A photograph of a classroom. A teacher is standing at the front, facing a class of students. The students are seated at wooden desks, some looking towards the teacher. The background features a green chalkboard with some faint writing. The overall scene is brightly lit and slightly blurred, giving it a soft, professional appearance.

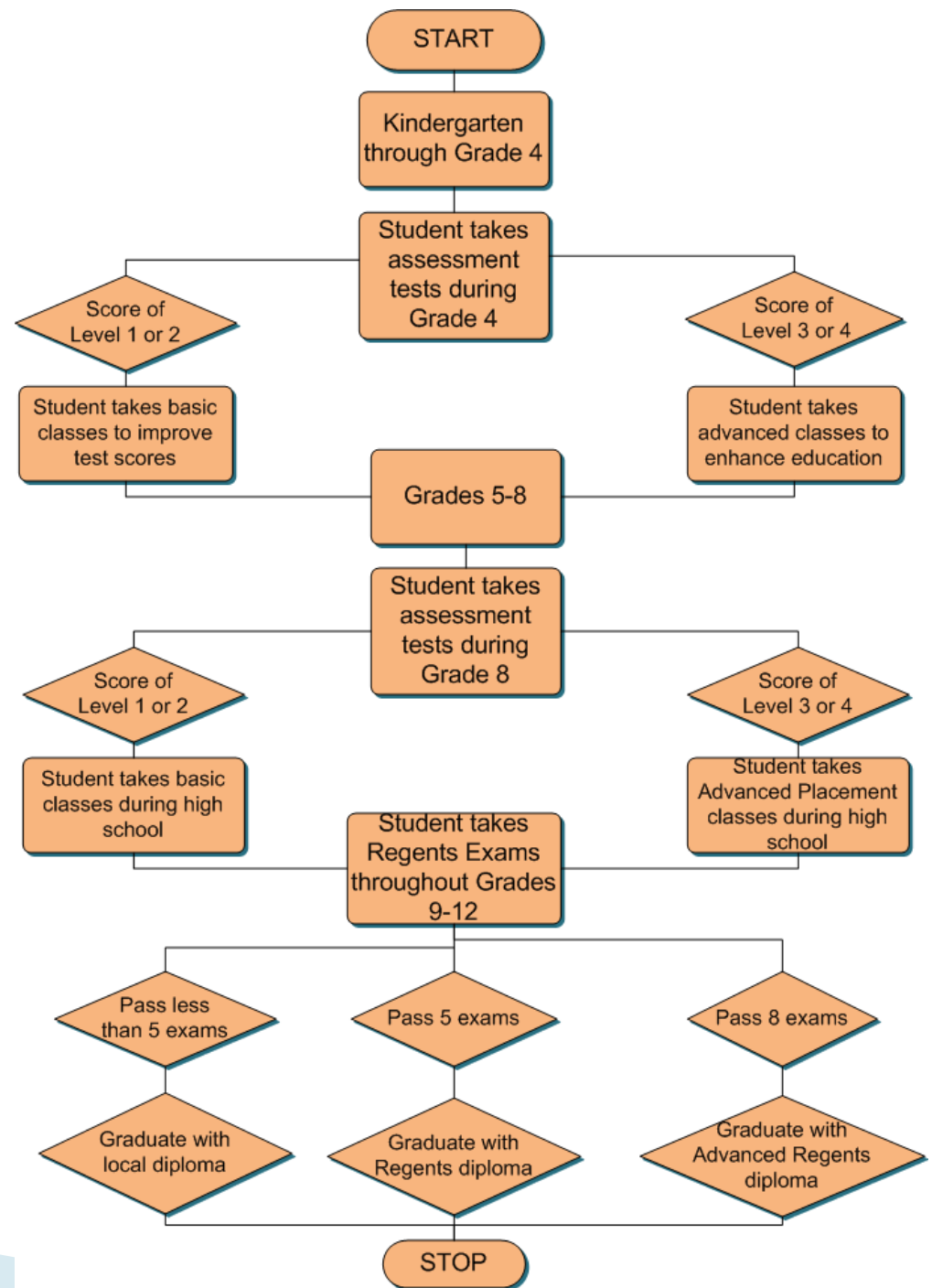
School System – Quality Assessment

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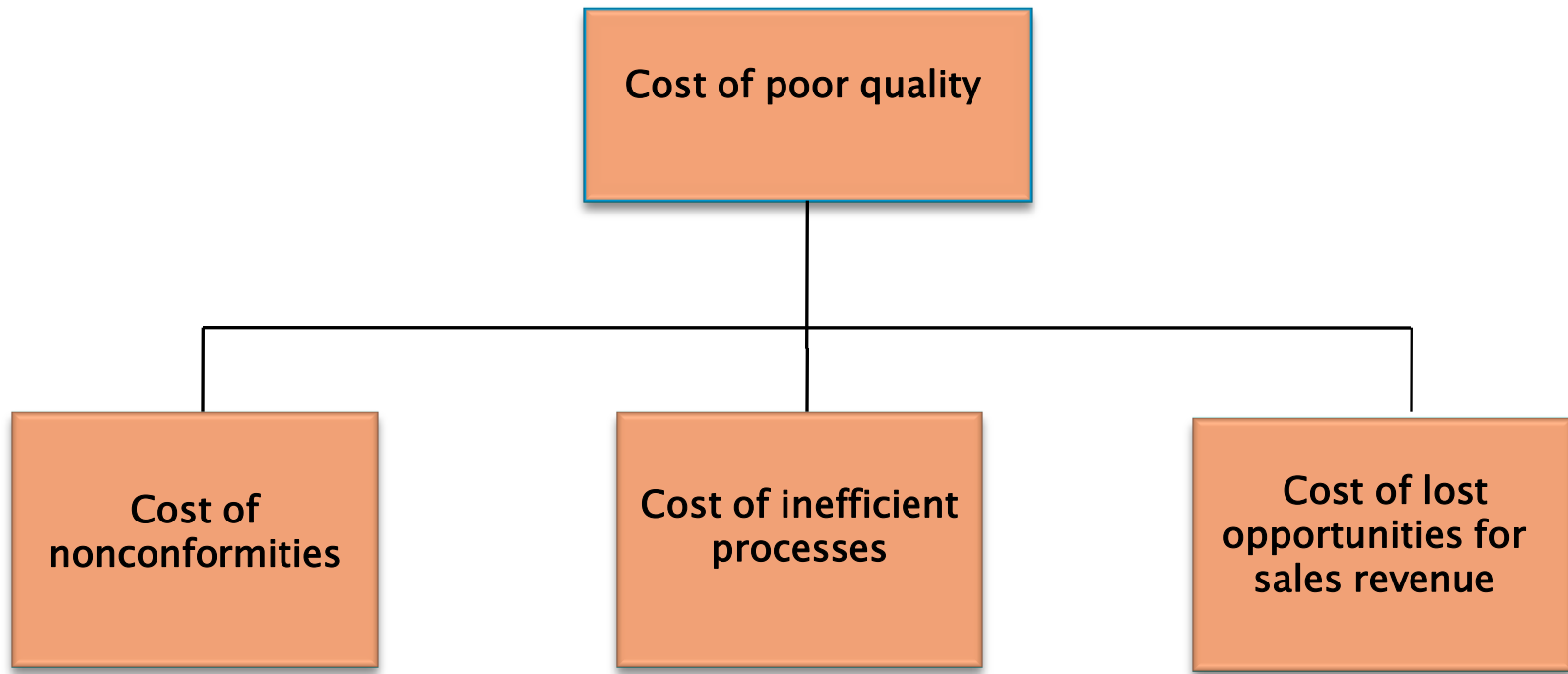
Group 1
MFE 634
Spring 2009

Flow Diagram

- ▶ This is how a student goes through the Syracuse City School District (SCSD)
- ▶ Assessments at grades 4 & 8 to give an indication of how students will perform on Regents exams in high school
- ▶ Number of Regents passed determines high school diploma



Cost of Poor Quality



- The costs of poor quality account for 15–30% of a school or firm's overall costs.
- Reducing the costs associated with poor quality is mandatory so that they hope to compete with other schools in the area around and increase the intake of students.

Six Sigma

Define Phase

- ▶ Identify potential problems in a school system
 - Cost of Poor Quality Analysis, Voice of Customer Analysis

Measure Phase

- ▶ Measure current process capability
 - Cause-effect diagram, graphs and charts, process capability analysis

Analyze Phase

- ▶ Collect and analyze data to determine critical process variables
 - Hypothesis testing, T-tests, ANOVA

Improve Phase

- ▶ Factors effecting problems in a school system
 - Design of Experiments, Lean

Control Phase

- ▶ Continuously measure process capability
 - Control charts, 5S, Mistake Proofing

Items of Concern

▶ **Academics**

- Students poor performance on state exams, literacy exams, and math exams
- Students do not have enough textbooks for each student to have their own
- Children cannot study and do homework outside of class
 - Extreme lack of motivation among the student populous

▶ **SCSD is very under funded**

- Problem in meeting budgetary constraints
- Teachers are underpaid
 - There is little incentive to work in the SCSD
- Teacher workload is larger due to layoffs
- Teachers quitting because they are annoyed with the system

▶ **Overcrowding**

▶ **Strong presence of poverty**

Quality Function Deployment

Customer Requirements	Quality Characteristics								
	Priority	Fire Code Regulations	Health Code	ADA Specifications	Appearance of School	Quality of Learning Environment	Global Impact	Quality of Teaching Environment	Qualified Employees
Safety	9	9	4			1			
Kitchens	8	9	9				1		9
Health Services	7		9			4		4	9
Handicap Accessibility	6	9		9	1	4		4	
Classroom Furniture	5	4			4	9		9	
Grounds Keeping	4	1	1		9		4		4
Ammenities	3				4	9		9	
Electronic Teaching Aids	2				4	9		9	
Environmentally Friendly	1						9		
CTQ Priority Score		231	175	54	82	151	33	142	151

Target values

- ▶ Meets code
- ▶ Complies with regulations
- ▶ School pride
- ▶ Ability of students to excel
- ▶ Reducing emissions/pollution
- ▶ Ability of faculty to teach effectively
- ▶ Specific training (certification)

LEGEND		
Priority	9	Highest
	1	Lowest
Relationships	9	Stronger
	4	Medium
	1	Small
	■	Positive
	●	Negative

Analyzing Factors to Explain Barriers to Education & Disparities

▶ Supply side

- Political and institutional factors
- Factors linked to the school

▶ Demand side


- Socio-economic
- Cultural factors which affect the behaviour and the choices of parents and students

Supply Side Constraints:

➤ Political & Institutional Factors

- Insufficient public support for the poor
- Political instability; Inconsistent educational policies
- Poor quality of education programmes

➤ School Factors

- Limited classroom space
 - High school fees
 - Distance from school
 - Lack of school canteens
 - Poor quality of hygienic facilities
 - Stereotypes at school (curricula, textbooks)
 - Teachers untrained/not sensitized to gender issues
 - Sexual harassment; insecurity
- 

Demand Side Constraints:

- **Socio–Economic Factors**
 - Poverty
 - Direct costs (fees, uniforms, transportation)
 - High opportunity costs
 - Residence in remote, low population areas
- **Demand Side Constraints: Cultural Factors**
 - Parents' low level of education

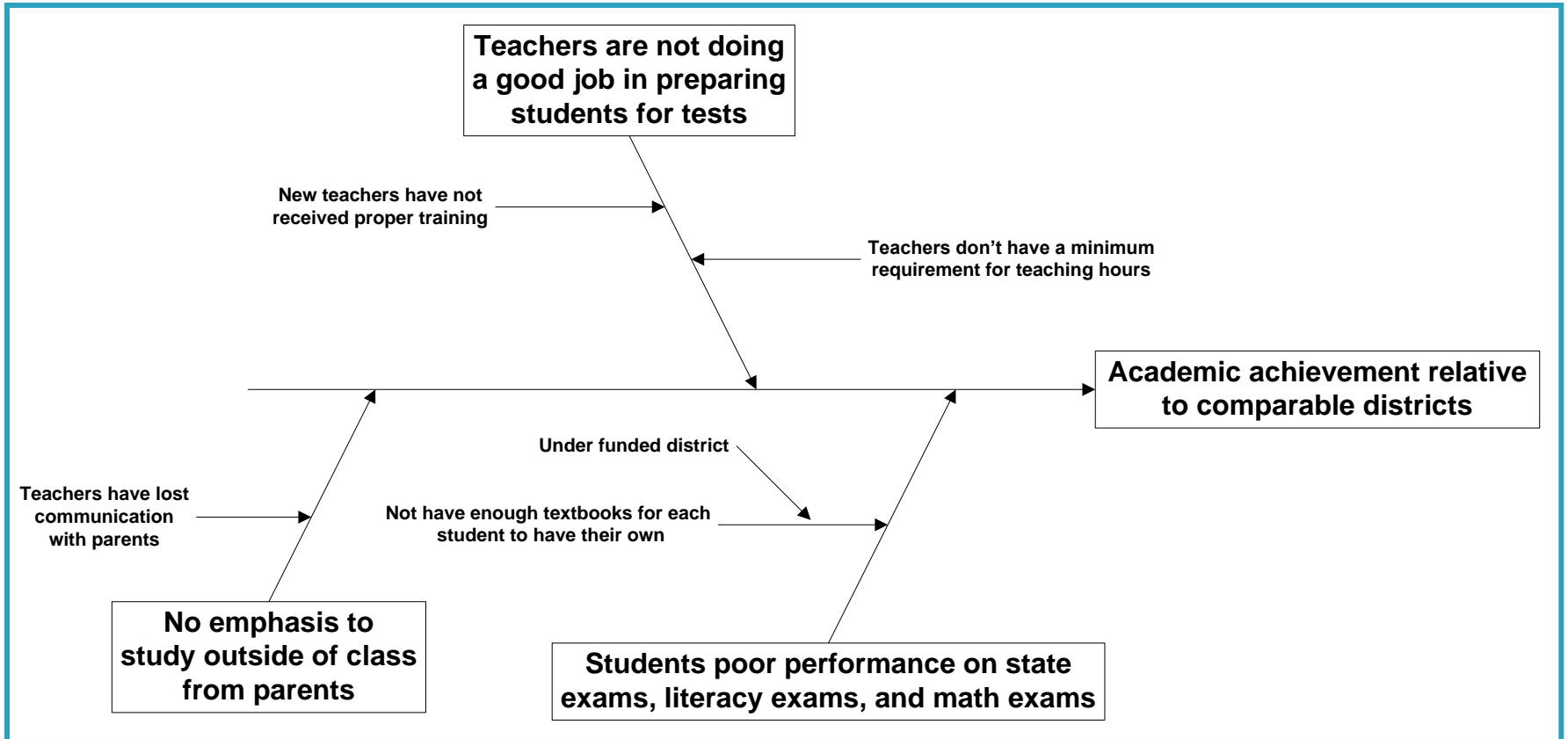
Root-Cause Analysis



Define the Problem

- ▶ Academics are a big problem for the SCSD
 - Students poor performance on state exams, literacy exams, and math exams
 - Under funded district
 - Students do not have enough textbooks
 - Children cannot study and do homework outside of class
 - Teachers are not doing a good job in preparing students for tests

Cause-Effect Diagram



Verifying the Root Cause with Data

Root Cause: Students poor performance on state exams, literacy exams, and math exams

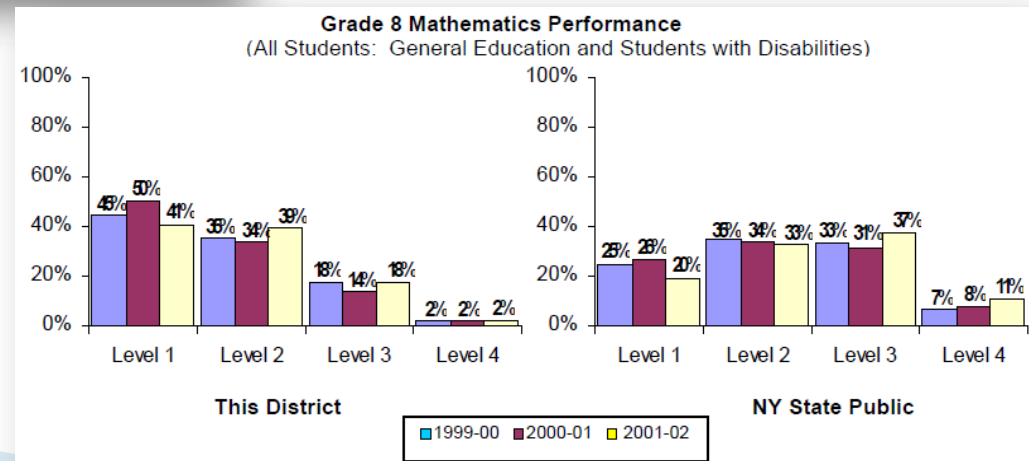
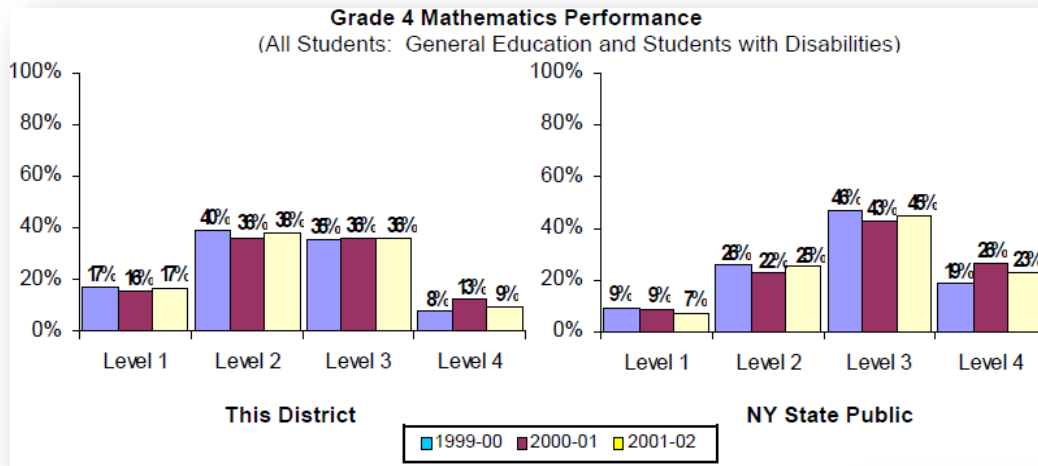
▶ **New York State Assessments**

- Grade 3–8
- Within the SCSD, there has been improvement over the years
- Students are still underperforming compared to state averages

Year	Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 8	
	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math	ELA	Math
2008	44%	66%	45%	60%	52%	53%	41%	49%	40%	41%	31%	29%
2007	--	57%	45%	55%	48%	43%	34%	35%	28%	26%	28%	20%
2006	41%	43%	43%	49%	37%	28%	33%	26%	28%	16%	21%	20%
State Avg (2008)	70%	90%	71%	84%	78%	83%	67%	79%	70%	79%	56%	70%

Verifying the Root Cause with Data

Root Cause: Teachers are not doing a good job in preparing students for tests



Verifying the Root Cause with Data

Root Cause: Lack of Parent Involvement

Q21. The State administers standardized tests to students and compiles average scores per school to assess schools. Would you say you know a lot, a little, or not much about these tests?

A lot	25.7
A little	38.6
Not Much	33.5
No Answer	2.2

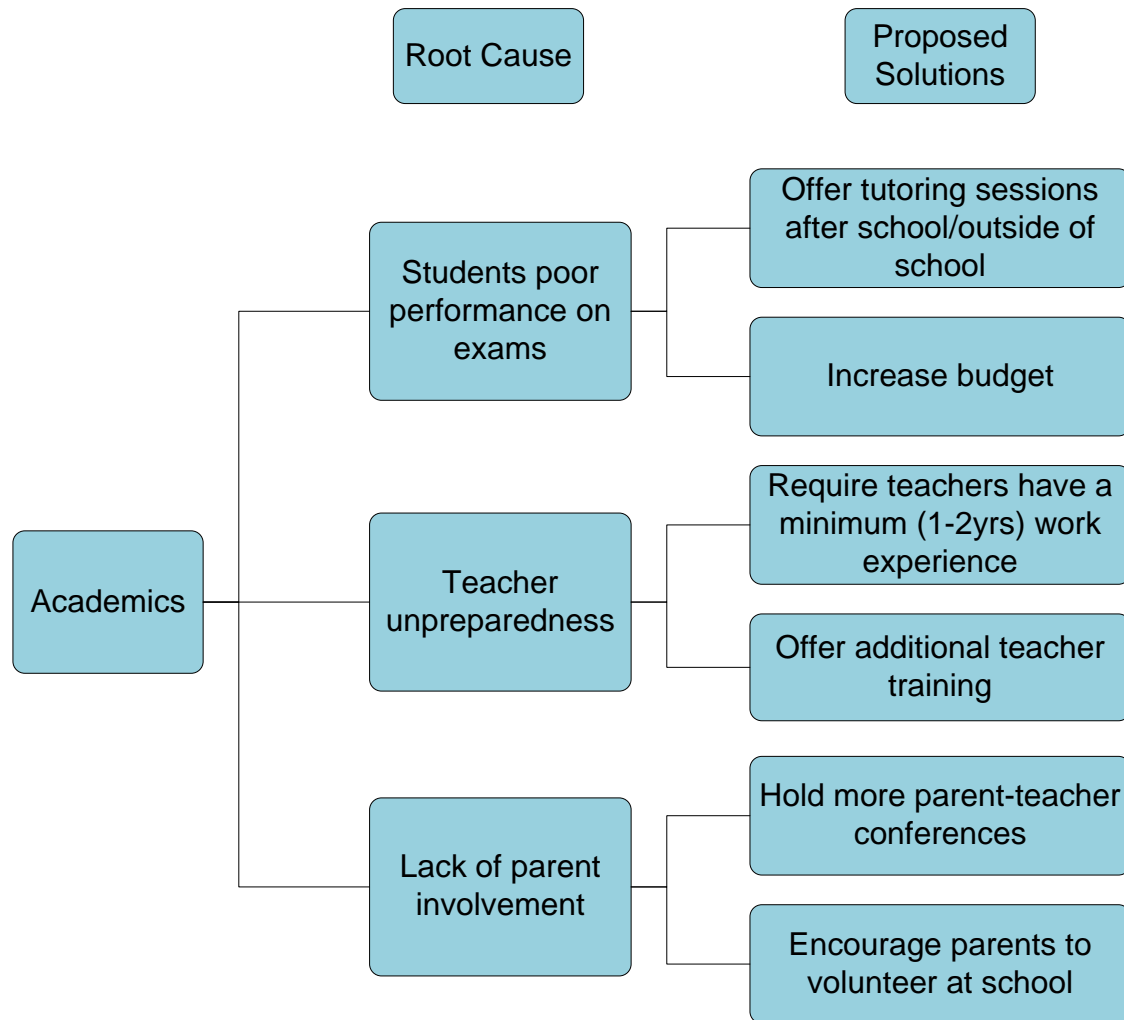
(If a lot/little): Do you think the tests are a good indicator, only somewhat good, or not very good guide to the quality of education occurring in the schools?

Very good	16.1
Somewhat good	51.5
Not very good	24.8
No opinion	7.6

(If a lot/little): Do you think the average scores for your children's schools are about right, too low, or don't you know enough about them to judge that?

About right	35.6
Too low	14.1
Don't know enough	50.2

Solutions & Prevention Steps

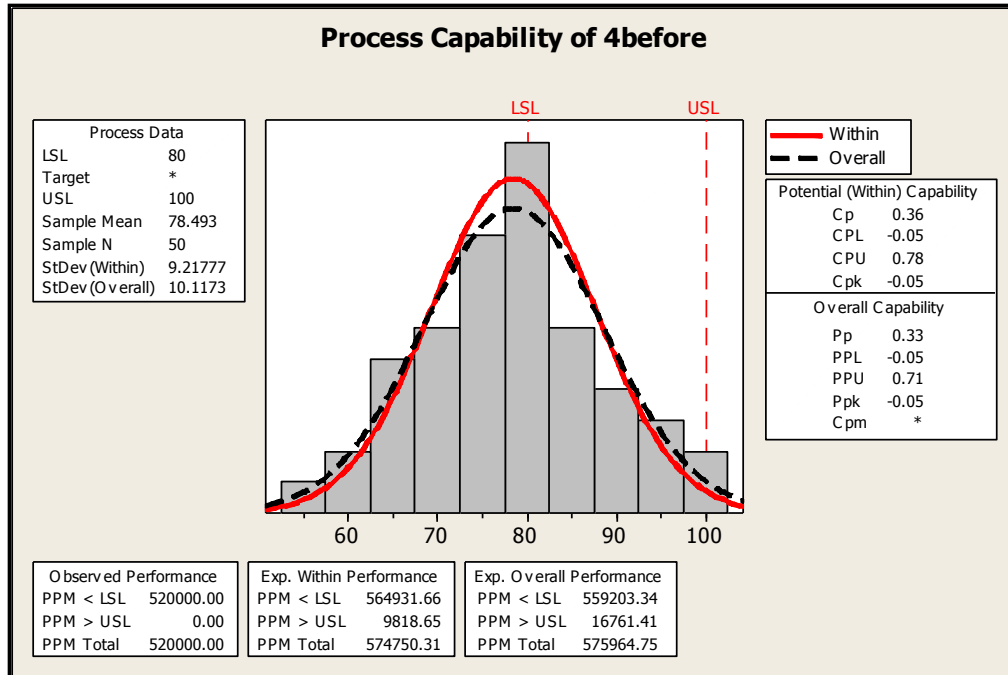


Process Capability Intro

- ▶ Examine the change in test scores for students in grade 4 to see if our improvements have had any effect on student performance
- ▶ Data taken over a five year gap to allow for the changes to have an effect
- ▶ Schools in the SCSD were given either:
 - An extra budget to distribute as they saw fit
 - Mandate to offer extra tutoring hours after school for students to attend
 - Both, a larger budget and required to hold after-school tutoring
- ▶ Assessment tests were taken at grade 4 to analyze the results of the improvements



Process Capability (Before Treatment)

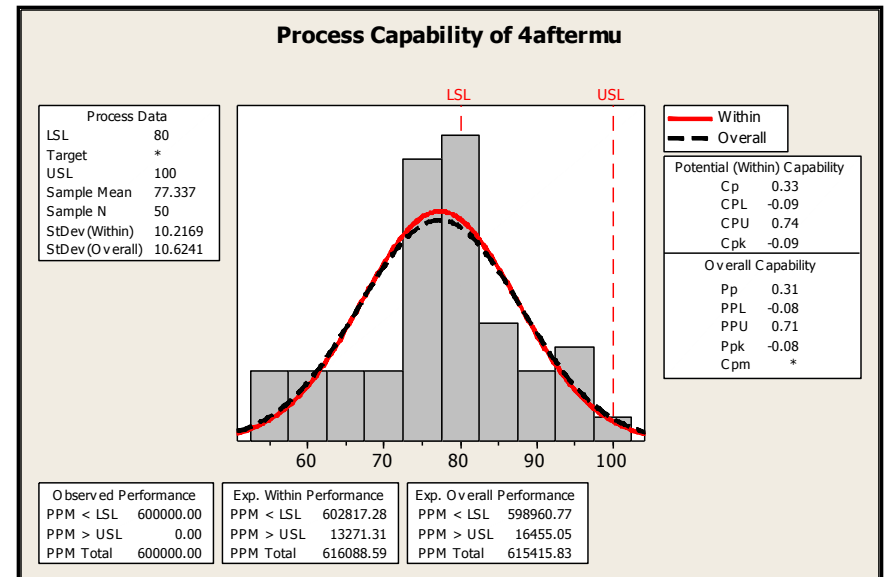
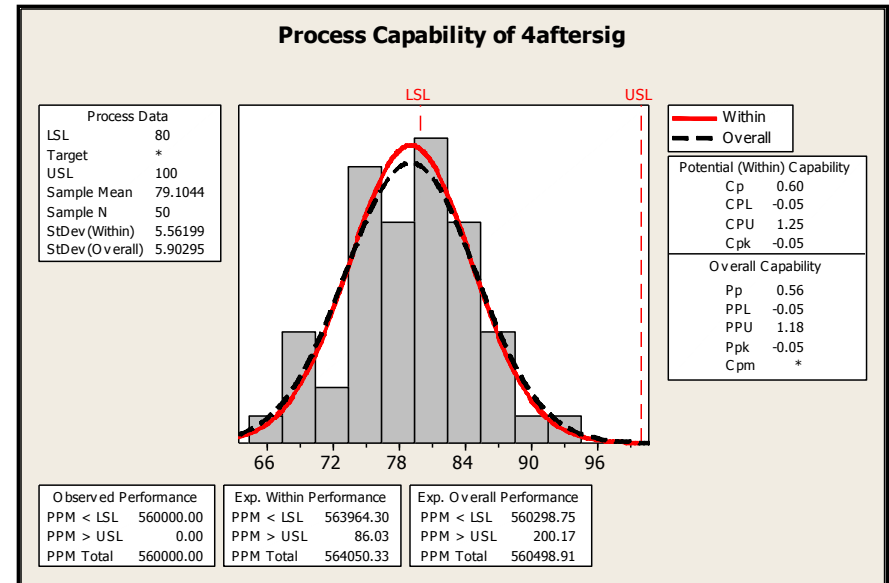


- ▶ Sig represents an increase in budget for the SCSD from New York State
- ▶ Mu represents an increase in tutoring held after school for students struggling in certain subjects.
- ▶ Before the changes were implemented, about half of Grade 4 students were in danger of failing

Process Capability (After Treatment)

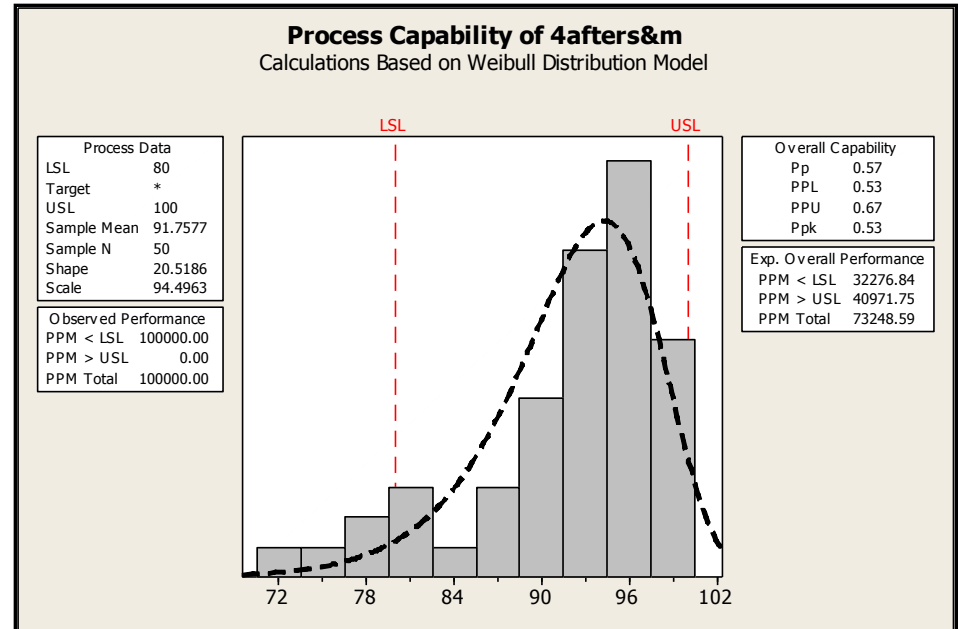
- ▶ After budget increase:
 - Slight increase in scores
 - Most of the class was still failing the assessment exams

- ▶ After-school tutoring:
 - Standard deviation spread of scores even higher than it had been before any improvements were introduced
 - Same number of students passing and failing the exams

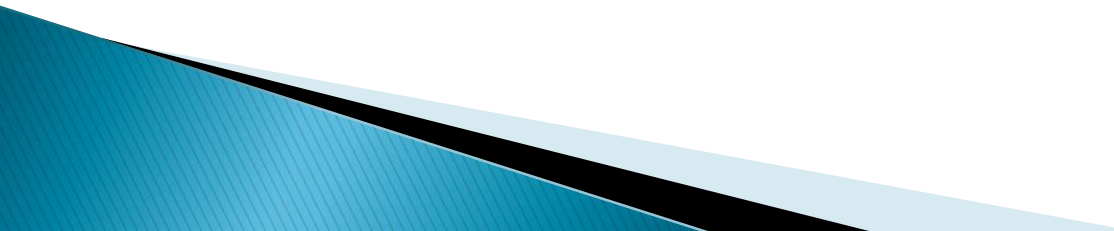


Process Capability (After Treatment)

- ▶ Both a budget increase and after-school tutoring programs:
 - Change in scores was drastic
 - Nearly all of the students were passing, and many were excelling in their assessment exams
- ▶ The higher grades indicate a higher level of learning and comprehension in the students, and a better preparedness for the next grades
- ▶ This is the best method for improvement in quality education



Conclusions

- ▶ COPQ analysis allowed us to develop a list of items of concern
 - ▶ Following Six Sigma outline to improve the process
 - ▶ Root-cause analysis gave more thorough investigation of items of concern
 - ▶ Process capability analysis used to assess the results of the treatments
 - ▶ To make improvements sustainable, continue applying treatments and implement yearly audits of test scores
- 

Questions?

