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# Internal Audit Report



## Schools' Technology Support

### An Operational Review



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May 2016

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## BACKGROUND

Previously, as part of its enterprise risk assessment, the Internal Audit (IA) Department carried out a schools' technology risk profiling exercise between May & June of the 2013/2014 school year.

The 2014 exercise was a supplement to the established annual district-wide risk assessment process that includes the Information Communications Technology Services (ICTS) department – mandated with technical oversight of all District Schools Technology environments.

The schools' technology landscape had not been fully captured /reflected in prior risk assessments, and Internal Audit had relied upon the risk assessments submitted by the ICTS department in part as coverage for the schools' assessments.

In order to expand from the general observations in the 2014 activity, an operational review of tech support provided by ICTS to schools was included in the annual audit plan for 2015/16. This review was to examine the schools' technology support function (i.e. Technology Support Representatives/TSR), current technology environment and operational conditions within selected schools with attention to continuity of academic operations, infrastructure and information security.

## OBJECTIVES, SCOPE & METHODOLOGY

### OBJECTIVES

The foundation of this assurance activity was based on the premise that:

- the success of schools' technology projects and operations, to meet growing demands and reliance on technology at all school levels and to fulfil the district's goals of "Intense Focus on Student Achievement" and "Safe Learning & Working Environment," is reliant on excellent technology support at all those levels.

The objectives of this exercise were to assess the following three areas:

- Service Level Agreements:
  - Conditions of performance and support metrics
  - TSR support of digital curriculum rollout (running as planned)
  - Service Providers' involvement in school tech support operations & functions
  - TSRs conformity to the schools' technology-related directives & policies
- Resource Management:
  - If TSRs are adequately-equipped and conditioned to function in support role
  - Training scheme; management /oversight regime
  - Schools vs TSR capacity - # of clients /systems per TSR /Turnover implications
- Asset Management
  - Property Control Procedures under Hardware /Software inventory
  - Infrastructure : Campus Data Centers (MDF /IDF)

## SCOPE

This review covered all District school categories under the five Learning Communities (LC), the School Transformation Office/STO and the five Technical Colleges. Due to the large number of schools in the District, the exercise was limited to those schools with the highest student count plus Digital Curriculum (DC) designation per category, and based on those two sampling criteria the following **19 school sites** were chosen – (cf. [Figure 1 - scope map](#) on page 5):

SCHOOL_NAME	TOTAL	SCHOOL_TYPE	LC_AREA	DC
East River High	2114	High	E	<input checked="" type="checkbox"/>
Corner Lake Middle	1272	Middle	E	<input checked="" type="checkbox"/>
Audubon Park Elementary	1205	Elementary	E	<input checked="" type="checkbox"/>
Apopka High	3195	High	N	<input checked="" type="checkbox"/>
Wolf Lake Middle	1228	Middle	N	<input type="checkbox"/>
Wolf Lake Elementary	1179	Elementary	N	<input type="checkbox"/>
Colonial High	3587	High	SE	<input checked="" type="checkbox"/>
Liberty Middle	1028	Middle	SE	<input checked="" type="checkbox"/>
Wetherbee Elementary	920	Elementary	SE	<input checked="" type="checkbox"/>
Freedom High	3436	High	SW	<input checked="" type="checkbox"/>
Southwest Middle	1325	Middle	SW	<input checked="" type="checkbox"/>
Millennia Elementary	1090	Elementary	SW	<input checked="" type="checkbox"/>
West Orange High	4180	High	W	<input checked="" type="checkbox"/>
Bridgewater Middle	1558	Middle	W	<input type="checkbox"/>
Windermere Elementary	704	Elementary	W	<input checked="" type="checkbox"/>
Meadowbrook Middle	1056	Middle	STO	<input type="checkbox"/>
Pinewood Elementary	582	Elementary	STO	<input checked="" type="checkbox"/>
Mid-Florida Tech	8821	Tech College	x	N/A
Orlando Tech	3799	Tech College	x	N/A

Table 1 – Sampled /Selected Schools List - \*cf. enrollment statistics as @ September 2015

Table 1 - depicts the student population sizes and Digital Learning sites using the [enrollment statistics as of September 2015](#) (K-12 info retrieved from the [official intranet site](#) and [Tech College details](#) provided by the Career and Technical Education /CTE office).

The 19 selected schools were selected based on the following considerations:

- Representation of each K-12 school type from each LC
- Representation of Tech Colleges from the 5 sites
- Enrollment size (as of 09/2015)
  - 15 - K-12 i.e. 1 High /Middle & Elementary from each of the 5 LCs
  - 2 - K-12 i.e. 1 Middle & Elementary from the STO
  - 2 - TCs i.e. applied highest enrolment size and proximity to the ELC
- Learning Curriculum i.e. highly-enrolled Digital Learning\_LaunchED sites
  - 13 of the current [19 sites](#) that comprise cohort 1 & 2 deployments
- Total of 17 - K-12 Schools derived from combination of:
  - 13 - Highly-enrolled DC sites – as labelled in last column of Table 1 -
  - 4 - Highly-enrolled non-DC sites – as labelled in last column of Table 1 -

## METHODOLOGY

As explained above, we used a sampling process across all school categories in the Learning Communities /School Transformation Office and Tech Colleges (previously Tech Centers).

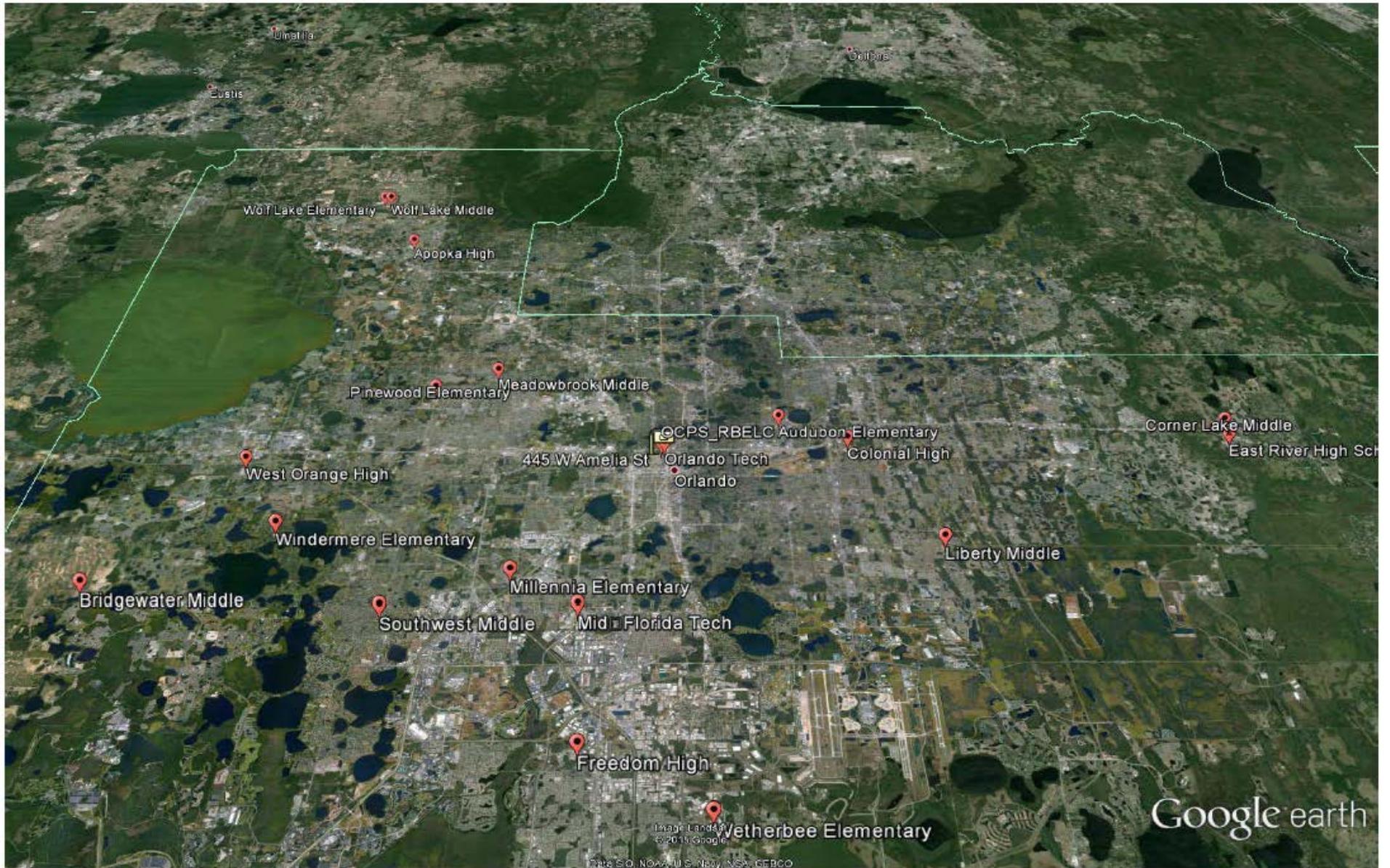
This exercise was conducted in accordance with the *International Standards for the Professional Practice of Internal Auditing* of the Institute of Internal Auditors and included such procedures as deemed necessary to accomplish the objectives.

This Information Systems-focused approach also recognizes the alignment to standards and guidelines of ISACA's Information Technology Assurance Framework /ITAF as applicable to our IT audit and assurance engagements.

Internal Auditing is an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes.

We are required to note any material deficiencies in accordance with Florida Statutes, School Board Policy and sound business practices. We also offer suggestions to improve controls or operational efficiency and effectiveness.

Our engagement involved collaboration with individual TSRs of sampled schools from each LC and selected TC, and with Area ITs and Area TSRs of each LC & TC - through face-to-face interviews with the TSR Administration with site visits to the selected 19 campuses.



Google earth



Figure 1 – Scope Map representation of sampled schools \_ Source: Google Earth®

## FINDINGS & RECOMMENDATIONS

The review process began off with face-to-face interviews with the five Area IT Admins and their Senior Technology Support Representatives (Senior TSRs) – all stationed at the Area Learning Communities - followed by individual school campus visits (with interviews and tech setup walkthroughs).

Our inquiries were focused around coordination, functional roles and responsibilities, scope of work (desktop support, change control, systems' logging and monitoring activities), inventory management, incidence management, campus continuity planning, training, level of awareness of the TSRs operational domain, operational challenges, infrastructure /data center management and third-party services.

The significant findings from those meetings and observations from the campus visits are captured below:

### A. Management & Coordination

- **Finding #1: No Service Level Agreements – Significant Risk**  
There is no formal service delivery agreement between the school-based tech support function provided through ICTS and the school administrations. This is, in part, because the service itself is still being defined as the district continues to implement digital curriculum.

Recommendation: ICTS management should endeavor to develop and maintain SLAs to serve as a formal operational statement on services delivered as per school administration expectations. (ref. 2011 ICTS & Schools SLA document – [SLA - School Support v3 06-16-11](#)).

Management Response: ICTS agrees with this finding and with the suggestion of the use of the standards established by the Information Technology Infrastructure Library (ITIL) to accomplish this and a good number of the recommendations specified in the Audit Report. Steps have been taken to establish the use of ITIL in the department and are listed below. Of particular importance will be gauging the level of maturity of the organization in formalized processes and the amount of time and funding which will be required to implement. Responsibility resides with the Director of Digital Curriculum to be completed in the 4<sup>th</sup> quarter of 2016.

- **Finding #2: Insufficient Records on Formal Tech Meetings – Moderate Risk**  
Weekly ICTS/Area IT Admins and Senior TSR meetings - agenda /minutes /discussion points are not recorded. These minutes are important because of the wide dispersion of the TSR's.

Recommendation: As part of its oversight function, the ICTS Infrastructure business unit should ensure that minutes of their weekly meetings are recorded for the sake of reference, confirmation of strategic discussions /decisions and formal endorsement of actions taken.

Management Response: ICTS agrees with this finding. Area IT Admin Team Meetings are held weekly every Thursday at the RBELC and meeting notes will be taken and uploaded on the shared TC collaboration site for dissemination to the team. Responsibility resides with the Director of Digital Curriculum to begin immediately.

- Finding #3: Lack of Consistency in Adherence to Standard Processes & Procedures - Significant Risk  
We noted a lack of consistency in following established processes and procedures in roles such as Digital Curriculum deployment /support procedures. We also noted irregular systems administration procedures (e.g. daily review of event logs, etc.). As with finding #1, service level requirements are not clear which can cause wasted time and deviation from the tech roles.

Recommendation: The establishment of a “[Technology Management & Support Team Collaboration Site](#)” by ICTS is commendable! However, ICTS management should enforce adherence to existing content with consistent updates in existing standard operating procedures for those facets of tech support standards where standard practices are considered critical. This does not preclude management from permitting innovation in areas where standard practices are not required. Some of the Area TSR teams - as a way of compensating for this inconsistency – have initiated /developed their own tools to support some inadequately resourced functions (e.g. knowledge wall, tech radar for remote systems monitoring and alerts).

Certainly, the ability to improvise is an important part of an IT team’s skill set, but improvisation shouldn’t be the norm. These initiatives should be considered and formally adopted as part of the existing SOP documentation library. Documenting tasks and procedures is the best way to be prepared for dealing with troubleshooting, system incidents, and TSR rotation. It also promotes continual improvement of tasks dealt with on a regular basis.

Management Response: ICTS agrees with this finding and continues to monitor and update Standard Operating Practices (SOPs). TSR are tasked with finding and improving processes that are innovative. To enact some of the innovative ideas, ICTS Management has been using a site review form to implement innovative ideas and to ensure consistency between learning communities. The site review form is updated annually as SOPs continue to change and develop with rollout of Digital Curriculum. Responsibility resides with the Director of Digital Curriculum to be implemented immediately.

- Finding #4: Tech College TSRs are not managed by ICTS Management – Low Risk  
In 2011, as part of the IT governance process, the District made a strategic decision to move K-12 School-based TSRs under the direct management of the ICTS department. However, that excluded the TSRs of the Tech Colleges – who are still managed by Tech Center Administrators /Assistant Directors as direct reports. Below are our observations:
  - CTE has a newly-established classified Senior TSR role - providing Area-IT Admin-type support
  - The Senior TSR is stationed at the RBELC and reports directly to CTE/Senior Instructional Specialist
  - There is a dotted passive reporting line between TC Senior TSR and ICTS/Infrastructure Director

- Senior TSR provides only passive operational oversight of Tech Center TSRs (just supplementary area support with neither reporting nor appraisal functions)
- New collaboration arrangement for TSRs through quarterly sessions organized by Senior TSR
- District Meetings: the Senior TSR participates in weekly meetings organized by ICTS/Infrastructure Director for all K-12 Area-IT Admins & Senior TSRs
- Unconfirmed if minutes are recorded for quarterly TC sessions
- No support coordination w/other TC TSRs (such as K-12 email distribution list)

Recommendation: With no direct Area-IT Admin role to provide similar administrative /operational oversight of all TC TSRs, ICTS should review this situation in coordination with CTE to ensure a common understanding in managing the TSRs. Alternatives include engaging an Area-type IT Admin to oversee the TSRs of the five TCs or upgrading the role of the Senior TSR from classified to administrative staff to enable the incumbent to act in a similar role as the case of the K-12 tech administrators.

Management Response: ICTS agrees with this finding. Continued discussions with administration will proceed.

## B. Roles & Responsibilities /Scope of Work /Service Delivery

- Finding #5: Inconsistent Digital Curriculum (DC) Deployment & Support Procedures - Significant Risk  
During our campus site visits, the following operational challenges (in providing support in the device inventory-to-checkout cycle) were observed:
  - Work-load /Support Issues:
    - TSRs appear over-burdened even before DC deployment (with same number of TSR(s) maintained – with some recording over 3,000 tickets in 2014/15 school year)
    - Operational challenges in handling DC vs other outdated /end-of-life span infrastructure already on campus (especially in peak periods such as testing season)
    - No formal orientation for campus coordinators
    - Inadequate procedural documentation for routine DC processes
    - Irregular check-in/check-out device activities
    - Increased Resolution Time: due to ad-hoc DC deployment, short implementation window, reimaging of devices, etc.
    - In some cases, students having to wait for devices during troubleshooting – so they miss classes!
    - Parents using student devices at home (determined through periodic maintenance)
    - Lack of clarity on the role played by Media Specialists
  - Device Management:
    - Undocumented device troubleshooting support and repair/return procedures
    - Deployment of images on Chrome-Books overwhelming (manual interventions)
    - Lenovo x131s units are not durable – very high maintenance
    - Equipment is transported in TSR personal vehicles (*what happens in event of device loss?*)

Recommendation: ICTS management should coordinate with the Digital Curriculum and Instructional Technology department to address the above support and device management issues through a joint review of existing workflows. The challenges encountered by the TSRs of the DC campuses take up valuable time for managing the digital technology environment. An effective solution should focus on establishing and maintaining documentation of standard procedures, consideration of additional support (using tech floaters) to the TSRs to reduce the workload burden, and developing a knowledge base from compilations of issues resolution and lessons learned.

Management Response: ICTS agrees with this finding. Responsibility resides with the Director of Digital Curriculum and the project manager. Discussions will continue with the Digital Curriculum workgroups.

- Finding #6: High Desktop Support to K-12 Tech-Staffing Ratio - Significant Risk

The average number of users and devices supported per TSR per sampled school was approximately 1,369 users and 2,330 devices, respectively. With only one TSR in the majority of sampled K-12 schools (13 out of 17), we derived a ratio of 1:1369 users per TSR and 1:2330 devices per TSR. That is extremely high - considering some industry standards by organization size!

Our research affirms the importance placed on optimum user and device levels serviced by desktop support staff to sustain service improvement levels. This is further complicated by the exponential growth under both levels with the advent of the District's digital learning program.

A recent study from an IT research firm (focusing on strategic management of information systems) provides benchmarks on typical desktop support staffing from over 200 IT organizations. To draw attention to the high TSR service ratio, we applied two metrics and associated ratios by comparing:

- Number of Devices maintained per TSR
  - Number of Users serviced per TSR
- (please see - *Figures 2 – 5*)

(Applied Source: [Desktop Support Staffing Ratios - Computer Economics, 2015](#))

**Devices by Organization Size – Median Percentile Sampling**

- 425 PCs per desktop support member (small w/IT operational budgets < \$5 million)
- 389 PCs per desktop support member (midsize w/IT operational budgets \$5 - \$20 million)
- 314 PCs per desktop support member (large w/IT operational budgets > \$20 million)

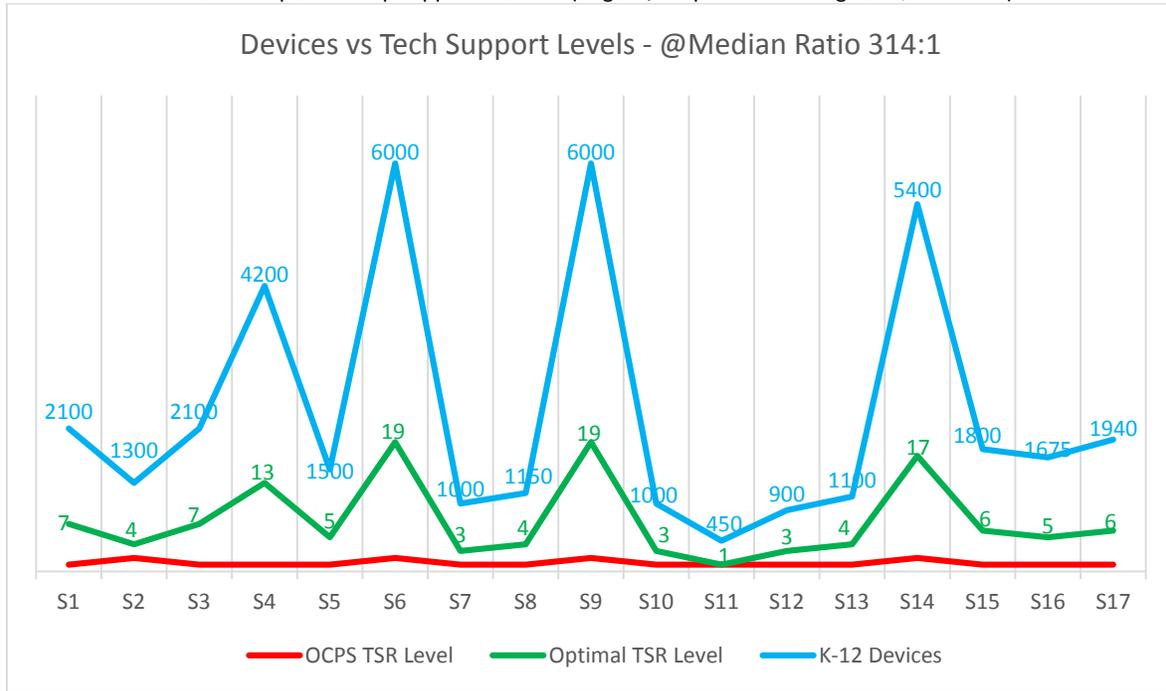


Figure 2 - Devices per TSR - by IT Organization Size (w/ICTS designated as large - applying median metrics)

**Devices by Organization Size – 75th Percentile Sampling**

- 800 PCs per desktop support member at small organizations
- 606 PCs per desktop support member at midsize organizations
- 533 PCs per desktop support member at large organizations

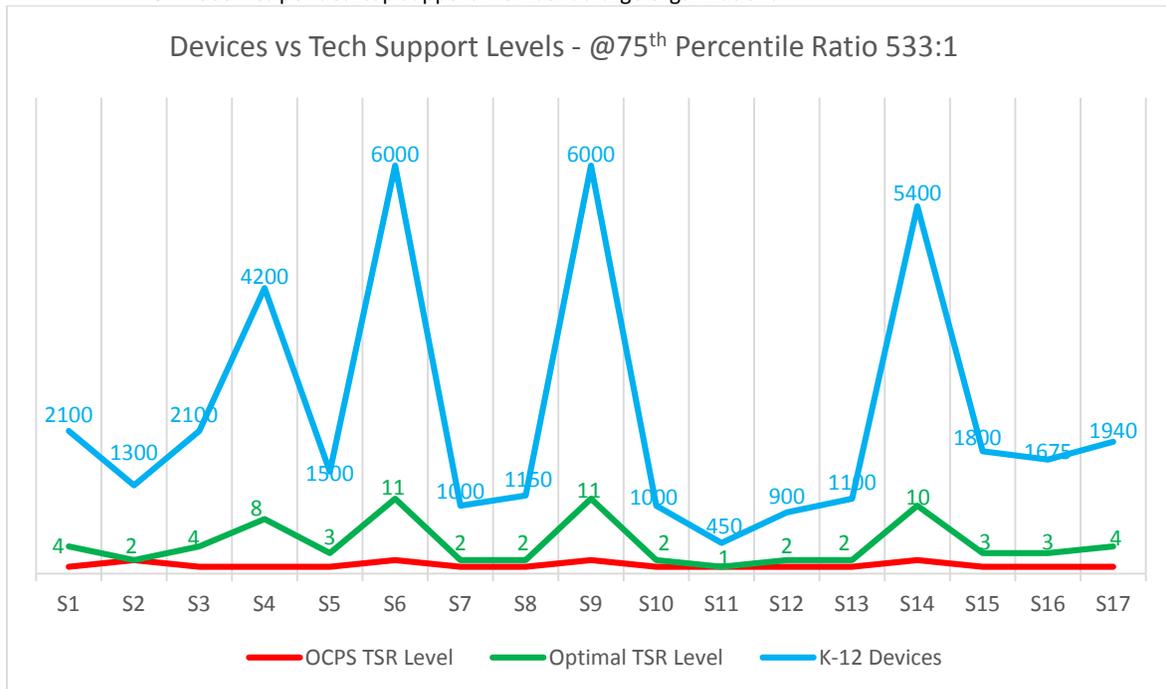


Figure 3 - Devices per TSR - by IT Organization Size (w/ICTS designated as large - applying 75th percentile metrics)

### Users per Organization Size – Median Percentile Sampling

- o @Median: 175 users per end-user support staff member at small organizations; 200 for midsize organizations and 182 for large organizations

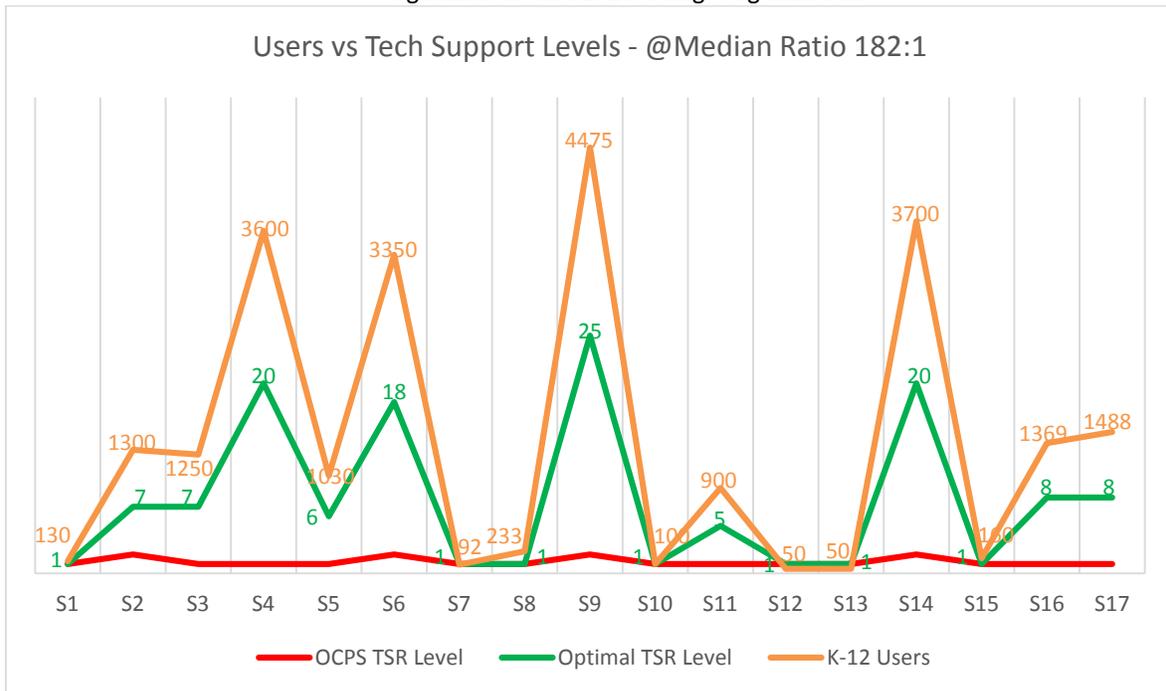


Figure 4 - Users per TSR - by IT Organization Size (w/ICTS designated as large - applying median metrics)

### Users per Organization Size – 75th Percentile Sampling

- o @75<sup>th</sup> percentile: 300 users per end-user support staff member at small organizations; 278 for midsize organizations and 312 for large organizations

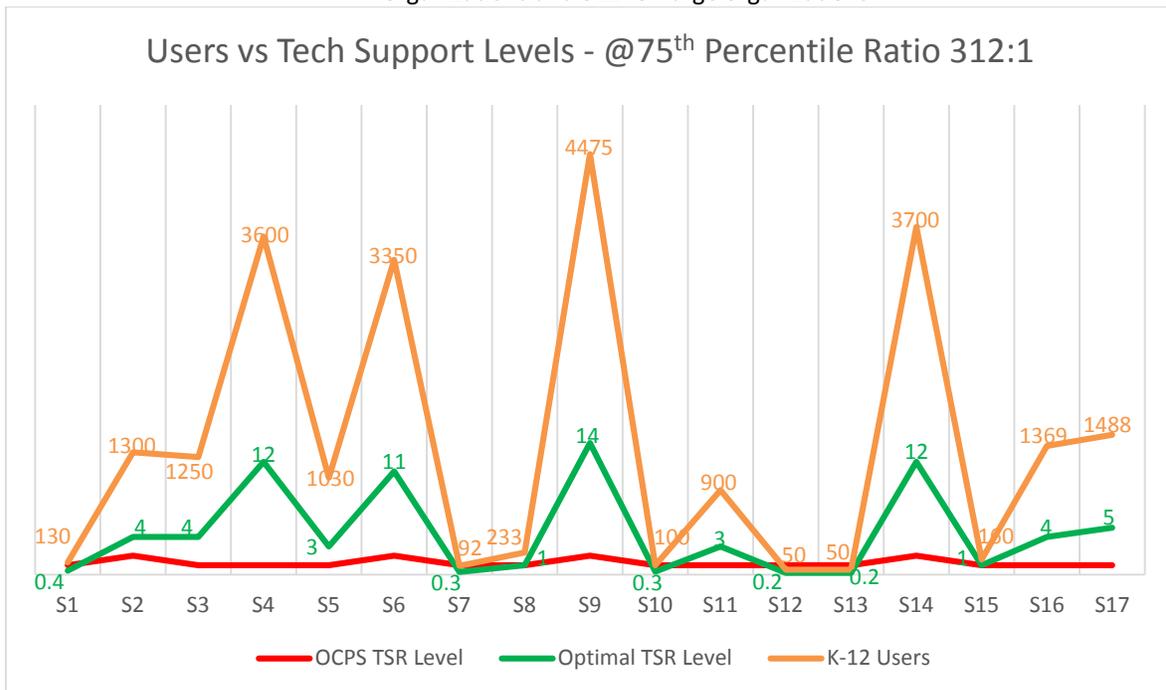


Figure 5 - Users per TSR - by IT Organization Size (w/ICTS designated as large - applying 75<sup>th</sup> percentile metrics)

Key (x-axis for all charts):-

- S1 – East River HS;
- S2 – Corner Lake MS;
- S3 – Liberty MS;
- S4 – Freedom HS;
- S5 – Wetherbee ES;
- S6 – Apopka HS;
- S7 – Wolf Lake MS;
- S8 – Wolf Lake ES;
- S9 – West Orange HS;
- S10 – Bridgewater MS;
- S11 – Windermere ES;
- S12 – Meadowbrook MS;
- S13 – Pinewood ES;
- S14 – Colonial HS;
- S15 – Audubon Park ES;
- S16 – Millennia ES;
- S17 – Southwest MS

Recommendation: The TSRs role also serves as the front line of the ICTS department in ensuring the smoothness of its day-to-day school technology operations. Thus, it will be beneficial for the ICTS management to consider these metrics and make the necessary adjustments with strategies for improving the efficiency of the schools’ tech support staff.

This issue is compounded with statistics obtained from Human Resources on TSR turnover (i.e. 2014-15 FY to date) stating that the:

- Number of school-based TSRs that terminated in 2014-2015 school year = 18
- Number of school-based TSRs that terminated in 2015/16 (i.e. 7/1/15-present) = 14

A staffing ratio assessment will help ICTS management to evaluate strategies for investing in more tech staff or improving the productivity of the schools’ tech support teams.

Management Response: ICTS agrees with this finding. CIO has taken responsibility to advocate for additional staff or staff augmentation through consultant work.

- Finding #7: Some TSRs are performing non-tech roles – Moderate Risk  
With the versatility of the TSR’s role in providing tech customer service, they often wind up resolving problems that fall outside the scope of their duty, and deviating from the tasks that should really be occupying them.

We noted the following issues during our school site interviews:

- Some TSRs performing property management chores (entire school inventory)
- TSRs showing teachers how to input grades
- TSRs carrying out janitor-type activities
- TC TSRs performing property management and procurement chores; preparing ID Badges

The TSRs lose productivity due to the amount of time and effort some of them spend each month on troubleshooting non-tech-related issues. Some of the TSRs also enjoy this role to some extent – as in some cases, it is a carry-over of the culture from their long association with school administrations when they were managed by the former.

Recommendation: Continuous guidance from the Area teams and ICTS coordinator is important - to ensure that tasks and responsibilities are clearly defined to mitigate the “do what needs to be done” effect.

Management Response: ICTS agrees with this finding. CIO along with the Director of Digital Curriculum will continue to address the issues. The CIO has had preliminary meetings with Administrators from Teaching and Learning as well as meetings with Area Superintendents.

- Finding #8: Improper Data Center Management - Significant Risk

The following observations were made during site interviews and walkthroughs of the primary data centers at the schools we visited. These primary data centers house Main Distribution Frames (MDF) with Intermediate Data Frames (IDF) located within vantage points on the premises:

- General Setting:
  - Some rooms were used as storage (even with “No Storage” signs at entrance); combined storage of card-boxed peripherals (fire hazard)
  - Classroom materials (textbooks, boxes, etc.), janitor stuff, food-stuffed refrigerator
  - Some sites have no fire control /suppression /extinguishing systems (e.g. no smoke-alarm /detection consoles or water-sprinkler systems)
  - Untidy ‘spaghetti’ cabling patch panels
  - One secondary server facility with no air-conditioning
- Facility Access:
  - Access restrictions pretty lax!
  - Master Keys with no restriction list
  - Vendors /Tech Providers not escorted /unattended (generally)
  - No visitors log (although a few have log books for vendors)
  - Tech providers access facility and perform installations without TSR’s knowledge (e.g. CCTV system installation in a decommissioned rack that was due for delivery to Surplus; and was detected due to the vigilance of the TSR)

Recommendation: ICTS Management should review these observed conditions and implement remedial actions by adhering to better data center management practices, such as – restricting storage to non-fire conducting materials, removing all sources of food, installing (as a minimum) portable fire extinguishers, tidying up patch cables and beefing up access /security requirements.

Management Response: ICTS agrees with this finding. Responsibility resides with the Director of Digital Curriculum to be implemented in the 3<sup>rd</sup> Quarter, 2016.

- Finding #9: Lack of Adequate Business Continuity Effort - High Risk

We noted that, besides daily data backups, there is no campus-type continuity-recovery planning (formal procedures or documentation). The backups are stored in same location (i.e. in the MDF rooms) which is not best practice to safeguard and ensure the availability of data in system emergencies.

Recommendation: Although IT contingency and disaster planning are reliant on the District’s directives, ICTS management should review operational conditions for academic continuity /disaster avoidance by involving the Area TSR teams in their periodic continuity/disaster mock drills.

As the schools have no Campus IT Continuity and Disaster Recovery Planning, but are reliant on the District’s enterprise continuity and disaster recovery procedures – a detailed assessment of this dependency and coordination is essential to ensure that academic operations can continue in the event of unexpected disruptions.

Management Response: ICTS agrees with this finding. Responsibility resides with the Director of Digital Curriculum to be implemented in the 3<sup>rd</sup> Quarter, 2016.

### C. Asset Management

- Finding #10: Lack of Standardized /Centralized Inventory Procedures - Significant Risk

During the school site visits, the following were observed:

- No centralized inventory system (for legacy and DC equipment)
- Some inventories (spreadsheet-format) prepared at TSR's initiative
- Equipment below \$1k not inventoried (introducing asset loss risk)
- Lack of documentation /Inconsistent inventory procedures
- Increase in theft during school seasonal breaks
- Tech Centers:
  - Access DB developed in-house (14 years ago) to handle Inventory Management;
  - Purchase Order Request App developed in-house
  - No centralized inventory system (for all equipment)

Recommendation: To ensure the ability /mechanism to track and account for all technical resource and operational properties, it is necessary to carry out an infrastructure /data center and soft inventory review; particularly those items below \$1,000 that are not accounted for in any inventory. This introduces the risk of potential device loss and user-accountability implications.

With the increasing number of devices /equipment – managing and keeping information centralized and organized can be a real challenge. The trend of the TSRs developing their own systems for recording /inventorying items remote from a centralized inventory system is a cause for concern. Obviously, this creates problems for IT teams in terms of how to guarantee the availability and integrity of inventoried data.

Management Response: ICTS agrees with this finding. Responsibility resides with the Director of Digital Curriculum to be implemented in the 3<sup>rd</sup> Quarter, 2016.

We wish to thank the Area IT, Area TSRs and School-based TSRs of the selected participating schools, the ICTS Infrastructure Director, Gail Cook, and Susan Gluckman and Adrian Washington of the Career and Technical Education (CTE) department for their cooperation and assistance during our audit, as well as the HR department, respective school administrators and area superintendents for the collaborative effort, and the Deputy Superintendent's office for facilitating the smooth kick-off of this exercise.

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