus courses paid approximately one-third of the total cost. And approximately $992,998 was paid in tuition charges by school personnel for all off-campus courses in the field of education in the state. The state expenditure for credit-related salary increases during the 1979-80 year was approximately $3 million. Cady and Johnson note that, although teachers enrolled in off-campus courses paid almost $1 million, there was in fact a $3-million, credit-related salary increase made during the same time.

An Extensive Analysis of In-Service Costs

The most comprehensive study of in-service costs was conducted by Donald Moore and Arthur Hyde and is the basis for three publications. Rethinking Staff Development: A Handbook for Analyzing Your Program and Its Costs (1978), An Analysis of Staff Development Programs and Their Costs in Three Urban School Districts (1980), and Making Sense of Staff Development Programs and Their Cost in Three Urban School Districts (1981) all deal with the same study but differ in emphasis. For our purposes, we will use the first publication (1978) as the primary source and will supplement the ideas and comments from the two later publications.

Rationale for Studying Costs

Moore and Hyde (1978) identified four reasons for studying and analyzing staff-development costs. First, in-service education must be better defined and understood because it is now used more extensively to bring about instructional improvement within the schools. Teacher turnover has declined sharply with the reduction of the school age population. Second, fiscal analysis of staff development in a district often produces some unexpected results. Third, to plan for the future, those programs and routines presently in place must be identified and analyzed. Fourth, costs must be reviewed as priorities and clearly established for future planning. As the fiscal resources available to school districts decline, budget proposals have to be better supported by cost information.

Educators who seek increased funding for staff development need to prepare graphic analyses of program costs, proposed accomplishments, and past results. Such cost analyses should compare both efficient and inefficient uses of resources. They should provide funders with information that will result in additional funding or reallocations, which in turn will support more productive staff development programs.

Moore and Hyde identified a broad range of activities associated with staff development. They argue that a reasonable basis for planning cannot be established unless the full range of activities used to conduct staff development is examined. For example, when a principal observes a teacher, it may not lead to staff improvement, but Moore and Hyde assume that it is an activity intended to achieve such a purpose, and it should therefore be identified as a cost of staff development.

They assumed that much of staff development is embedded in the routines of a school district. Identification of those routines results in a better understanding of the contrast between what is actually occurring and the perception of what is occurring. There are many assumptions made about staff development that may be invalid. It is important to study routines because they define trainer roles and establish what is

appropriate or inappropriate to calculate as a cost. Routines can be difficult to identify and study because they are dispersed throughout the school district. Routines are rarely called staff development, and school districts rarely keep financial records on them, but they do reflect the way people spend their time.

There are routines at the school building level that are frequently overlooked as being part of staff development such as staff meetings, department meetings, work days associated with opening and closing of school, early release for curriculum development, preparation periods for training projects, and on-site in-service that utilizes the school's own staff. There are routines carried out at the district level that are equally overlooked as being part of staff development which include program reviews of specifically funded programs and participation on district committees (such as facility planning committees, curriculum planning committees, and program planning committees).

In-Service Expenditures

In all three city districts studied, the majority of staff-development opportunities were job-embedded--done during the regular working day of the teacher. Special funding played only a minor role in staff development in most schools. The areas of greatest cost were staff salaries and benefits, teacher salaries and benefits, substitute costs, consultant fees, teacher stipends, sabbaticals and salary increases.

The Moore and Hyde sample was limited to three cities with populations ranging from 500,000 to 750,000. The districts were rated as either high, medium, or low in in-service activity. Their sample included "Seaside," a district selected from the upper one-third, "Riverview," selected from the middle one-third, and "Union," selected from the lower one-third.

After the extent of teacher in-service activity was identified in each district, the amount of teacher time spent in each of the activities was estimated through interviews. Administrative staff were also asked to estimate the percentage of their time spent in

their various staff-development activities. The financial administrators of each district were interviewed to determine how the expenses and salaries of teachers and administrative personnel involved in staff development were charged for the identifiable costs.

A substantial portion of the staff-development cost cam from locally generated funds. Although the percentages varied slightly in the three different Moore and Hyde publications, it is relatively safe to conclude that at least 90 percent of Seaside's in-service expenditures, at least 50 percent of Riverview's in-service expenditures, and at least 80 percent of Union's in-service education expenditures were from local funds.

When all three districts were asked to estimate their total investment in staff development, the actual cost of staff development was fifty times more than most local school staffs had estimated. The significant difference came partly from what Moore and Hyde (1980) identify as "hidden cost." (We call these indirect costs.) This is not to imply that costs were deliberately being disguised. It is more a matter of recognizing the true breadth of in-service education and of identifying related costs. These findings provide a sharp contrast to those of W. Robert Houston and H. Jerome Frieberg (1979), who concluded that the school district with more than one percent of its budget devoted to staff development is rare indeed.

Replication Studies

Larry D. LaBolle (1983) used the Moore and Hyde model to study four rural Alaskan school districts and their total investment in staff development. Robert J. Valiant (1985) used the model to study three moderate-size school districts in the State of Washington. Richard D. Cole (1987) studied four small districts (1,000 to 5,000 pupils). All investigators corroborated Moore and Hyde's findings, with similarities. (See Table 1.)

Insert Table 1 About Here

The plan of separating staff development costs along "direct" and "indirect" costs seemed to provide answers to policymakers. But when these data were tested further, a new interpretation emerged. Let us now focus on Section II of this paper--The Regression Analysis of Data.

Section II--Regression Analyses

The remainder of this paper presents (1) the statistical analysis of the staff development costs reported by Moore and Hyde (1978), LaBolle (1983), Valiant (1984), and Cole (1987), and (2) the implications resulting from that analysis. The statistical analyses focused on the following two purposes:

1. To explore the degree of correlation between the reported staff development cost factors for each of the four studies individually, as well as across all four studies.

2. To develop appropriate regression equations, based on the calculated correlation coefficients for each of the four studies individually as well as across all studies.

Six major cost factors were reported and analyzed in all four studies: (1) total district budget; (2) total district staff development expenditures; (3) staff development costs as a percentage of total district budget; (4) number of staff development hours per participant; (5) mean staff development costs per participant; and (6) the proportion of direct staff development costs compared to indirect costs.

Assumptions

The following assumptions were made with respect to the data and the analytic procedures:

1. The fiscal values given in all four studies were accurately collected and reported.

2. The districts selected, although not having been randomly selected, were nonetheless representative of similar districts.

3. The fiscal values reported satisfied the necessary statistical assumptions for the application of correlational techniques.

4. Appropriate cross-study fiscal comparisons could be made using values adjusted for inflationary factors.

Limitations

The limitations of this investigation followed those of the original researchers:

1. The study was limited to a small number of districts: Moore and Hyde, n = 3; LaBolle, n = 4; Valiant, n = 3; Cole, n = 4.

2. The staff development costs reported reflected only those values directly associated with administrators, teachers, and instructional aides.

3. Conservative estimates of staff development costs were used wherever reasonable doubt existed.

4. The costs reported were only those actually borne by the districts studied. Costs borne by individuals or other organizations were not included.

5. Districts studied were not randomly selected from a larger population, thus generalizability of findings must be exercised with caution.

6. The fiscal values reported were derived from different fiscal years, thus all values were adjusted to 1985 dollar levels (the fiscal year of the Cole study).

7. The cross-study correlations are based on the aggregation of data from all four studies, thus necessitating the use of caution in interpreting the results (Shavelson, 1988).

Findings of the Studies

Moore and Hyde studied three large, urban school districts. They identified the rationale for studying district staff development costs, constructed a model by which such costs could be determined, and implemented their model with three selected

districts. Data were collected for the 1977 and 1978 fiscal years. Their findings, adjusted to 1985 values, are presented in Table 2.

Insert Table 2 About Here

LaBolle used the Moore and Hyde model to study staff development costs in four rural Alaskan School districts. His findings, adjusted to 1985 dollars, are presented in Table 3.

Insert Table 3 About Here

Valiant replicated the above two studies by examining staff development costs in three moderate-sized districts in Washington state. His findings, expressed in 1985 dollars, are shown in Table 4.

Insert Table 4 About Here

Finally, Cole used the Moore and Hyde model to build on the work of all three previously cited researchers. Studying four districts with enrollments between 1,000 and 5,000 students, his findings reinforced those of Moore and Hyde, Labolle, and Valiant. The results of his investigation, presented in actual 1985 dollars, are presented in Table 5.

Insert Table 5 About Here

Correlations Between Variables

Correlation coefficients were calculated for all combinations of variables, using values adjusted to 1985 dollars. Correlations were determined for individual studies as well as for all studies combined. Table 6 presents the obtained correlation coefficients.

Insert Table 6 About Here

Regression Equations

One goal of scientific inquiry is that of prediction. In the present investigation, the identification of predictive cost factors related to staff development was one such goal. Thus it was assumed that appropriate regression equations could be identified that would allow for staff development cost predictions to be made.

In attempting to determine which combinations of factors would produce correlations useful for regression analysis, the following two criteria were established: (1) the correlation coefficients across groups must be similar to each other, and (2) the correlation coefficients across groups must be similar to that of the coefficient for the combined groups. Examination of the data in Table 6 revealed four combinations of values which fit the above criteria: (1) total district budget by total staff development costs; (2) percentage of district budget devoted to staff development by hours per participant; (3) percentage of district budget devoted to staff development by mean cost per participant; and (4) hours per participant by mean cost per participant. All other combinations of factors showed wide differences in correlations and thus were not deemed useful for purposes of regression analysis.

The regression equation may be expressed in the following form:

$$Y' = (B * X) + A$$

where: Y' = the value to be predicted
B = the slope of the regression line
X = a known value upon which a second value is to be predicted
A = the value of Y when X is zero (the "Y intercept")

Statistical formulas, based on the correlation coefficients, allow for the calculation of the "B" and "A" values of the regression equation (see Shavelson, 1988). By substituting a known value for "X", the predicted values of "Y'" may be obtained.

Tables 7 through 10 present the obtained regression equations. These equations allow for the following predications to be made: (1) total district staff development costs likely to occur based upon a given total district budget figure; (2) number of staff development hours per participant based upon the percentage of the district budget that

is devoted to staff development; (3) mean cost per participant for staff development based upon the percentage of the district budget devoted to staff development; and (4) mean cost per participant for staff development based upon a known number of staff development hours per participant.

Insert Tables 7-10 About Here

Discussion

In this investigation, four combinations of factors were found to have sufficiently strong correlations for regression equations to be determined. For each of the four combinations, five regression equations were determined: one for each of the individual study groups, and one based on the combined values across all groups. Although the individual correlations for each of the combinations were quite similar, it is readily apparent that the regression equations derived from each are noticeably different. The logical question is: Which one is the most valid?

For example, consider what happens when the superintendent of the "Sunnyday" district, knowing that staff members will each complete fifty hours of staff development activities, attempts to predict the staff development cost per participant. Which equation from Table 9 will provide the most accurate estimate? Using that known value in each of the five equations would yield the following different predicted amounts: $1,930, $1,847, $1,683, $3,156, and $2,120. Few budget officials would be comfortable with such a wide variation!

Several explanations for this variation in predicted values are possible. First, any statistical regression calculation is subject to error. Prediction in the behavioral sciences is often far from exact. The value predicted from a regression equation is exactly that: *a prediction.* The *actual* values will fall within a range of scores both higher and lower than the predicted value. A more accurate prediction may be possible if one were to use each of the formulas to predict costs for a given amount. By then

calculating the range of error associated with each predicted value, one could examine the amount of "overlap" in predicted values. It may be possible that the actual amount is to be found somewhere in this "overlap" area. Additional investigation along this line would be interesting.

A second, more intriguing explanation, relates to the tenuous nature of determining correlations based on data combined from several different groups. Even if the relationship between variables is similar for each individual group, combining such groups may produce misleading correlations. Furthermore, even though the data collection and analysis procedures in the four studies cited in this paper were consistent, the data were collected from groups of differing sizes, in differing years, and from different locations. It may not be possible to develop a single, accurate regression equation, based on the aggregation of the data provided by these studies, that would fit all possible districts. The cost of providing inservice programs may necessitate the establishment of differing funding categories based on the size of the district and other contextual factors. Thus, separate regression formulas for districts of differing sizes may be necessary.

This conclusion has significant implications for state legislative policy. If, indeed, the inservice funding requirements differ for districts of varying sizes, then legislative efforts which intend to provide equal per-teacher inservice funding statewide would seem to be based on invalid assumptions. It may be inappropriate to establish a state budget appropriation for inservice by setting a per-teacher amount and multiplying by the total number of teachers in the state. Likewise, it would be inappropriate to set a total dollar amount for all inservice programs statewide, and then divide the amount equally for all teachers. A more appropriate funding formula may well involve disproportional funding for districts of differing sizes. Legislative budget efforts need to give serious consideration to this possibility.

In conclusion, funding for inservice is only the first step. Continuous analysis of funding formulas, budget allocations, and actual expenditures is called for. The implementation of inservice funding at the state level will require close monitoring and supervision in its initial years. Modifications will need to be made as programs are implemented and experience gathered. The result may well be a more productive and vital inservice projects and staff development programs for teachers in all districts.

TABLE 1. TOTAL STAFF DEVELOPMENT COSTS AS A PERCENTAGE OF TOTAL OPERATING EXPENDITUES FOR REPORTED YEARS

District	Fiscal Year Studied	Staff Total Budgeted Expenditures	Development Costs	Percent of Total Expenditures
Seaside[M]	1977	$613,656,000	$9,368,000	5.72
Riverview[M]	1978	122,429,000	4,607,000	3.76
Union[M]	1978	123,943,000	3,953,000	3.28
Baleen[L]	1982	4,666,572	551,328	11.81
Beluga[L]	1982	7,562,071	701,508	9.28
Scrimshaw[L]	1982	4,485 726	280,693	6.26
Ptarmigan[L]	1982	6,748,070	384,944	5.70
Fruitland[V]	1983	14,961,300	463,801	3.10
Orchard[V]	1983	19,005,800	526,461	2.77
Vineyard[V]	1983	26,826,400	1,014,038	3.78
Capital[C]	1985	4,938,634	320,032	6.48
Newton[C]	1985	16,631,887	943,144	5.67
Lake Shore[C]	1985	10,681,618	613,433	5.74
Long Creek[C]	1985	8,674,265	481,286	5.54

[M]Districts from Moore and Hyde Study (1978)

[L]Districts from La Bolle Study (1983)

[V]Districts from Valiant Study (1984)

[C]Districts from Cole Study (1987)

TABLE 2. ADJUSTED STAFF DEVELOPMENT COSTS: MOORE AND HYDE STUDY

	District		
	Seaside	Riverview	Union
Total Budget	$291,091,350	$202,192,920	$185,422,900
Staff Development Costs	$ 16,662,654	$ 7,608,515	$ 6,528,426
Percent of Budget	5.72	3.76	3.52
Hours Per Participant	101.71	33.45	45.67
Cost Per Participant	$2,861	$1,856	$1,601
Ratio of Direct to Indirect Costs	0.17	1.00	0.33

TABLE 3. ADJUSTED STAFF DEVELOPMENT COSTS: LA BOLLE STUDY

	District			
	Baleen	Beluga	Scrimshaw	Ptarmigan
Total District Budget	$5,203,813	$8,432,658	$5,002,147	$7,524,945
Staff Development Costs	$ 614,800	$ 782,269	$ 311,008	$ 429,261
Percent of Budget	11.8	9.28	6.22	5.70
Hours Per Participant	253.40	189.00	133.50	127.90
Cost Per Participant	$ 11,078	$ 8,503	$ 5,540	$ 5,434
Ratio Direct to Indirect Costs	1.00	0.50	0.50	0.50

TABLE 4. ADJUSTED STAFF DEVELOPMENT COSTS: VALIANT STUDY

	District		
	Fruitland	Orchard	Vineyard
Total Budget	$16,166,401	$20,536,678	$28,987,212
Staff Development Costs	$ 501,159	$ 568,806	$ 1,095,717
Percent of Budget	3.10	2.77	3.78
Hours Per Participant	25.52	40.55	53.05
Cost Per Participant	$ 1,346	$ 1,334	$ 1,838
Ratio of Direct to Indirect Costs	0.22	0.10	1.00

TABLE 5. ACTUAL STAFF DEVELOPMENT COSTS: LA BOLLE STUDY

	District			
	Capital	Newton	Lake Shore	Long Creek
Total District Budget	$4,938,634	$16,631,887	$10,681,618	$8,675,265
Staff Development Costs	$ 320,032	$ 943,144	$ 613,433	$ 481,286
Percent of Budget	6.48	5.67	5.74	5.54
Hours Per Participant	105.10	67.50	57.10	54.10
Cost Per Participant	$ 3,596	$ 3,286	$ 3,178	$ 3,230
Ratio Direct to Indirect Costs	0.25	0.33	0.50	0.50

TABLE 6. CORRELATION VALUES

	St. Dev. Costs	S. D. % of Budg.	Hours/ Partic.	Cost/ Partic.	Ratio of Costs
Total	+0.99[M]	+0.99[M]	+0.95[M]	+0.99[M]	-0.53[M]
Budget	+0.56[L]	-0.15[L]	-0.20[L]	-0.14[L]	-0.52[L]
	+0.97[V]	+0.78[V]	+0.97[V]	+0.93[V]	+0.89[V]
	+0.99[C]	-0.65[C]	-0.53[C]	-0.58[C]	+0.12[C]
	+0.97	*-0.28*	*-0.25*	*-0.35*	*-0.05*
St. Dev. Costs		+1.00[M]	+0.97[M]	+0.99[M]	-0.57[M]
		+0.71[L]	+0.66[L]	+0.71[L]	+0.26[L]
		+0.91[V]	+0.89[V]	+0.99[V]	+0.97[V]
		-0.60[C]	-0.48[C]	-0.54[C]	+0.07[C]
		-0.17	*-0.14*	*-0.26*	*-0.12*
S.D. % of Budget			+0.96[M]	+0.99[M]	-0.57[M]
			+0.99[L]	+0.99[L]	+0.83[L]
			+0.62[V]	+0.94[V]	+0.98[V]
			+0.97[C]	+0.94[C]	-0.78[C]
			+0.94	*+0.96*	*+0.33*
Hours/Participant				+0.94[M]	-0.77[M]
				+0.99[L]	+0.82[L]
				+0.83[V]	+0.77[V]
				+0.99[C]	+0.90[C]
				+0.97	*+0.29*
Cost/Participant					-0.50[M]
					+0.85[L]
					+0.99[V]
					-0.88[C]
					+0.37

[M]Moore and Hyde Study
[L]LaBolle Study
[V]Valiant Study
[C]Cole Study
Values in italics are for all groups combined.

TABLE 7. REGRESSION EQUATIONS: STAFF DEVELOPMENT COSTS PREDICTED FROM TOTAL DISTRICT BUDGET

Study	Regression Equation	Standard Error of Estimate
Moore and Hyde	Y' = 0.098 X - 11676292.00	231680.33
LaBolle	Y' = 0.069 X + 82106.05	147700.16
Valiant	Y' = 0.049 X - 340844.53	67574.32
Cole	Y' = 0.054 X + 36626.95	15134.14
Combined Groups	*Y' = 0.048 X - 103780.51*	*1126467.38*

X = Value of Total District Budget

Y' = Predicted Staff Development Costs

TABLE 8. REGRESSION EQUATIONS: HOURS OF TRAINING PER PARTICIPANT PREDICTED FROM PERCENTAGE OF BUDGET EXPENDITURES FOR STAFF DEVELOPMENT

Study	Regression Equation	Standard Error of Estimate
Moore and Hyde	Y' = 29.08 X - 65.74	7.88
LaBolle	Y' = 20.44 X + 7.27	5.09
Valiant	Y' = 16.58 X - 13.63	8.84
Cole	Y' = 53.76 X - 243.93	5.03
Combined Groups	*Y' = 25.25 X - 50.67*	*20.81*

X = Percentage of Budget Expanded for Staff Development
Y' = Predicted Staff Development Hours Per Participant

TABLE 9. REGRESSION EQUATIONS: MEAN COST PER PARTICIPANT PREDICTED FROM PERCENTAGE OF BUDGET EXPENDITURES FOR STAFF DEVELOPMENT

Study	Regression Equation	Standard Error of Estimate
Moore and Hyde	Y' = 549.59 X - 275.57	50.51
LaBolle	Y' = 944.93 X - 159.28	151.72
Valiant	Y' = 532.59 X - 207.16	70.57
Cole	Y' = 415.89 X + 886.45	56.22
Combined Groups	*Y' = 1121.68 X - 2430.90*	*767.41*

X = Percentage of Budget Expended for Staff Development
Y' = Predicted Mean Cost Per Participant

TABLE 10. REGRESSION EQUATIONS: MEAN COST PER PARTICIPANT PREDICTED FROM HOURS PER PARTICIPANT

	Regression Equation	Standard Error of Estimate
Moore and Hyde	Y' = 17.12 X + 1074.03	192.24
LaBolle	Y' = 45.98 X - 451.81	162.99
Valiant	Y' = 17.25 X + 821.11	132.09
Cole	Y' = 7.86 X + 2763.70	27.29
Combined Groups	*Y' = 42.53 X - 5.63*	*628.58*

X = Hours Per Participant
Y' = Predicted Mean Cost Per Participant

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