



A Report and Estimating Tool for K-12 School Districts

Minnesota 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 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 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 Minnesota school district is a system of eight schools serving 4,100 students in kindergarten through grade 12. Five of the schools—the high school, the middle school and three of the six elementary schools—are located in or near a town center and three elementary schools are situated in more remote, rural settings.

All the buildings are networked and connected, using a frame relay wide area network, to the district central office. Computer technology throughout the district is deployed and supported by district technology staff. All but a few of the desktops are standardized on a single operating system and connected to the LAN and WAN. Users are provided with 100 megabytes of storage at the district office and are discouraged from storing data on the computers that they use. There is a high degree of central office control in the district.

Total Cost of Ownership Metrics

Overall Cost

Unit	Total Cost	Direct Cost	Indirect Cost
Overall District Cost	\$1,217,132	\$948,893	\$268,239
District Cost per Client Computer	\$1004	\$783	\$221

Direct Cost by Category

Unit	Hardware	Software	Direct Labor	External Application Providers
District Cost	\$300,300	\$62,500	\$546,500	\$39,593
District Cost per Client Computer	\$247	\$52	\$451	\$33

Hardware Cost by Category

Unit	Client Computer	Server	Network	Printer	Supplies
District Cost	\$244,800	\$35,200	\$6,800	\$6,000	\$7,500
District Cost per Client Computer	\$202	\$29	\$6	\$5	\$6



Asset Metrics

Category of District Resource	Ratio
Students per Student Dedicated Client Computer	4.4
Teachers per Teacher Dedicated Client Computer	NA
Non-Classroom Personnel per Non-Classroom Client Computer	1.1
Total Users per Total Client Computers	3.7
Client Computers per Printer	14.3
Client Computers per Server	101.0

Staffing Metrics

Direct Labor Category	Total Cost	Cost Per Client Computer (\$US)	Client Computers per Staff
Operations and Financial	\$175,500	\$145	202
Professional Development and Training	\$117,000	\$97	418
Curriculum Development and Support	\$254,000	\$210	112
Total Support	\$546,500	\$451	62

Interpretation of TCO Metrics

There were no teacher-dedicated computers in the Minnesota School District. (Ratio N/A)

The Minnesota district deployed 95 percent of its desktop and mobile clients in instructional areas. None of the classroom computers are intended for the exclusive use of teachers, although some of the teaching staff tended to dedicate one of their classroom computers for their own use. The practice of having dedicated computers for teachers allows them more flexibility regarding their use of the device. It also eases security concerns related to access to records. The district dealt with these issues by implementing roaming profiles so that each user could access their own data (and only their own data) from any device.

The Operations and Financial cost per client computer was \$145. The client computers per Operations and Financial staff was \$202.

The two factors that drive these metrics are the efficiency of the technology staff and the cost per staff. Some important issues in this district were:

- The district used a standardized set of software (a district approach rather than school by school or teacher by teacher). This helped the district avoid configuration and conflict problems that often come with supporting a wide variety of software.



- Because of the high level of standardization, the technical staff was able to easily re-image every desktop each year. The proactive approach may reduce the number of problems that the staff confronts during the school year.
- The district technology was relatively new. Most of the client hardware was obtained through a leasing arrangement initiated in 2000. A buyout of the desktop computers is anticipated when the lease period expires at the end of the 2002-2003 school year.
- The average costs (burdened salary) per teacher, technology staff, and administrative staff member were \$40,000, \$24,750, and \$18,000 respectively. The relatively low cost per staff was primarily due to the rural location of the district. It is important to consider this when comparing cost metrics of districts in different locations. The client computers per staff metrics normalize the data for the salary differences.
- Eighty-six percent of the operations and financial direct labor cost came from formal IS staff, and only 14 percent came from teachers. While we have not collected extensive data regarding sources of labor yet, we believe this is a favorable ratio. In other words, the district is increasing efficiency by having lower cost but more technically competent staff perform technical duties. In some labor markets, technical staff may earn as much or more than certified teaching staff. This was not the case in Minnesota.

The professional development costs per client computer, and the content and curriculum development costs per client computer were \$210, and \$451 respectively.

These costs represent “getting the most out of technology” rather than providing and supporting the technology itself, which is covered in the operations and financial category. It is interesting to note that this district spends more on each of these functions than in operations and financial support.

One of the reasons behind this may be the variety of staff supporting these functions. Fifty-eight percent of the labor for these functions came from technology staff, 24 percent came from non-classroom staff, and 17 percent came from teaching staff.

Because of the variety of personnel involved in this process, there is no degree of certainty as to the relative involvement of the technology infrastructure in day-to-day instructional activities. A more formal process of assessing the integration of technology is critical, especially in view of the technology requirements established by the No Child Left Behind Act of 2001. The level of instructional involvement with technology is a somewhat unanswered question. *Readers should note that the degree of classroom use of computers is an important factor in comparing relative costs.*



The software cost per client computer was \$52 and the external application provider cost per client computer was \$33.

In analyzing the mechanisms the district used to provide applications it was found that 39 percent of the costs were from external application providers. This was primarily because the district makes use of a financial/business data system (accounting, budget and payroll) that is hosted by a higher education entity outside the district. The remaining 61 percent of application costs were due to software purchases.

In analyzing the types of applications purchased by the district, it was found that 47 percent of the costs were for infrastructure software (primarily Microsoft licensing). The district has little control over these costs.

Twenty-nine percent of the applications costs were content or curriculum related. The district discourages the purchase and installation of software that has not been evaluated and licensed for all content and curriculum of the same grade level. When a piece of software is proposed for use and accepted, the district makes every effort to secure an enterprise license. At the time of the study, the Minnesota district had compiled a set of references to Web-based freeware that is matched to the curriculum.

The remaining 24 percent of applications costs were from educational administrative applications such as the student information system.

Twenty-two percent of the total cost of ownership (or \$268,239) consisted of Indirect costs.

Indirect costs include "underground" technology support costs borne by the end-user community such as peer support, and the cost associated with downtime. Indirect costs for the district were reported based on staff interviews rather than a user survey. For this reason we are less confident in these results than in some of the other metrics presented. Many of the practices that help reduce direct labor may also reduce indirect labor. Factors driving down indirect costs could have included:

- Deployment of new and standardized hardware, which made training simpler.
- The presence of mature processes for software deployment, which reduced user labor in the software installation process.
- Re-imaged each computer every year. This practice may have eliminated configuration anomalies that may have been introduced throughout the previous school year. These conflicts could have resulted in users seeking and providing support as well as experiencing downtime.



The TCO Process

Of the four districts in the Case Study set, the Minnesota district had the easiest time collecting and explaining the costs associated with the distributed computing environment. The relatively young shelf life of the hardware inventory contributed, but the school system has also established a stable technical environment in which the users are respected and supported. Throughout the interview process, the district technology director was able to retrieve much of the required data from electronic files in his possession or from information that was provided by other central office staff. Other than attempts to collect Indirect Costs, there was little reliance on institutional memory or estimation.

The data collection, however, was still primarily manual in that it required the location and interpretation of disparate data sources. For example, the hardware costs were extrapolated using lease payment records. Fortunately, the district had centralized buying practices. This reduced the number of sources needed to collect the data. If schools or teachers were allowed to purchase equipment on their own, the data collection would have been much more complicated.

There were no formal inventory systems or procedures in this district. The establishment of an Information Technology Asset Management (ITAM) repository would have helped move the district further along on the TCO Maturity Model. Improved asset management also might allow the district to pursue other types of more in-depth analyses. For example, with a better understanding of the asset inventory, the district might be able to analyze the cost associated with client computer power consumption. This would be almost impossible given the current state.

As with each of the case study participants, the Minnesota district was left to estimate the indirect labor (non-budgeted, informal) costs. In the opinion of the IS staff, the high degree of standardization minimized the amount of indirect costs incurred. That situation may change if the district is not able to adopt a replacement cycle for end-user devices before they become outdated.

It appears that the Minnesota district is well positioned to raise its levels of TCO process maturity and leverage the Web-based TCO tool to drive and measure efficiency/value initiatives. The basic procedures for collecting and maintaining the TCO data are within grasp. With the addition of a formal inventory process and end-user surveys, the school district should be able to collect information with greater levels of detail and reliability.



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 both 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 Total Cost of Ownership (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

California District Case Study

An urban district with 140,000 students

Utah District Case Study

A suburban district with 48,000 students

Pennsylvania District case Study

A rural district with 2,500 students



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