A Report and Estimating Tool for

K-12 School Districts

California District Case Study

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Introduction

In the winter of the 2002-2003 school year, four school districts participated in a total cost of ownership (TCO) of the distributed computing project commissioned by the Consortium for School Networking with the sponsorship of the U.S. Department of Education and NCREL. The scope of the project from a technical perspective included end-user computing devices, network servers, local-area-network hardware and the labor costs associated with each of the components. Software, application service providers, content and curriculum development, and staff development and training were included as well.

Data from each district was used to develop a case study that reports pertinent TCO metrics, discusses the TCO process as related to the district, and provides background information on the district and the distributed computing environment. The metrics represent a baseline for the district from where they came. From this baseline, trending analysis can be performed. In addition, the process for data collection should be refined over time, as a first-time TCO analysis often requires a great deal of manual effort. Comparisons of your district to a case study or other districts are difficult to analyze, as there are many variables for differentiation.

There are four sections to each case study. The first is an overview of the district, and the general setting of the distributed computing environment. The second section contains the TCO metrics. The third section includes an interpretation of key selected TCO metrics. The fourth and final section discusses the TCO processes as they are related to the district.

Please refer to the section entitled "TCO Data Collection—Tables and Definitions" in the document "Preparing for TCO Analysis" for a definition of any of the table fields in this section.

Overview and General Setting

The California school district serves 148,000 students in kindergarten through grade 12 in an urban setting. There are 187 schools, including 16 high schools, 23 middle schools and 114 elementary schools. This California district is among the top 10 largest districts in the nation and practices a site-based management model. It should be noted that there is very little central control of the IT budget or strategy.

Background—A District in Transition

As an enterprise, the system is currently undergoing a review of organizational and business practices, including the technology effort. Currently, technology is organized into two major areas, one for business and administration and one for curriculum and instruction. A department responsible for facility operations has primary responsibility for telephony and for building design and improvement.

Business and Administration (IT): Standard Desktops, Distributed Governance

Business and administration IT has responsibility for many back-office operations in the district offices and in administrative/managerial offices within the schools. There is a concentrated effort to standardize business desktops by maintaining software standards as imaged for each computer deployed.

This group also maintains the enterprise resource planning (ERP) and student information systems (SIS) data systems and servers, and the district network. Operations, food services and transportation also maintain data systems and services outside the scope of responsibility of the main IT group, but utilize the standard desktop images as configured by IT, and sit on the same district network.

School business and administrative technologies are relatively unaffected by site-based decisions. Support from IT, however, is very limited for computers that are not within the prescribed standard and imaged through the efforts of IT.

The district has standardized on an Intel-based Microsoft Windows platform in business and administration. As machines are purchased, the district works with the vendors to provide a CD with images of standard applications, including legacy systems clients, specifically configured for them. Computers are purchased with a three-year warranty. District technicians provide warranty repair work and charge back to the participating vendors. IT supports the standard client devices.

This district is currently converting from legacy administrative system for ERP, HR and SIS to off-the-shelf packages provided by Peoplesoft (ERP and HR), Zengel (SIS) and 4GL (SIS/Special Education). Previously, it had migrated the legacy systems from a mainframe platform to a client-server environment.

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Educational Technology: No Standards Yet

Educational Technology (ET) works with the schools to provide support for student and teacher use of computers in the classrooms and laboratories. Support for computer resources deployed in the libraries is provided by other district staff.

Schools are encouraged to stay within recommended standards for hardware and software, but in reality, the schools are free to buy and use anything they have the money to purchase. They also accept all manners of computer donations and use them throughout the school. The instructional area is predominantly on the Macintosh platform. ET does not provide a standard image; however, ET provides assistance by working with site-based technology liaisons, both paid and unpaid positions selected and directed by the building principals.

There are also no software standards for instruction.

Other Technologies and Issues

A department for operations works directly with the schools and both major branches of technology. Cooperation among the departments is generally good and reportedly improving over time. IT and ET have input into the educational and other development specifications for buildings and retrofits.

There is an eight-year building modernization program (referred to as Project MM) that has been funded through a bond referendum. The objective of the project is to make improvements to the physical plants and the electronic capacity of the buildings in the district. As a result, each classroom will have computer access points on each wall, and provisions for electric power, HVAC and wiring closets are included. Prior to Project MM, 47 of the 180 schools had been upgraded.

Staff development is provided on a voluntary basis. Teachers and staff are also invited to participate in district and county school system staff development activities offered as both fee-based and gratis-based.

One of the challenges of the case study was collecting accurate, reliable data due to a lack of centralized administration. While California is attempting to rectify this situation, it will continue to face challenges bringing IT costs and strategy under control until that is accomplished.

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TCO Metrics

Overall Cost (in US$)

Unit	Total Cost	Direct Cost	Indirect Cost
Overall District Cost	$69,354,423	$22,423,531	$46,930,892
District Cost per Client Computer	$1,491	$482	$1,009

Direct Cost by Category

Unit	Hardware	Software	Direct Labor	External Application Providers
District Cost	$14,424,105	$296,000	$7,703,426	$0
District Cost per Client Computer	$310	$6	$166	$0

Hardware Cost by Category

Unit	Client Computer	Server	Network	Printer	Supplies
District Cost	$9,524,156	$2,925,000	$724,949	$1,250,000	NA
District Cost per Client Computer	$205	$63	$16	$27	NA

Hardware Inventory Ratios

Category of District Resource	Ratio
Students per Student Dedicated Client Computer	3.65
Teachers per Teacher Dedicated Client Computer	2.27
Non-Classroom Personnel per Non-Classroom Client Computer	1.35
Total Users per Total Client Computers	3.35
Client Computers per Printer	3.92
Client Computers per Server	71.54

Staffing Metrics

Direct Labor Category	Total Cost	Cost per Client Computer (US$)	Client Computers per Staff
Operations and Financial	$7,703,426	$165.67	336.8
Professional Development and Training	NA	NA	NA
Curriculum Development and Support	NA	NA	NA
Total Support	$7,703,426	$165.67	336.8

Interpretation of TCO Metrics

The California district could not collect its professional development and training, or curriculum development costs.

■ We believe that the most interesting metrics in this study are the ones that could not be collected. We also believe that the root cause of California's inability to measure (and thereby manage) costs related to professional training and development, and content and curriculum development lies beyond the scope of technology management. In order for a district to develop a clear, consistent district-wide curriculum technology strategy, the district must first address the issue of educational goals, and curriculum strategy to meet these goals. Without these two prerequisites, the development of a technology infrastructure supporting these goals will be impossible. While California is currently working on these initiatives, this structure has historically not been in place.

■ Staff development for teachers is offered on an *ad-hoc* basis, but no formal staff development program is in place. This is critical area where the district can create common funding, processes and practices for all schools. Such an initiative would also lead to the development of a central skills repository and potentially a more optimal application of instructional talent.

■ While no hard-cost data is available for these categories, any spending that is being done is not being leveraged on a district-wide basis. Therefore, the district is not achieving the maximum benefit from its investments.

California's software cost per client computer was $6.

■ Software costs are some of the most difficult to collect in any TCO study, because it is often purchased from a variety of vendors by a variety of individuals from a variety of sources within the district. At $6 per client computer, California's software cost is by far the lowest of any of the case study districts. The two probable reasons behind this are that procurement is so decentralized that much of the data could not be collected, and that financial resources to make these purchases are scarce. These factors have led to the presence of a variety of software packages in place, and therefore a variety of software images that need

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to be supported. The lack of coordination in the district, from both a technical and an academic perspective, has prevented the development of any standards. The lack of funding has made it difficult to replace older software with a standard, even if one was in place.

■ This diversity creates inefficiency from a technical and an academic perspective. The district loses leverage in technical training, has less of an ability to take advantage of volume purchasing discounts, and leaves itself vulnerable to technical problems related to interactions among configurations (for example, one product causing the other to fail or work unreliably). The current situation limits the ability of the teaching staff to share best practices in technology integration or learn from each other's mistakes. The operational inefficiency, combined with limited staffing, hinders the district from taking full advantage of its technology investments.

Two-thirds (67.7 percent) percent of the TCO (or $46,930,892) consisted of indirect costs.

■ Indirect costs include "underground" technology support costs borne by the end-user community such as peer support among faculty, staff and students, as well as the cost associated with downtime. It also should be noted that indirect support cost is twice that of direct labor cost, which is $22,423,531. Since indirect costs can typically range from 35 percent to 50 percent of total costs, this represents a huge opportunity for California schools to reduce indirect costs through a greater investment in direct costs. We believe that an investment in best practices and automation (while increasing management controls) can return a significant amount of time to each teacher's day. In our opinion, the responses indicate that underground support is likely significant and represents a <u>key opportunity for improvement</u>.

The ratio of operations and financial staff to client computers was 336.8 to one.

■ This ratio is a key driver of the indirect costs. This ratio is higher than all other districts (meaning fewer computer technicians are available to help teachers and students), and hints at the underground support mentioned previously. Gartner would recommend reviewing support ratios for the Windows environment. A rate this high means that California schools have limited resources to effectively support their environment. It is no surprise that indirect costs are two-thirds higher than direct with this support ratio.

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■ It is important to note that these are only the cost implications of the current environment. California schools may find it difficult to implement student information systems and curriculum-based initiatives with this low a ratio of support. While educational (content and curriculum) IT costs were not available, Gartner would expect issues associated with their timely deployment given the under-staffing.

Only 39 percent of the direct labor cost for operations and financial support came from the formal technology support group. The majority of these support costs (61 percent) came from classroom staff, or non-classroom administrative staff.

■ There is a real opportunity to rationalize the workload distribution based on skills, efficiency and cost of labor. With a more standardized infrastructure, it is likely that the formal technology support personnel could handle most if not all of the labor involved in the classroom environment. This would lead to economies of scale, which would allow the district to gain more utility out of its technology investment at a lower price. In this scenario it should also be possible for teaching personnel to spend more time with students or in other more traditional roles.

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The TCO Process

The California district was the last of the four case study subjects to be interviewed. The district entered the TCO process with no cost modeling experience, but they enthusiastically embraced the concepts presented.

Because of the size of the district, and the site-based management structure in place, California took the longest time to collect the data required for the analysis. Data was pulled from disparate sources and there was a great deal of reliance on the memories of individual staff members, and on estimation.

The district happened to be going through a budgeting exercise at the same time it was doing the TCO study. These activities, while separate efforts, complemented each other from a data collection and analysis perspective. For example, the data collection effort for labor could not have been justified without the budget exercise. The results showed the true level of staffing that was in place when organizational boundaries were ignored. The presence of this information opened the door for a budget discussion of resource requirements based on data, and not opinions or emotions.

There was no formal information technology asset management (ITAM) repository in place to provide data for the study. The lack of technology standards is a hindrance in developing such a repository. When a technology inventory becomes large and diverse, there tend to be more and different types of items that need to be tracked. This diversity increases the likelihood that automated discovery tools will have difficulty recognizing technology in place. Diversity also increases the complexity of the inventory record that needs to be maintained. Therefore, the district's efforts to streamline its inventory will dovetail nicely into efforts to improve asset management and to continue TCO measurement.

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Definitions

Total Cost   Includes all costs within the model. It is a balanced look at what it truly takes to support a computer for the district. The metric includes direct and indirect costs.

Direct Costs   Include all technology and direct labor costs incurred by the school district during the study period (hardware, software, external application providers and direct labor).

Indirect Costs   Include all of the labor incurred by the user community for the study period. Indirect labor includes the costs of users supporting one another, spent in training classes, casual learning, self support, user applications development and downtime costs.

Hardware   Includes the annual costs for client computers, peripherals, servers, network equipment and printers.

Software   Includes the annual costs for all software running on client computers and servers. This would include infrastructure software, educational administrative software and personal productivity software, as well as content- and curriculum-specific software.

Direct Labor   Includes burdened salaries from personnel whose job role includes operations and financial support, professional training and development or curriculum development.

External Application Provider   Includes all costs associated with organizations that provide the use of applications, and associated services to customers.

Client Cost per Client Computer   Measures the annualized cost of personal computers, and peripherals divided by the total number of client computers.

Server Cost per Client Computer   Measures the annualized cost of servers divided by the total number of client computers.

Network Cost per Client Computer   Measures the annualized cost of network equipment (hubs/routers/switches, etc.) divided by the total number of client computers.

Printer Cost per Client Computer	Measures the annualized cost printers divided by the total number of client computers.
Students per Available Client Computer	Includes the total number of students divided by the total number of client computers located in classrooms, libraries, media centers, labs, etc., along with the total number of student dedicated client computers, not including student-owned equipment.
Teachers per Teacher Dedicated Client Computer	Includes the total number of classroom teachers divided by the total number of client computers dedicated for use by these individuals.
Non-Classroom Personnel per Non-Classroom Personnel Client Computer	Includes the total number of non-classroom personnel divided by the number of client computers dedicated for use by them.
Client Computers per Printer	Includes the total number of client computers divided by the total number of printers.
Client Computers per Server	Includes the total number of client computers divided by the total number of servers.
Operations and Financial Cost	Measures the total personnel, and vendor costs associated with "hands-on" labor, and help-desk support around client computers, servers, printers and network equipment. It also includes any costs around planning and process management, finance and administration (budgeting, procurement, asset management, etc.), and physical database administration.
Professional Development and Training costs	Includes training of personnel to provide familiarization and proficiency with the operation of equipment and software to carry out school tasks, whether instructional or administrative.
Curriculum Development and Support costs includes	Labor involved in integrating IT into the teaching and learning process.
Client Computers per Staff Metrics	The number of operations and financial, professional development and training, and curriculum development and support personnel are divided by the total number of client computers to create client computers per staff metrics. Looking at the data this way tends to normalize for high or low salaries when making comparisons.

Related Documents

Please refer to these documents (available at the www.classroomtco.org Web site) for additional information regarding TCO in the K-12 environment.

Why TCO Matters

Necessary reading before getting started

Preparing for TCO Analysis

Input fields required for the Web-based TCO Tool and extensions for further evaluations

The Web-based TCO Tool

A review of the Web-based TCO Tool

Utah District Case Study

A suburban district with 48,000 students

Minnesota District Case Study

A rural district with 4,000 students

Pennsylvania District Case Study

A rural district with 2,500 students

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