



ALBUQUERQUE  
PUBLIC SCHOOLS

*Accelerate Progress for Students*

# A CASE STUDY

*To determine if improving certain district operational activities correlates with improved student achievement*

Presented to  
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# PRESENTATION TOPICS

## Study Background

- **APS Maintenance and Operations Demographics**
- **Significance of Study**

## Study Details

- **Study Format**
- **Research Review**
- **Key Performance Indicators (KPIs)**
- **Raw Data Input**

## Study Conduct

- **Preliminary Timeline**
- **Analysis Approach**

## Study Results

- **Presentation of Results at Future CGCS Conference**
- **Can improvement in CGCS KPIs be correlated to improved student achievement?**



# STUDY BACKGROUND

## APS Maintenance and Operations Structure

- **Employees** ~265
- **Students served** ~89,000
- **Schools served** 141 traditional plus 4 charters
- **Square feet schools served** ~14.5 Million square feet
- **Square miles served** 123
- **Budget**



**Past 3 Years - APS:**  
Cut: ~\$100M; Lost: ~ 1,000 positions  
⇒ Lots in M&O area

# STUDY BACKGROUND, *con't*

## Maintenance and Operations Trends

- Positions cut
- Square footage to maintain increased
- Number of work orders increased
- Available dollars focused in classrooms
- Food Service has more federal mandates
- Fewer buses to transport students

**M&O Past 5 Years:**  
 New Schools: 5ES, 1MS, 2HS  
 Replacements: 2ES  
 New Sq Ft: 2.5M  
 Renovated Sq Ft: 5M

Fiscal Years	Work Orders	Square Feet	M & O Budget	Operational	SB-9	Salaries OT & Benfits	School Sites	FTE's
2007	57,760	12,003,465	\$ 48,342,400.00	\$ 2,903,213.00	\$ 31,393,556.00	\$ 14,045,631.00	136	330.5
2008	63,476	12,008,841	\$ 55,391,208.00	\$ 2,629,799.00	\$ 37,165,908.00	\$ 15,595,501.00	137	320.5
2009	68,155	12,703,152	\$ 48,564,786.00	\$ 2,066,226.00	\$ 30,832,290.00	\$ 15,666,270.00	139	310
2010	68,372	14,207,533	\$ 41,227,836.00	\$ 1,329,653.00	\$ 25,350,736.00	\$ 14,547,447.00	141	285.5
2011	74,546	14,207,533	\$ 30,237,780.00	\$ 909,154.00	\$ 14,776,670.00	\$ 14,551,956.00	142	265



Georgia O'Keefe ES

**If M&O operations correlate with improved student achievement  
 – why cut?**

# **SIGNIFICANCE OF THE STUDY**

## **Hypothesis**

- **Certain Maintenance and Operations functions directly correlate with student achievement**

## **Study Significance**

- **By provided research evidence of whether (and by how much) certain M&O improvements (or cuts) impact student achievement, a more realistic approach to prioritizing and funding M&O functions can be achieved**

**If M&O operations do correlate with student achievement, then we may be indirectly reducing student achievement by cutting M&O functions, or perhaps by distributing our limited M&O funding in a non-optimum way.**

# STUDY DETAILS

## How the study will be formulated

- **Use CGCS KPIs as a basis for potential Maintenance and Operations areas of improvement**
- **Obtain raw input suggestions from Maintenance and Operations staff – what activities do staff feel directly affect student achievement?**
- **Select certain areas (Maintenance and Operations KPIs and student achievement) where a controlled design of experiment can be conducted**
- **Establish a controlled design of experiment to determine if improved effectiveness and/or efficiency of the selected areas has any correlation to improvement in selected student achievement areas**

# STUDY DETAILS, *con't*

## Research review

- Preliminary review indicates there is only limited research
- Some research results do show positive correlation between school facilities and student achievement and to some extent transportation funding and student success on SATs
- Additional research will be conducted to determine what research evidence may be available in any of the study selected areas



# STUDY DETAILS, *con't*

## Key Performance Indicators (KPIs) and M&O Relationships

APS M&O Divisions	APS M& O activities	CGCS Business Functions
Mechanical	Metal Ship, Locker Repair, HVAC, Plumbing	M&O
Grounds	Equipment Operators, Landscaping, Irrigation, Playground Repair, Playground Maintenance & Fix Portables	M&O
Structural	Furniture Repair, Glaziers, Locksmiths, Masons, Paint Ship, Welding, Roofing Repair	M&O
Electrical	Electricians, Audio Visual, Fire Ext Service, Telecommunications	M&O
Building Services	Custodian Supervisors, Interior Pest Control, Carpet Cleaners, Specialty Cleaning, Small Appliance Repair, Procurement Specialist, M&O Warehouse	M&O
Fleet Maintenance	Tire Shop, Specialty Equipment Maintenance, Vehicle Maintenance, Fueling Station	Transportation
Environmental	Environmental Inspectors	M&O
Support Services	Utilities, Wireless	M&O
Computer Network	Central Office Network; District-wide Network	Information Technology
Energy Conservation	Energy Efficiency; LEEDS Certification	M&O
Technology Support	Technology Repair & Service	Information Technology
Food Services	FRL; Breakfast, Lunch	Food Services
Safety and Security	School Resource Officers, APS Police Officers	Safety and Security

### *Potential Study Parameters*

- **Current APS KPI Ranking**
- **Description of Key KPI Activities to Consider**
- **Pilot Program Key Focus Areas**
- **Expected Outcomes Influencing Student Achievement**



# STUDY DETAILS, *con't*

## Input (the raw data – already initiated)

- **Operations department**
- **Managers and staff**
- **Areas and activities that staff believe might directly impact student achievement – and how!**



**Link to matrix of potential Maintenance and Operations activities as defined by M&O staff.**

**Examples from Transportation:**

- **Buses late to school in morning**
- **Buses not showing up in morning**
- **Bus driver attitude**
- **Bullying on bus**
- **Overcrowded buses**
- **Lack of special education equipment on buses**

# STUDY CONDUCT

## Design of Experiment (DOE)

### What is DOE?

- DOE refers to an experiment where one or more variables believed to have an effect on an experimental outcome are identified and manipulated according to a plan.

### How would DOE be used?

#### The key elements of the experiment are:

1. *Response Variable*: The outcome variable being investigated. Also called independent variable.
2. *Primary Variables*: The controlled variables believed most likely to have an effect on the response variable.
3. *Background Variables*: Variables which may have an effect but cannot or will not be deliberately manipulated or held constant.
4. Common causes or experimental error: This is the “noise” measurement for the experiment.
5. Interaction: A condition where the effect of one factor depends on the level of another factor.

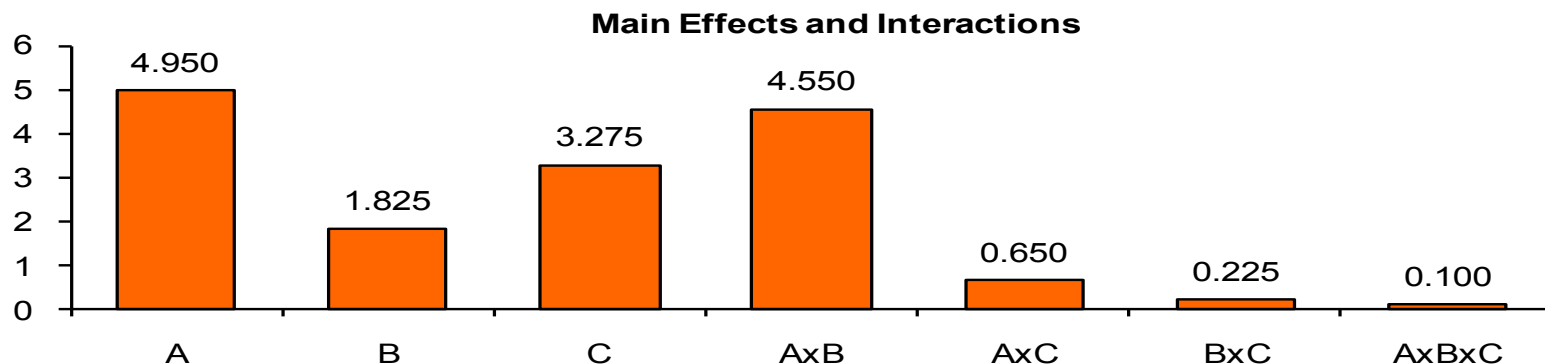
### Some thoughts on the APS DOE strategy

The APS DOE strategy would be to select student achievement parameter(s) as the *Response Variable(s)*; specify M&O area KPI/activities as *Primary Variables*; define student/school socioeconomic/disaggregated information as *Background Variables*. Data collected in accordance with the DOE model would then be analyzed for statistical significance, interaction, and effects of the *Primary Variables* on the *Response Variable(s)*. In addition, analysis to understand the “unknown” error in the experiment and whether that is significant is important.

# ANALYZING THE FINDINGS

## Analysis Expectations Using DOE

- DOE Model dictates whether replication or randomization is appropriate
- Potential Experimental Models and Analysis
  - Fixed effects model; random effects model; mixed model
  - Completely randomized design; balanced design; unbalanced design
  - **Randomized block design (probably more suitable for APS DOE effects)**
- Expected Results of Analysis
  - There will be statistical correlation between selected Maintenance and Operations activities and specified student achievement parameters
  - The block effects of socioeconomic/disaggregated groups (e.g., race, ELL, poverty, statistical peer groups) will be *Background Variables* that are influential in the correlation results.



# PRELIMINARY TIMELINE

- **11/30/11: Research Review**
  - Literature
  - Raw data staff input
- **01/31/12: Selection of DOE parameters**
  - Select Maintenance and Operations parameters
  - Select student achievement parameters
- **02/29/12: Define expected outcomes and relationship to the CGCS KPIs**
  - Yes, it is Leap Year!
- **07/31/12: Gather Maintenance and Operations and student achievement parameter data**
- **08/31/12: Conduct DOE analysis of the data**
- **09/30/12: Write preliminary report of results**
  - Prepare presentation for future CGCS conference
- **10/31/12: Define follow-on strategy**



# FUTURE PRESENTATION OF THE RESULTS

**CGCS Fall 2012 – Indianapolis**  
Preliminary Results

**CGCS Fall 2013 – Albuquerque!**  
More detailed results



# THANK YOU!

For more information, visit [www.aps.edu](http://www.aps.edu)

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