Report: Overview of Information Technology Services – June 2016

Abstract:

Information Technology in Richland School District Two supports all of the operational, administrative and instructional technology requirements of the school district. External performance reviews have reported that the district has been ahead of most other peer school districts in the implementation of educational technologies. The district continues to be an education technology model for other districts as demonstrated by the continued interest in site visits to Richland Two by educators from around the state and the nation; hundreds of teachers and district decision makers have visited Richland Two in the last few years. One-to-One computing, innovation and the underlying infrastructure are noted areas of interest by visitors. Technology in Richland Two has been recognized locally and nationally and has earned awards including the NSBA's District Salute Award, the S.C. School Boards Association's Saluting Student Success Award, two Palmetto Pillar Awards, and the ISTE Sylvia Charp Award for effectiveness and innovation in the application of technology.

Introduction:

The Richland School District Two Information Technology Services department is organized according to its three primary functional areas. Those areas are:
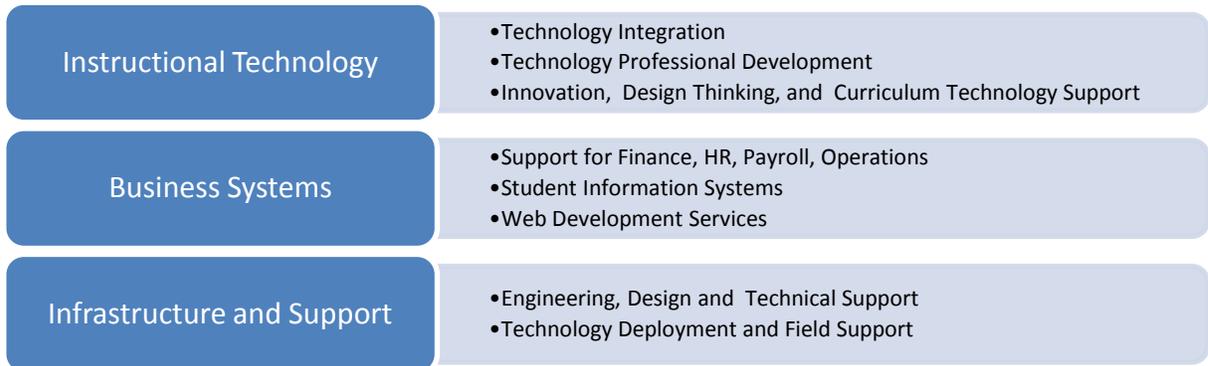
Instructional Technology	• Technology Integration • Technology Professional Development • Innovation, Design Thinking, and Curriculum Technology Support
Business Systems	• Support for Finance, HR, Payroll, Operations • Student Information Systems • Web Development Services
Infrastructure and Support	• Engineering, Design and Technical Support • Technology Deployment and Field Support

Figure 1: Information Technology Functional Areas

Organization of this Report

This *Overview of Information Technology Services* report is divided into a series of three sub-reports, each providing an overview of the three functional areas listed in Figure 1 above. Each of the areas will be presented – one per month during June, July and August – beginning with Infrastructure and Support and a discussion of infrastructure sustainability and reinvestment.

Part I: Infrastructure and Support

The Infrastructure and Support area of IT provides services in the following areas:
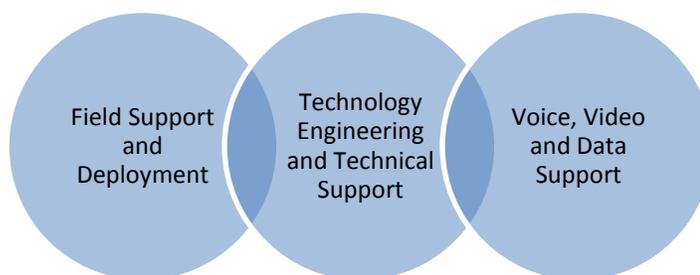

Field Support and Deployment

Technology Engineering and Technical Support

Voice, Video and Data Support

Figure 2: Infrastructure and Support Functional Areas

Sub-functional Area 1: Field Support and Deployment

The field support and deployment team is made up of 20 field support technicians divided into three support teams. Two of the teams are organized into 8 field support technicians each and have assigned groups of schools for delivering service. A third team consists of 4 field support technicians who are flexible for district-wide support and who form a task force for addressing technology issues that are more time consuming or may be managed as a special project, or may be designed as a "surge" team for large, seasonal projects. Each of the three teams has a team captain for work coordination and supervision.

The field support teams provide the following services:

- Service and Support / Work Order Response: Field Support Technicians/Teams are assigned groups of schools on a rotational basis where they resolve work orders submitted by schools and departments. Work orders can be any request for technology help that cannot be resolved locally at the school.

Work Orders in 2015-16

19,074

Figure 3: Total Work Orders Submitted during 2015-16 School Year

- Work Order Statistics:

Quantity: Between August 1, 2015 and June 7, 2016, there were more than 19,000 work orders submitted.

Resolution Time: 58.8% of work orders are resolved in 7 days or less. 72.9% of all work orders are resolved in 15 days or less. Examples of the remaining aged work orders older than 15 days are typically the result of unique problems or requiring additional resources. Situations may include parts on back order, requests put on hold, or device repair that has been queued for batch repair work

(Chromebook repair). The average daily age from a 12 month sampling for all work orders is 14 days. *Please note that the age duration includes weekends and holidays.*
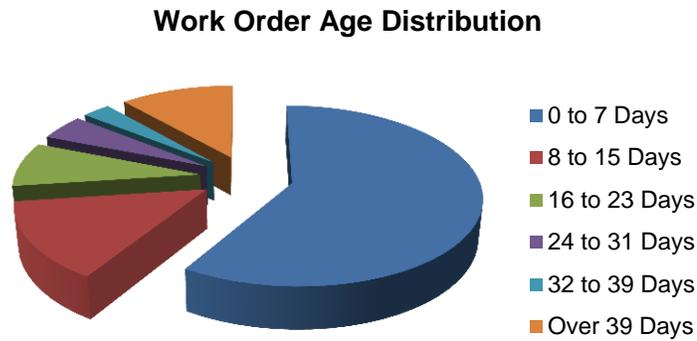
Work Order Age Distribution

Figure 4: Work Order Age Distribution. Age includes Weekends and Holidays.

- <u>Technology Device Statistics:</u> The field support teams invest a large proportion of their time delivering support for student and staff computing devices. These services include resolving software and operating system issues, repairing Windows laptop and desktop computers, and in general support and repair services for the 1TWO1student computing initiative.

  The total quantity of staff and student computing devices is 43,424 and is broken down into the following device types and resulting inventory percentages:
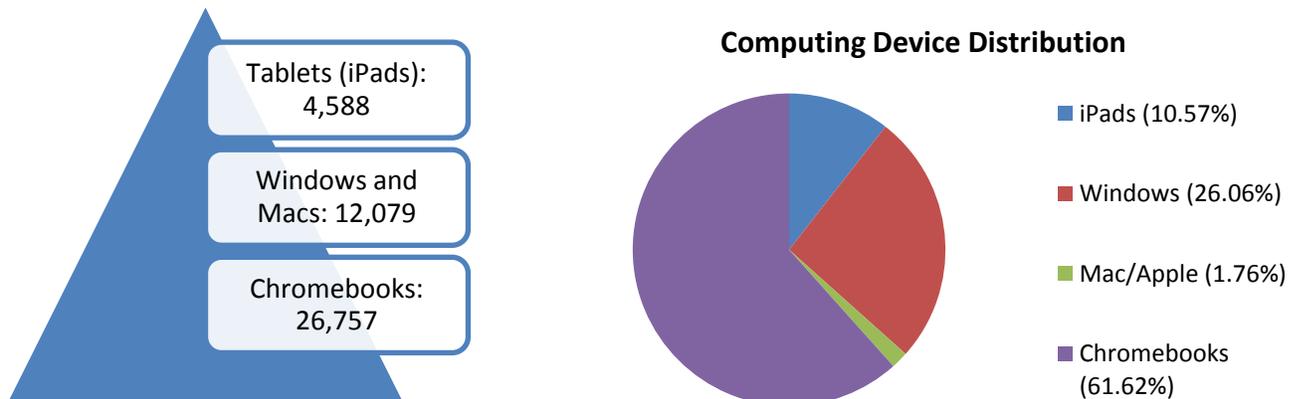

Tablets (iPads): 4,588

Windows and Macs: 12,079

Chromebooks: 26,757

Computing Device Distribution

- iPads (10.57%)
- Windows (26.06%)
- Mac/Apple (1.76%)
- Chromebooks (61.62%)

Figure 5: Student and Staff Computing Device Distribution

- <u>Technician to Device Ratio:</u> In considering service level loads, the district currently has a ratio of one technician for every 2,171 computing devices.

- <u>Device Ratio Comparison to Other Districts:</u> The following list ranks several other S.C. school districts by device-to-technician ratio from highest to lowest:

#1 Charleston County School District	2,775:1
#2 Greenville County School District	2,294:1
#3 Richland School District Two	2,171:1
#4 Lexington School District One	1,683:1
#5 Berkeley County School District	1,545:1
#6 Richland School District One	767:1
#7 Kershaw County Schools	676:1

- **Technology Deployments:** The field support teams also execute the deployments of technology resources. Examples include: Chromebook rollouts, computer equipment replacement cycles, movement of equipment due to facility maintenance, computer lab additions, and new facility implementations. Examples of large rollouts include a 6,000 Chromebook rollout this summer for high schools, and a 2,000 unit Windows computer replacement project that is underway.

- **Related Technology Support:** The field support teams are also instrumental in providing a variety of technology and technical support services for schools, classroom teachers, and school and district administrators that covers a wide range of products and processes ranging from digital microscopes, to streaming video processes, point-of-sale devices, biometric scanners, and audio/video presentation systems.

Sub-functional Area 2: Technology Engineering and Technical Support

The Technology Engineering and Technical Support staff is made up of the Director of IT Operations (who manages the day-to-day operations of the Infrastructure and Support area), one Senior Systems Engineer, one Systems Engineer, and one Systems Support Specialists II.

The Technology Engineering and Technical Support staff provides the following services:

- Overall network engineering services
- Design collaboration and operation of the district data center
- Wide area network design and operation services
- Local school networks
- Data communications
- Video Distribution
- Data Backup and Disaster Recovery Services
- Data and Network Security Services
- Database Administration
- Automation of database processes
- Technical implementation and commissioning of software applications

The engineering staff designs the implementations and supports the following examples of components that makeup the district's network and system infrastructure:
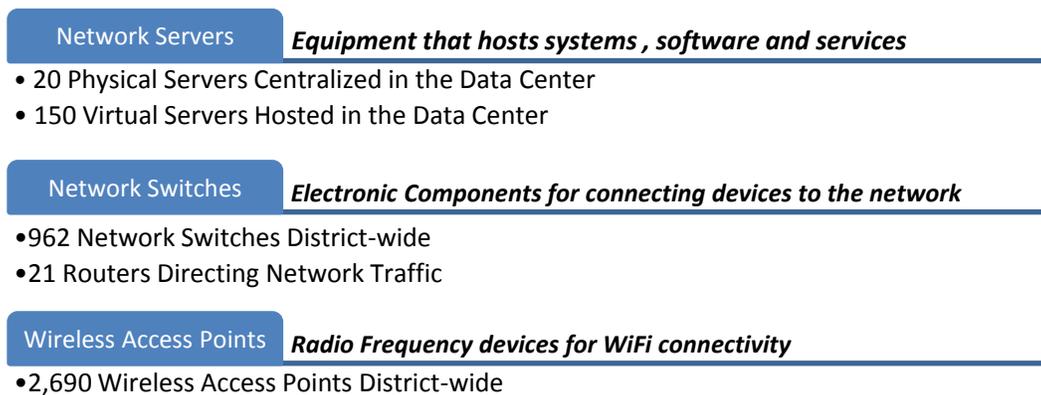
Network Servers — *Equipment that hosts systems, software and services*
- 20 Physical Servers Centralized in the Data Center
- 150 Virtual Servers Hosted in the Data Center

Network Switches — *Electronic Components for connecting devices to the network*
- 962 Network Switches District-wide
- 21 Routers Directing Network Traffic

Wireless Access Points — *Radio Frequency devices for WiFi connectivity*
- 2,690 Wireless Access Points District-wide

Figure 6: Quantities of Sample Infrastructure Components

Sub-functional Area 3: Voice, Video and Data Support (Telecommunications)

The voice, video and data support functions of the district are generally managed by two telecommunications technicians with assistance from the systems engineer and one field support team captain.

The Voice, Video and Data Support team provides the following services:
:
- Management and maintenance of the district telephone systems
- Management and maintenance of all data cabling
- Management and maintenance of the district fiber optic wide area network
- Responding to Public Utility marking services and requests
- New construction data and voice cabling design
- Coordination of cabling contractors
- Interactive Board and Projector maintenance

The Voice, Video and Data support team supports the following examples of telecommunication components within the district's communications infrastructure:
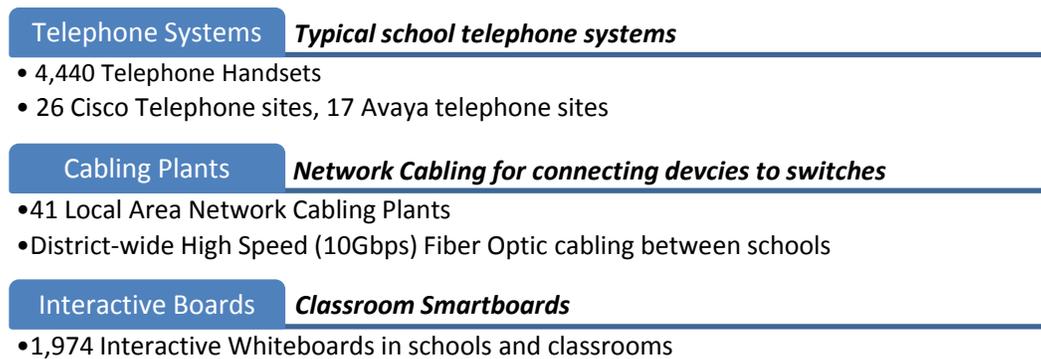
Telephone Systems — *Typical school telephone systems*
- 4,440 Telephone Handsets
- 26 Cisco Telephone sites, 17 Avaya telephone sites

Cabling Plants — *Network Cabling for connecting devcies to switches*
- 41 Local Area Network Cabling Plants
- District-wide High Speed (10Gbps) Fiber Optic cabling between schools

Interactive Boards — *Classroom Smartboards*
- 1,974 Interactive Whiteboards in schools and classrooms

Figure 7: Quantities of Voice, Video and Data Components

Technology Funding and Infrastructure Sustainability

Technology funding in Richland School District Two has generally been made possible through the following sources:

- General Fund Allocations
- Capital Expenditure Funds (8% General Obligation Bonds)
- E-Rate Funding
- Bond Referendum Funds (New schools, Initial 1TWO1 Startup Costs, Fiber Project)
- State Funding (K-12 Technology Initiative, Professional Development Funds)

To gain an understanding of each funding source, below are brief descriptions of those sources:

General Fund Allocations

The district general fund has allocated funds for technology outside of personnel expenses. These allocations are generally considered "discretionary" funds, and are typically used for operational expenses that cannot be funded from capital expenditure funds. (e.g. Capital expenditure funds can purchase a computer, but cannot pay for the network cable to connect it the network because the cable is a supply item while the computer is capital asset).

Below is a comparison of general fund allocations from 2006-07 to present. It is important to note that during the budget shortfall years of 2006-2008, each district-level department participated in extensive budget cuts in order to balance the general fund budget. In the years since the general fund budget cuts, the continuing financial climate has made restoring those funding levels impractical.
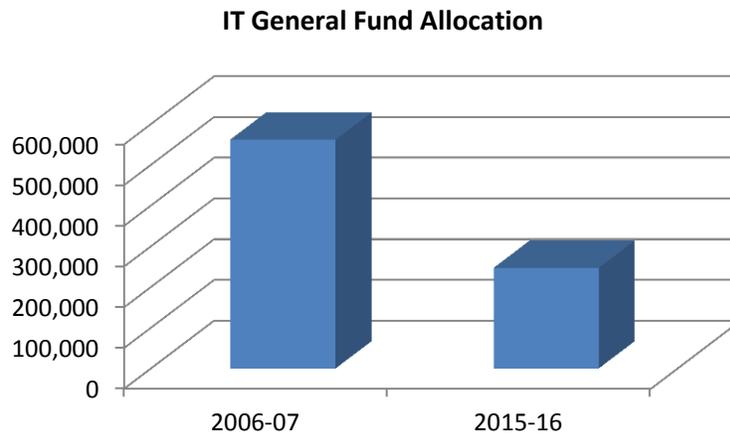
IT General Fund Allocation

Figure 8: General Fund Allocations for Technology

Capital Expenditure Funds

Capital Expenditure Funds have been the mainstay of technology funding for many years. As illustrated below, the capital expenditure funding levels peaked in 2014-15 and have decreased by slightly over $1 million since that time.
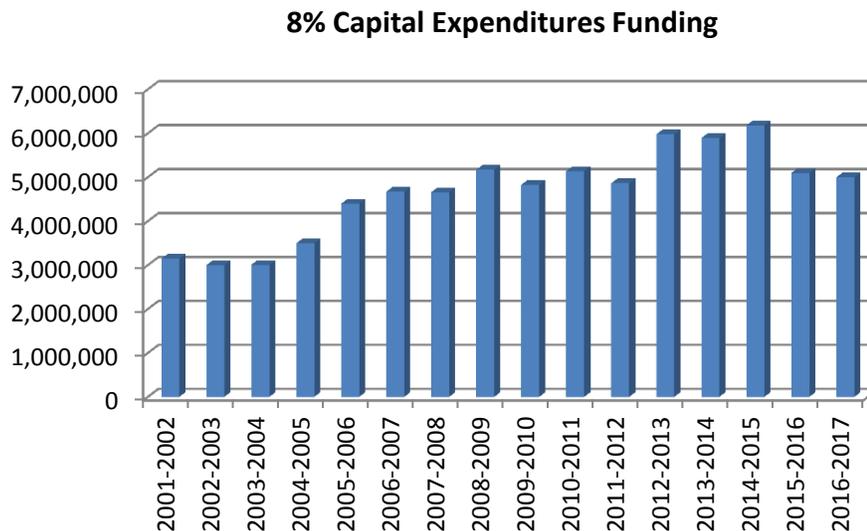
8% Capital Expenditures Funding

Figure 9: Capital Expenditure Technology Funding

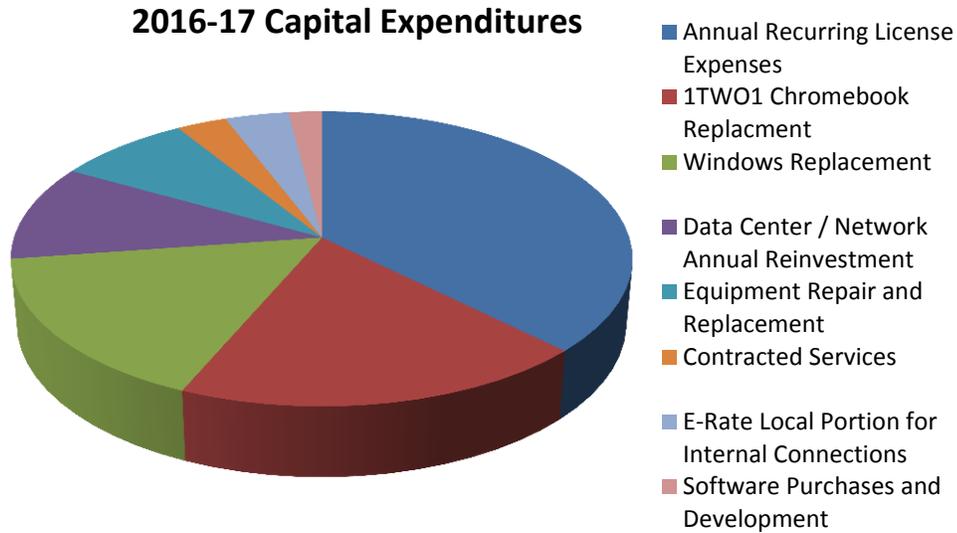The Chart below illustrates the expenditure categories of the 2016-17 Capital Expenditure Funds:

2016-17 Capital Expenditures

- Annual Recurring License Expenses
- 1TWO1 Chromebook Replacment
- Windows Replacement
- Data Center / Network Annual Reinvestment
- Equipment Repair and Replacement
- Contracted Services
- E-Rate Local Portion for Internal Connections
- Software Purchases and Development

Figure 10: Capital Expenditures Category Breakdown

Federal E-Rate Funding

The Universal Services Administrative Company (USAC) administers the federal E-Rate program for schools and libraries. Historically, the E-Rate program has provided certain expense reimbursements to schools and libraries in the following two areas:

- Telecommunications expenses (Local, Long Distance, and Cellular Expenses)
- Internal Connections (Network Equipment)

Since the inception of the program in 1998, Richland Two has qualified only for Telecommunication Expense reimbursements due to the district not meeting the higher levels of free or reduced lunch percentages needed to qualify for additional discounts in the area of Internal Connections (typically 90% Free/Reduced Lunch needed for Internal Connections).

Through the E-Rate program, the district has received E-Rate funding (illustrated below) as funding augmentation for information technology projects.

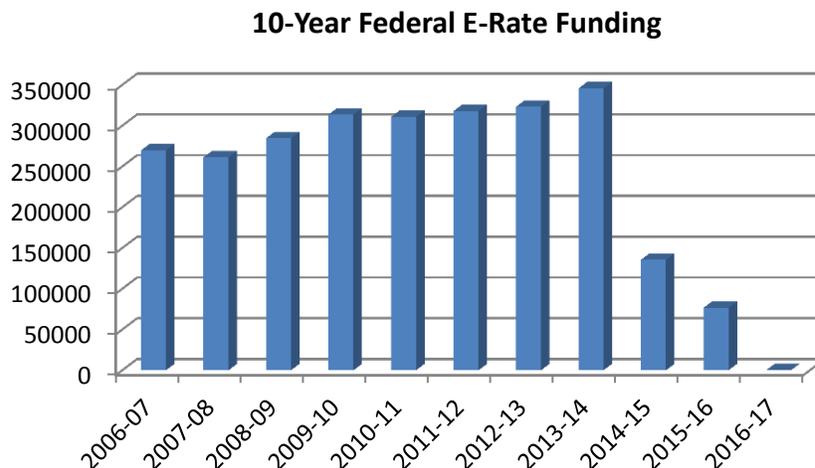## 10-Year Federal E-Rate Funding

Figure 11: Richland Two E-Rate Funding

In July, 2014, The FCC adopted the E-Rate Modernization Order with the aim to focus on providing all schools and libraries nationwide with funding for broadband Internet service and wireless internal connections rather than discounts on telecommunications. (Please note that South Carolina has been providing all schools with broadband Internet access for 20 years through the S.C. K-12 Technology Initiative, which means that the E-rate Modernization Order does not help S.C. districts in this regard). Richland Two is, however, seeking discounts for internal connections under the new rules.

One result of the E-Rate Modernization order is the elimination of telecommunication reimbursement funding for Richland Two through a phase-down of the funding. The current fiscal year (2015-16) is the final year of reimbursements for telecommunications.

Going forward with E-rate funding, the district is currently applying for funds that will essentially create a cost share of the expenses related to the sustainability of the district's networking infrastructure. The district is eligible for a 60% discount on networking equipment that will be paid by the E-rate program.

State Technology Funding

Over time, various levels of funding have been allocated by the state for technology hardware purchases. These allocations came from sources such as EIA funds and the K-12 Technology Initiative funds. During the past two years, Governor Haley has urged that additional funding be made to districts for acquiring one-to-one computing or for the infrastructure to support one-to-one computing. During this time, Richland Two has received the following funds that have been used to offset the sustainability cost of our 1TWO1 Student Computing initiative:
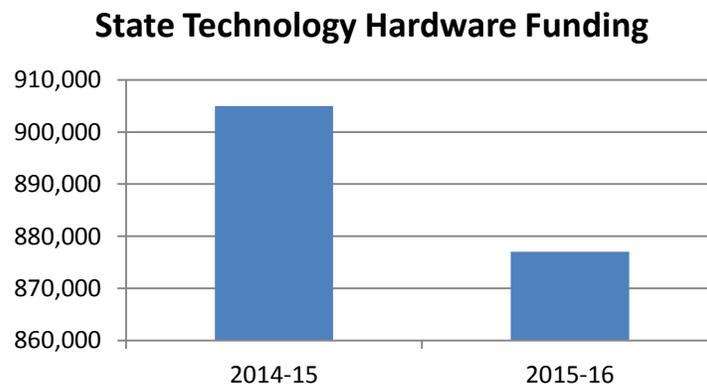
State Technology Hardware Funding

Figure 12: State Funding for Technology Hardware Purchases

These funds were $905,000 in 2014-15, decreasing to $877,000 in 2015-16. It is reported that these state-level funds may continue for the next fiscal year, but the longevity of this funding source is unknown at this time.

Computing Device Sustainability

One of the biggest challenges in maintaining a large technology implementation with student one-to-one computing is the sustainability of the computing infrastructure by maintaining reinvestment levels that are sufficient to keep staff and student devices fresh.

Information Technology has taken the following steps in efforts to sustain the computing device implementation and to make contingent shifts of devices where maintaining a straight line replacement model is not possible:

- <u>Reduce the inventory of Windows computers</u>
  Because students in grades 3 through 12 each are assigned a Chromebook, it is possible to reduce the quantity of Windows computers in order to shift the associated reinvestment funds to the 1TWO1 project.

  During the past 2 years, the inventory of Windows computers in the district has been reduced by approximately 40%.

- <u>Take advantage of large bulk purchase discounts</u> of Chromebooks and the market decrease in unit cost. The current unit cost for Chromebooks, including management console license and sales tax is $311.00, which is down approximately 20% from the start of the 1TWO1 project.

- <u>Focus on keeping high school and middle school devices somewhat newer</u> than elementary school devices by replacing middle and high school Chromebooks, and shifting the used devices down to the lower grades. This practice has the following attributes:

  - o <u>Pros:</u> The life of the Chromebook can be extended a couple of years by recovering usable devices from middle and high school, and re-using them at elementary schools. This practice reduces the sustainability cost.

  - o <u>Cons:</u> Planning is made more difficult because of the unknown quantity of Chromebooks that will be viable for re-use at the elementary schools. In many cases, students damage their Chromebooks, but continue using the device until it is turned-in at the end of the school year. In some cases it is not economically practical to repair all broken devices for re-use. The result is a lower quantity of devices available that can be rolled down to the lower grades.

  - o <u>Cons:</u> In this model, the elementary schools would continue to receive used devices, rather than new devices. Over time, the processing power of the Chromebooks continues to increase in response to the demands of software. At some point, the feasibility of the older devices becomes more of a risk.

  - o <u>Cons:</u> Because of device attrition through breakage, there will eventually be insufficient quantities of used devices to supply a replacement schedule at elementary schools.

<u>Budget Considerations for a Straight Line Replacement Model</u>
In a straight line replacement model, the life cycle of computing devices is established and adhered to, and the associated replacement schedules are known in advance, making future planning more reliable. The use of used devices and refurbished models is diminished. Students and staff benefit by having the newer devices on hand for their education experience.

The following budget presentation assumes a 5-year life cycle for Windows and Mac Desktops and laptops, and a 4-year life cycle for Chromebooks:

Current Capital Expenditure Budget (2016-17)

Chromebook Replacement	$ 1,826,193.60
Windows/Mac Computer Replacement	$ 813,100.40
Data Center Growth and Maintenance	$ 375,000.00
General Repair	$ 400,000.00
Contracted Services	$ 150,000.00
Wide Area Fiber Move/Add/Change	$ 150,000.00
E-Rate Matching Funds for Network Equipment	$ 190,000.00
Software and Development	$ 100,000.00
Recurring Maintenance and Licensing	$ 1,872,706.00
State Funds allocated for 1:1 initiative	$ (877,472.00)
Total Funds Available 2016-2017	$ 5,877,000.00
Total Current Budget Allocation 2016-2017	**$ 4,999,528.00**

Example Capital Expenditures Budget with Straight-Line Replacement Model:

Chromebook Replacement	$ 2,084,555.25
Windows/Mac Computer Replacement	$ 1,917,450.80
Data Center Growth and Maintenance	$ 375,000.00
General Repair	$ 400,000.00
Contracted Services	$ 150,000.00
Wide Area Fiber Move/Add/Change	$ 150,000.00
E-Rate Matching Funds for Network Equipment	$ 190,000.00
Software and Development	$ 100,000.00
Recurring Maintenance and Licensing	$ 1,872,706.00
Anticipated Funds allocated by state for 1:1 initiative	$ (877,472.00)
Total Budget Needed	$ 6,362,240.05
Delta From Current Budget	$ (1,362,712.05)

In the above example, the straight-line replacement model assumes that desktops and laptops are replaced every 5 years, and Chromebooks are replaced every 4 years. This model would require additional funds of approximately $1.4 million. As discussed in previous district budget deliberations, it is desirable to shift the recurring maintenance and software licensing expenses ($1,872,706) to the general fund. By doing so, the current capital expenditure funding levels would be sufficient to reach straight-line, true sustainability for computing devices district-wide.

While the discussion above presents possible scenarios for reaching straight-line sustainability, it does not relieve pressure on the 8% capital funds – it suggests that maintaining the 8% funding levels can be sufficient for straight-line sustainability if other sources of funding are found for the annual recurring expenses.

Other Possible Funding Scenarios: Periodic Bond Referendum
The previous section described the sustainability of computing devices for staff and students. Outside of the category of computing devices, the district has made investments in other technologies, including:

- Interactive Boards
- Projectors
- Digital TV Displays

- Telephone Systems
- Wireless Networks
- Network Switching Equipment
- Data Center Equipment

These investments are additional areas of sustainability that could be funded from periodic bond referendum.

Sustainability Reinvestment Funding Concepts

Concept 1: Work toward reaching computing device sustainability via the normal, annual 8% capital funds – made possible by shifts of recurring expenses to the general fund – and then including non-computer related infrastructure items in periodic bond referendums.

Concept 2: Include a portion of computing device sustainability in bond referendums – in addition to other infrastructure items – as a way to relieve pressure from the annual 8% capital funds.

Summary
Richland School District Two is a regional and national leader in the use of technology to enhance the student learning experience. Technology is also being leveraged to become more efficient and streamlined and is the gateway to identifying and implementing innovative practices aimed at making Richland Two better.

Technology funding and sustainability is clearly challenging, but is a necessary component of the education organization. More and more, technology has become the "utility" that must be maintained in order for the organization to function, and for students to be competitive in the global economy.

*** End of Part I: Infrastructure and Support ***