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## ABSTRACT

School districts prepare annual budgets in order to have adequate funding available for their operations. Today's budgets require flexibility and adaptability as school-district finances and governmental regulations and guidelines change. This article discusses several types of budgets and budget preparation that utilize microcomputer technology. The formats include the line-item program, performance, and zero-base-budget arrangements. The newsletter briefly describes the development of microcomputer electronic spreadsheet programs and details how to set up a budget spreadsheet template using Lotus 1-2-3 software. The electronic spreadsheet is able to provide financial summaries, inventory-control listings, scheduling, staff and financial projections, and percentage allocation of resources. Individual modifications can easily be made as budgetary situations change and the electronic spreadsheet information is updated. One table depicts the segments of a budget-spreadsheet template. (LMI)

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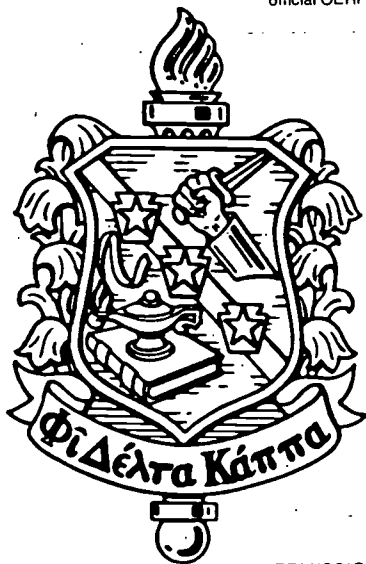
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All articles are written by members of the Trenton Area Chapter of Phi Delta Kappa.

— Marlene Fisher Gourley  
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Dr. Herman J. Hinitz has taught Chemistry, Advanced Placement Chemistry, Physics, Biology, Electrical and Electronic Engineering, Computer Technology and Applications, and Earth Science in the New York and Philadelphia Public Secondary Schools Systems. Dr. Hinitz has been an adjunct faculty member of Trenton State College and St. John's University. He has published, been a consultant, been involved with intensive short courses, and given presentations in the fields of chemical thermodynamics, enzyme biochemistry, solid state electronics, superconductivity, and computer based technology and applications. Dr. Hinitz dealt with the computerization, streamlining, coordination, and administration of New York State Regents standardized examinations involving an urban high school with responsibility for over three thousand students, and more than two hundred faculty and staff.

# PREPARATION OF SCHOOL DISTRICT BUDGETS WITH MICROCOMPUTER ELECTRONIC SPREADSHEETS

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School districts prepare annual budgets in order to have adequate funding available for their operations. Today's budgets require flexibility and adaptability, as school district finances, and governmental regulations and guidelines change (1 - 10). The projected expenses for the maintenance of current operations in the next fiscal year, as well as new anticipated expenses, are included. This article discusses several types of budgets, and then a budget preparation utilizing micro-computer technology.

The individual expenses at each of the cost centers in the school district can be summarized into a set of appropriate generalized categories. These values can then be totaled to obtain an overall amount. The proposed budget can be presented to the funding authorities (resident taxpayers and appropriate agencies at the municipal, county, state, and federal government levels, for example) for approval, adoption, and reimbursement. Micro-computer electronic spreadsheet programs can be used for the preparation and dynamic modification of the budgets.

The major functions of a school district budget are to: control funds available, maintain financial records of expenses and financial transactions, provide for sufficient funding for priority requirements, and to keep track of the flow of revenue into and out of the district's apparatus for monetary affairs. In the preparation of the budget estimate, a balance is sought between the revenue estimate and the expenditures estimate.

## **Budget Formats**

The forms that the budget estimate (1, 2) can take include line-item, program, performance, and zero-base budget templates.

Line-item budget arrangements can have the expenditure categories listed as administration, transportation, food services, instructional services, personnel, capital expenses, supplies, contractual services, etc. These categories focus on the services and commodities to be purchased with available revenues, rather than on services provided by the school district.

Program budget arrangements could have the expenditure categories itemized as high school mathematics, junior high school social studies, elementary school science, etc. These major organizational units can span several departments or agencies. These categories are used in the preparation of estimates of the costs of the resources needed for the services to be performed in moving towards specified goals and objectives. The anticipated results of the services to be performed are determined as a part of the budget preparation process.

Performance budget arrangements can have the expenditure categories enumerated as work units or cost centers such as: curriculum development costs, building repairs, etc. The program elements, functions, and activities are composed of individual work components. The work input and services output to be performed on the individual work components, are prepared as a part of the budget design process. A clear relationship is established between a service level

standard and the cost of the resource-time (people-hours) required for a particular performance level of achievement.

Zero-base budget formats have the expenditure categories as "decision packages" relating specifically allocated funds for particular goals, objectives, and activities. These decision packages provide information for alternative service levels, both lower and higher than the current level. A listing is included of the risks or consequences of not providing adequate funding for these possible budget arrangements at each of the alternative levels. A ranking system can be used to determine trade offs and funding levels, since a justification must be provided for each program and activity that requires an allocation of funds.

Zero-base budgeting can also be used together with any of the first three budget systems as a supplementary process in which decision packages or alternative budgets are prepared for each "decision unit" or program or service. Alternative service delivery systems such as private sector contracts or transference to another jurisdiction or district can also be included.

An assessment of the expenditure needs of the district, and then a projection of the cost of maintaining current services into the next year and beyond, can be made. It is then possible to set priorities for the allocation of limited resources among the various categories and choices available, and to determine an appropriate listing in the order of relative importance.

Needs assessment (1, 2) can be accomplished using existing information, such as demographic statistics, observed conditions, and appropriately formulated and delivered surveys. The projection of the costs of

maintaining current services into the future can serve as a minimum baseline for the allocation of the resources. The incremental budgets (line-item, program, and performance) accept the base as correct and add allocations to this base. Zero-base budgets allow relative priorities to be set within this base (as each item, program, request for funding, etc. is justified), as well as add to the base at a later point in the process.

### **Microcomputer Electronic Spreadsheet Programs**

In the late 1970s, an electronic spreadsheet program, Visicalc, was introduced, for use on the Apple II series of microcomputers. This electronic spreadsheet was able to deal more effectively with information in the spreadsheet cells. A spreadsheet cell is the rectangle formed by the intersection of a row with a column. The rows are numbered, down the left side, while the columns have letter designations. For example, cell B4 is located in the second column and in the fourth row, and cell D2 can be found in the fourth column and in the second row, as seen in Table 1. Each of these cells could contain numerical, alphabetical, or alphanumeric information, as well as computational formulas. This electronic spreadsheet provided the capability to make modifications in the values entered in the individual cells in the spreadsheet, and at the same time, to have the row and column sums, and other dependent variable data automatically calculated by the program.

Initially, the electronic spreadsheet provided the capability to allow business people to prepare financial statements and summaries more easily. Multiple financial pro-

jections, termed "what if" situations, were made feasible with this electronic spreadsheet. Different anticipated revenues and expenditures could be entered into the electronic spreadsheet, and the impact of these amounts on the final values could be readily determined. The development of more capable microcomputers, such as the IBM personal computer series, in the early 1980s, provided a basis for the development of more powerful electronic spreadsheet programs, such as Lotus® 1-2-3®, Quattro Pro®, and Excel®. The initial version of the electronic spreadsheet provided a matrix of approximately 250 columns by 2000 rows. In updated versions of Lotus® 1-2-3® and of Quattro Pro®, there was an increase to approximately 8000 rows, and with Excel® to approximately 16000 rows. Additional electronic spreadsheet programs became available, and were able to interchange information, through established protocols and procedures. Information could also be interchanged with word processing and with database management programs. Integrated programs became available which offered word processing, electronic spreadsheet, graphics, and database management application program capabilities within one operational package. A file of information could be prepared with one part of the package, and then modified by another segment of the package. The capability to exchange (or import and export) information with other popular microcomputer application programs was incorporated into these integrated packages or suites.

### **Budget Spreadsheet Template**

The preparation of a microcomputer electronic spreadsheet, which contains all of the relevant budget-  
information for an entire school

district, can be accomplished with presently available hardware and software. Limitations may be encountered with the capacity of the RAM (random access memory) in the specific microcomputer, and of the electronic spreadsheet. The operating system, applications program, and the budget spreadsheet files can rapidly use up the available RAM. As a result, the net or effective capacity of the spreadsheet may be limited by the size of the available RAM rather than the ability of the electronic spreadsheet program to control and manipulate a large matrix of individual cells. An objective assessment of both current and future hardware and software needs is helpful in dealing with these problems.

Using the line-item budget as the model, a general electronic spreadsheet template can be prepared for a school district budget. The line items, and the educational program items, the subtotals for each of these expenditure categories, and the grand totals are positioned in the appropriate locations in the two dimensional spreadsheet, as in Table 1.

The line items can be listed along the left side of the spreadsheet, while the educational program items can be listed across the top. The line items could include such expenditures as: salaries for administrative, supervisory, faculty, staff, and support personnel; fees for services provided to the school district on a contractual or consulting basis to architects, lawyers, accountants, printers, mechanics (involved with the repair and maintenance of buses, trucks, and automobiles); textbooks, library acquisitions, audiovisual materials, consumable and non-consumable instructional and administrative equipment and supplies; travel and transportation for students and personnel; insurance, utilities, federal, state and



local taxes; pension and social security disbursements; tuition and academic fees for academic advancement of personnel; interactions with other school districts; miscellaneous and/or special categories; and new and/or re-instituted activities, etc.

The educational program items could refer to expenditures in the particular subject areas, such as language arts, mathematics, social studies, science, music, art, modern languages, industrial arts, home economics, physical education; expenses of support areas such as guidance, building and central administrative functions, food and medical services, extracurricular activities, transportation, special education, computers for instructional and administrative usage; and other miscellaneous categories.

The line, as well as the educational program items, can be divided into smaller categories, as appropriate for the itemization of the expenditures. It is helpful to be able to obtain both horizontal and vertical subtotals for each of the line and educational program items, in addition to the totals for the major categories.

A small portion of the spreadsheet template is shown in Table 1. Some rows are present at the top of the spreadsheet containing title, educational program, subprogram, and expense center designations. Column A lists the numerical designations for each of the line items. Blank rows separate each of the line items for clarity and ease of locating information. Column B contains a one line brief description of the line item. This information allows this spreadsheet to be used by individuals who are less familiar with the financial information summaries. Columns C through L contain information for the first educational program item, which is sub-

centers in the school district. Column L is used for the (horizontal) subtotals of the line items.

In this example, this school district has three elementary schools, EL1, EL2, and EL3, two middle schools, MS1 and MS2, and one regional high school, HS. The central and secondary location administrative offices, CA and SA, and district wide expenses, DW, are also expense centers. The subtotal, ST, summarizes the line item expenses for this first educational program in the different expense centers.

The procedures and terminology provided with Lotus® 1-2-3® are used in the following examples. The spreadsheet program provides the ability to add the values of particular cells, utilizing algebraic type formulas of the form (+C8+D8+E8+F8+G8+H8+I8+J8+K8) in which the individual cells are designated. The formula is present in cell L8, and the normal spreadsheet display (and printout) provides the sum of the values in these cells, as the numerical value shown in cell L8. This formula can be copied to the next row to cell L9, with an automatic adjustment (by the electronic spreadsheet microcomputer program) of the relative cell addresses, to obtain (+C9+D9+E9+F9+G9+H9+I9+J9+K9).

A similar procedure can be used to obtain the vertical subtotals. For example, the formula (+C8+C10+C12+C14), present in cell C16, provides the sum of the values in these four cells. This formula can be copied to cell D16, again with an automatic adjustment of the relative cell addresses, to obtain (+D8+D10+D12+D14).

The spreadsheet program contains several built in mathematical, financial, statistical, database man-

agement, and logical operator functions which can simplify the calculations. They can be used to prepare appropriate tables and summaries of selected information. One appropriate function to use is @SUM, which can be employed to add a column or a row of values. It is possible to use the formula @SUM(C8..K8) in cell L8 to perform the same function as the previous longer formula. The formula in cell C16 could also be changed to @SUM(C8..C14) for the vertical sum. The copying process would change the relative cell addresses appropriately to obtain @SUM(C9..K9) and @SUM(D8..D14), respectively. Cells may remain empty until information becomes available, (since empty or blank cells provide a value of zero during the summing process).

If the second educational program segment, beginning in column M, is structured exactly as the first, then the spreadsheet program provides the capability to copy a rectangular array of cells, referred to as a spreadsheet range or block, from one part of the spreadsheet to another. If fewer columns are required, then the appropriate columns can be deleted from the copied range or block, and the formulas adjusted, for example.

The line item (horizontal) totals at the right side of the spreadsheet can be obtained through the sum of the values from the appropriate subtotal cells, using formulas of the general type (+L8+R8+AD8+AL8+AX8+BH8). Similarly, the educational program expense center (vertical) totals could use formulas of the general type (+C16+C24+C30+C34+C44+C58) to obtain the sum values.

A summary total of the line item values can be provided in a vertical column arrangement present to the left of, right of, above or below the main body of the spreadsheet. As

re entered or changed in the

spreadsheet cells, these values and totals can automatically change to reflect the new amounts. The ability to use windows on the monitor screen allows the side by side viewing of different parts of the spreadsheet. In this manner, the impact of changes in the budget on the final amounts can be quickly and easily seen. Some of the more capable spreadsheet programs offer the ability to dynamically link different cells in separate spreadsheets. It is also possible to link these cells with files prepared with other applications programs, such as word processing and database programs. When there is a change or an update of the value contained in a cell, which is dynamically linked with other cells and/or (word processing or database) files, the new value is also automatically updated in the other linked files. The reverse updating process is also feasible, moving from the word processing or database report to the spreadsheet. Some of the more powerful spreadsheet programs offer three dimensional relationship arrangements as matrices of approximately 250 columns by 8000 (or 16000) rows by 250 sheets or pages.

### **Additional Procedures**

Information can be entered into one budget spreadsheet from written summaries of the appropriate information. For more experienced individuals, it is possible to append or add values directly from other spreadsheets. Two spreadsheets can have the values in the appropriate cells algebraically combined (added or subtracted, for example), and have the final spreadsheet reflect the results of this combination. This procedure can be used with caution and after additional backup files have been provided for the initial individual spreadsheets.

"What if" financial projections can

be prepared to examine the impact of anticipated changes in population, expenses, funding, personnel, facilities, etc. on the final budget amounts. One or more values in a given range can be substituted into particular selected cells to determine the effects produced in other cells. Sensitivity tables can be constructed (by the spreadsheet program) to show the resultant outcome values with respect to the "new input values."

The spreadsheet program has the capability to begin with a particular final value (such as the total funding available) and to calculate the values of the variables that are needed to obtain that same final value. The "Backsolver" or "Solve For and Optimizer" or "Goal Seek and Solver" functions can be used for this type of calculation.

In these ways, it is possible to plan ahead and prepare appropriate contingency plans to be implemented at the appropriate times for given situations. "What if" projections can provide powerful budgetary projection capabilities, when used together with zero-base templates and/or with line-item, program or performance budget formats. The allocation of limited resources and finances can thereby be accomplished more efficiently and equitably.

If the hardware and software requirements of a particular microcomputer system do not permit the entire budget to be present on one spreadsheet, then two or more spreadsheets can be prepared with a coordinated placement of the information. Using some of the sophisticated hardware, firmware, and software ancillary options currently available, it is possible to view more than 25 rows and 80 columns on the monitor screen. The spreadsheet, or selected excerpts, can be printed in a smaller character size, as well as sideways, with the appropriate dot matrix, ink jet or la-

ser printer. A particular range or block of cells can be "printed to fit" on one page. Local area networks (LAN) and groupware programs can be used to transfer information more quickly than carrying paper and/or diskettes from one location to another. Groupware programs can provide the capability for several individuals at different terminals and locations to work on the same files at the same time.

## Summary

The preparation of the budget can be simplified and made less tedious through the use of the appropriate microcomputer programs. Administrative, faculty, and staff personnel can utilize spreadsheet and other applications programs to accomplish their work. Some of the automated data processing, which previously required a mainframe or minicomputer, may now be performed with a microcomputer. The electronic spreadsheet is able to provide financial summaries, inventory control listings, scheduling, "what if" staff and financial projections, and percentage allocation of resources, for example. Individual modifications can be easily made as budgetary situations change and the electronic spreadsheet information is updated. The currently available microcomputer technology can improve the efficiency of budget preparation and modification.

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# BLE 1. SEGMENTS OF A BUDGET SPREADSHEET TEMPLATE.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	...	IS
Line Item	Program or Subject Area	EL1	EL2	EL3	MS1	MS2	HS	CA	SA	DW	ST	EL1	EL2	EL3	...	Line Item Totals
	Mathematics	Science														
		Physical Science														
2																
3																
4																
5																
6																
7																
8	100	Adm Sal	127	78	55	21	45	125	17	22	14	504	109	55	65	150752
9																
10	127	SupySal	74	56	39	55	73	88	47	65	59	556	95	75	42	275189
11																
12	164	FcitySl	129	85	96	33	77	176	28	49	63	736	84	58	35	178635
13																
14	194.7	StatSal	78	24	15	15	27	24				168		21		34576
15																
16		Subtotal:	408	243	190	124	195	416	116	136	136	1964	288	188	163	639152
17																
18	200	TextBks	85	56	21	42	59	89	5	3	6	366	14	25	19	244244
19																
20	244.4	Library	42.		15		25	44			9	135		17		142626
21																
22	287.39	AV Eq		25	49		164		24	18	280			14		182526
23																
24		Subtotal:	127	81	36	91	84	297	5	27	33	781	14	42	33	569396
25																
7963																
7964		Program Item	5075	1640	2440	7420	7800	7600	7640	1800	1440	42855	2589	5890	3589	45976238
7965		Totals:														

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The "25th Anniversary Logo of the Trenton Area Chapter of Phi Delta Kappa," found on the cover of this issue, was designed by Drs. Herman and Blythe Hinitz, as co-editors of the Chapter Newsletter in 1995.

The "1995 Outstanding Newsletter Award Logo," found on the inside back cover of this issue, was presented to the Chapter on the basis of the 1994 - 1995 Newsletters, with Drs. Herman and Blythe Hinitz, as co-editors, after an international competition sponsored by Phi Delta Kappa.



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