

# Using longitudinal data systems for evaluating school improvement and teacher initiatives

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Workshop for State Leaders and Evaluators of Teacher Professional Development

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# Overview

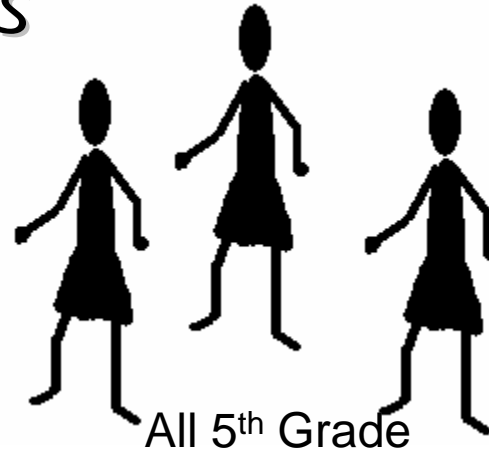
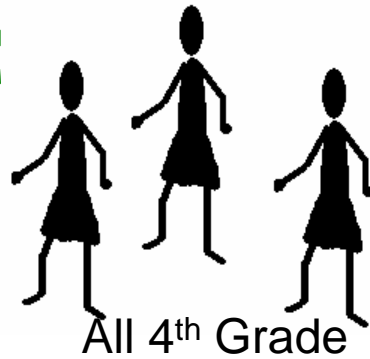
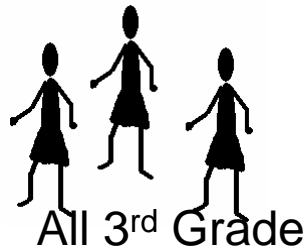
- Longitudinal data systems
  - What are they?
  - What do you need to have them?
  - What can you do with longitudinal data?
- Three studies using longitudinal data
  - What we've learned
  - What you should consider



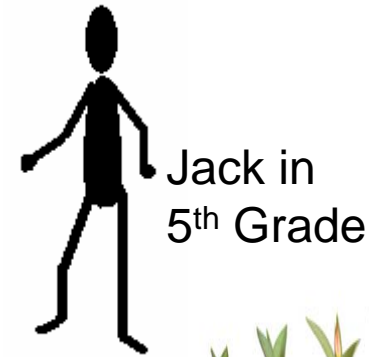
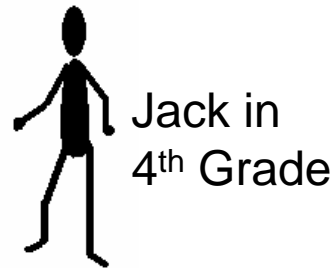
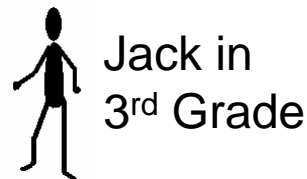
# Longitudinal Data Systems

- Longitudinal Data Types

## Cross Cohort



## Within Cohort



# Longitudinal Data Systems

- Generally longitudinal data systems provide a method of tracking within cohort student information.
- What's important for longitudinal data systems?
  - Identities
  - Characteristics
  - Relationships



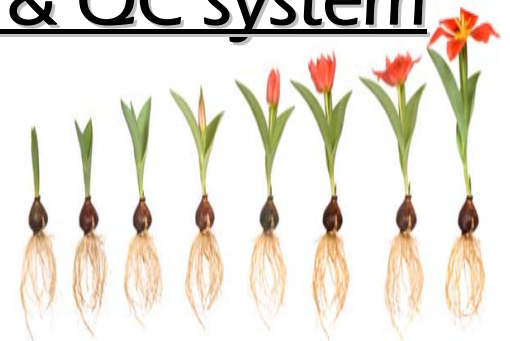
# DATA QUALITY CAMPAIGN

[www.dataqualitycampaign.org](http://www.dataqualitycampaign.org)



# Data Quality Campaign's Essential Elements

- Unique Student ID (SID)
- SID characteristics
- Ability to match SID to test info
- Info on untested SIDs
- System to match SIDs to teacher IDs
- SID transcript info
- SID college readiness test scores
- Student level graduation & dropout data
- SID across ed. systems
- An audit & QC system



# Longitudinal Data Systems

- What do you need to have a longitudinal data system?
  - A database (e.g., Oracle, SQL Server)
  - A data warehouse (e.g., Tetradata, Hyperion)
  - Definitions, relationships and identifiers
  - Support system to maintain and extract information



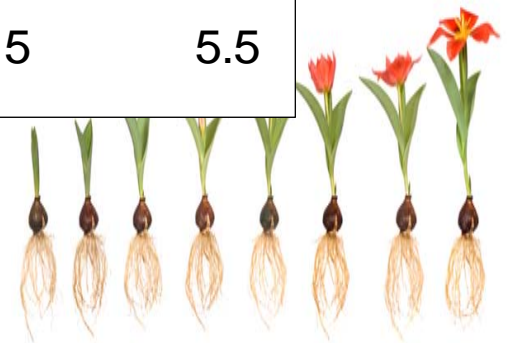
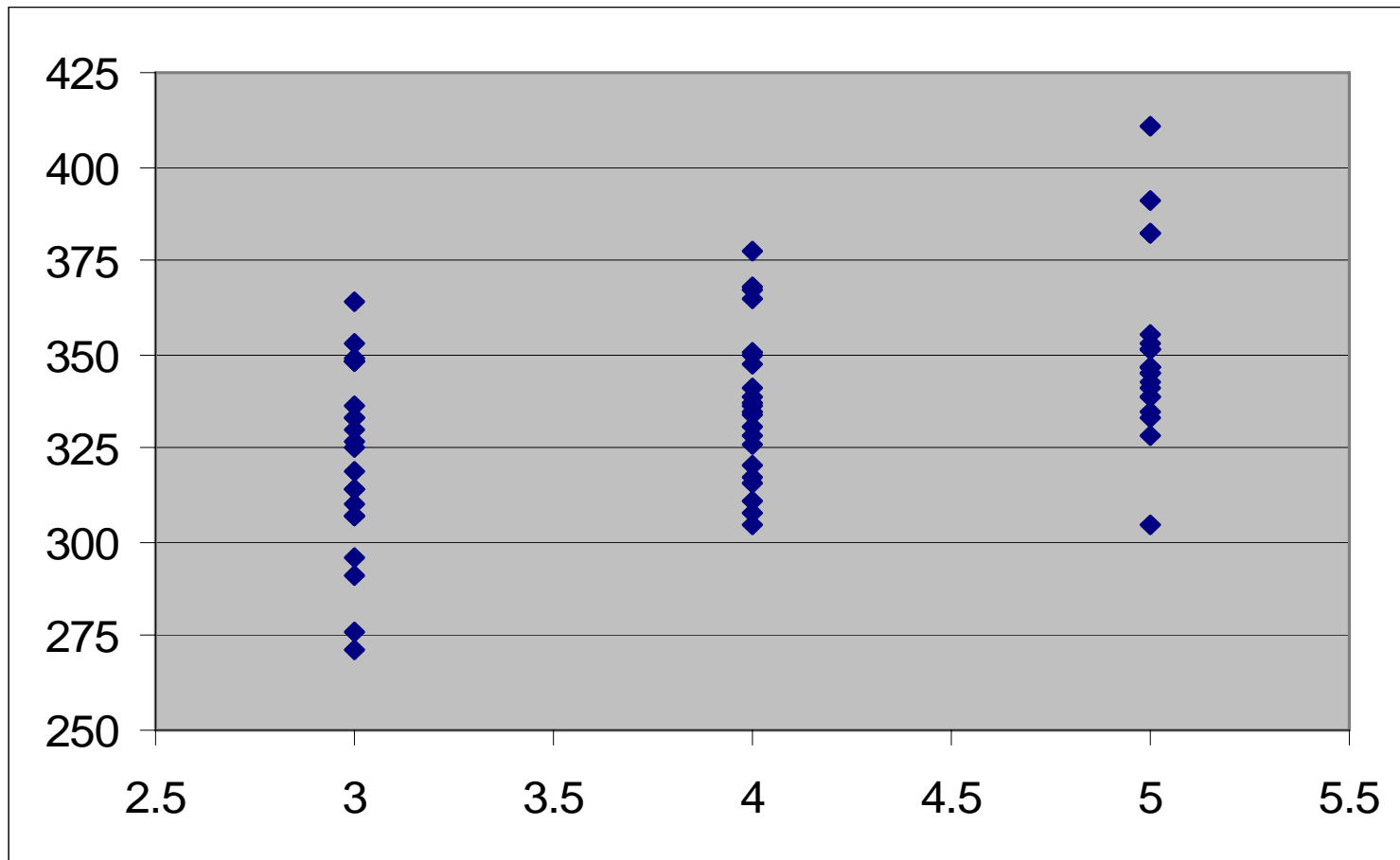
# Longitudinal Data Systems

What can you do with longitudinal data?

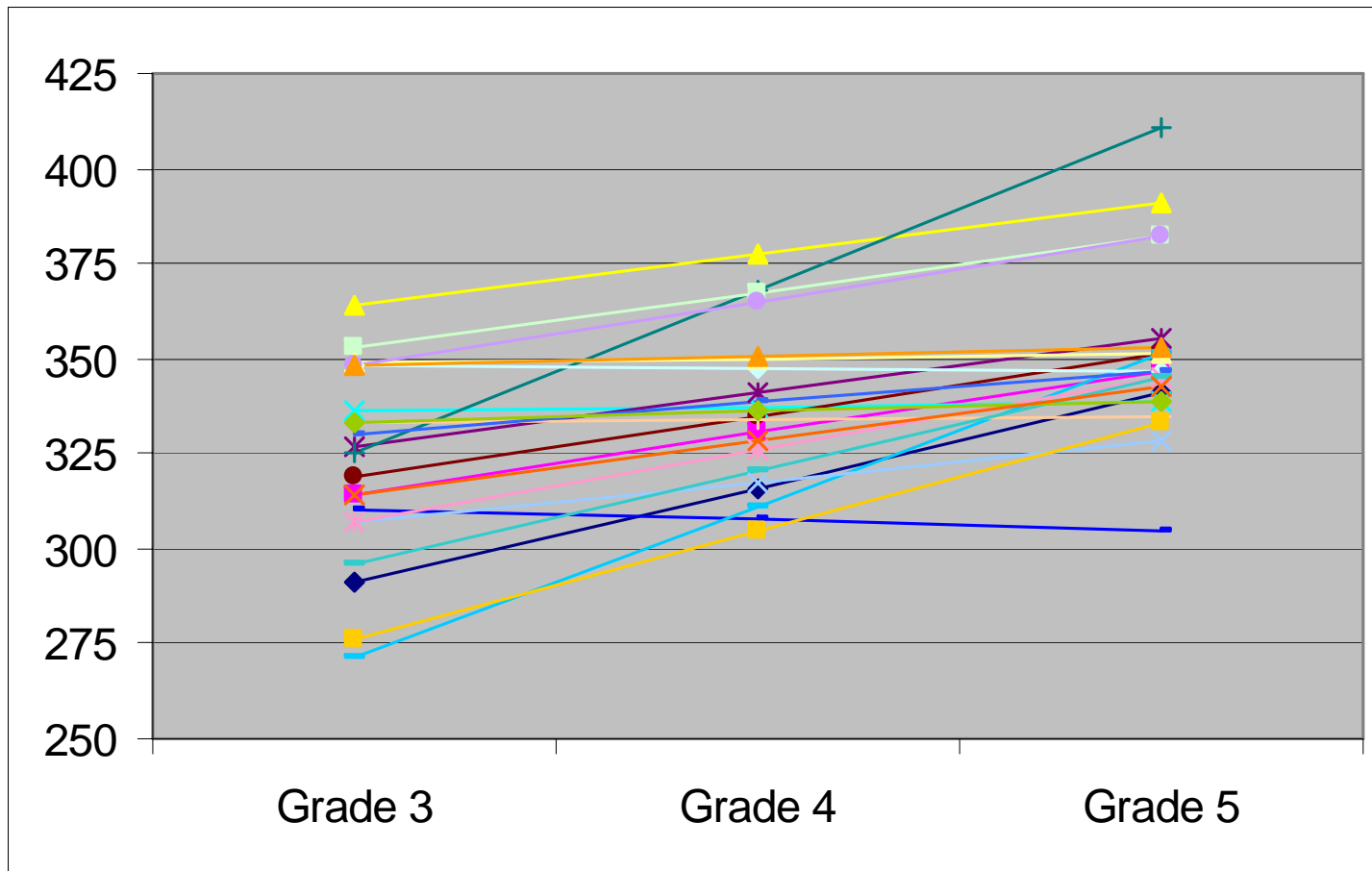
- Graphical Representations
- Descriptive Analyses
- Inferential Analyses



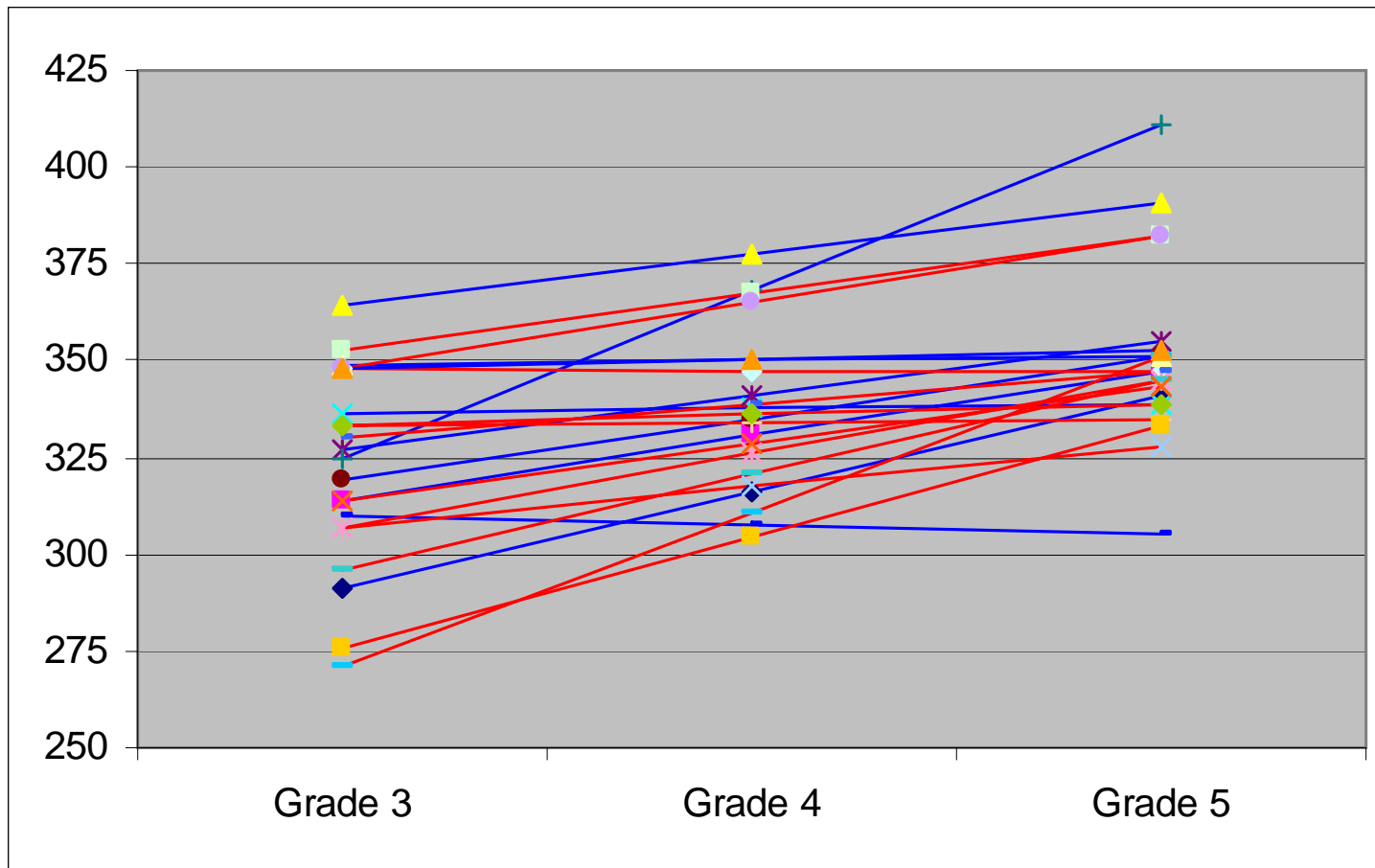
# Graphically-Scatter Plot



# Graphically-Scatter Plot



# Graphically-Scatter Plot



# Descriptive

Group	Statistic	Grade 3	Grade 4	Grade 5
Female	Mean	323.25	352.25	355
	SD	21.25	19.69	32.65
	N	8	8	8
Male	Mean	322.36	333.43	348.64
	SD	27.64	25.45	15.86
	N	14	14	14



# Inferential

- Regression analyses (wave to wave)
- Repeated measures ANOVA
- Time Series Analyses
- Hierarchical Linear Models (Value-added)
- Linear Mixed Models (Value-added)



# Three Studies of Longitudinal Data



# Study 1: Non-Traditional Teacher Preparation Program Comparison

- Alternate teacher certification program for Milwaukee Public Schools called MTEC.
- At issue is whether non-traditional teachers have negative effect on student achievement
- Research Question: Are gains in student reading/math scores different controlling for important variables?

NO. Maybe.



# Study 1-Loss Rate

Table 2: Student Frequency Count of 3<sup>rd</sup> and 4<sup>th</sup> Graders in the 2003-2004 School Year by Each Data Step by Subject

Subject	Original Testing File	Combined Teacher-Student File	Combined File for Teachers 3 yrs. Or Less	Final Working File
Reading Count	10,433	9,049	2,998	2,350
Mathematics Count	13,359	11,343	3,904	3,073



Connecting teachers and students is a challenge, especially if you don't have effective & unique identifiers.

22.5% & 23.0%



# Study 1: Morale of the Story

- Having a unique student ID is critical;
- Connecting students IDs to test scores is critical;
- Connecting student ID to teacher ID is critical;
- Having unique teacher IDs is critical...  
...to effectively investigate longitudinal questions.



# Study 2: Middle Schools vs. K-8s

- Do students in K-8 schools differ from students in middle schools in...
  - Their engagement in education?
  - Their academic achievement?
  - Their growth in academic achievement?

**YES, YES, and YES**



# Study 2: Changes Over Time

School Type	SY 2005	SY 2007
K-8 Old	12	30
K-8 New	16	5
K-8 Trans	20	14
Middle School	37	35



# Study 2: Morale of the Story

- Things change over time!
- You need to account for these changes, e.g., teachers, buildings, school structures, etc., in your statistical models.



# Milwaukee Public School Research

- MPS Research Reports:

<http://mpsportal.milwaukee.k12.wi.us/portal/server.pt?open=512&objID=341&PageID=0&cached=true&mode=2&userID=2>



# Study 3: ELL Student Growth

- What is the nature of ELL students' growth in English as measured by state ELP assessments?
- Is growth effected by...
  - Gender?, Age?, Grade?
  - Poverty?, Disability status?,
  - ELL program effects?,
  - Pupil teacher ratio, Native language?

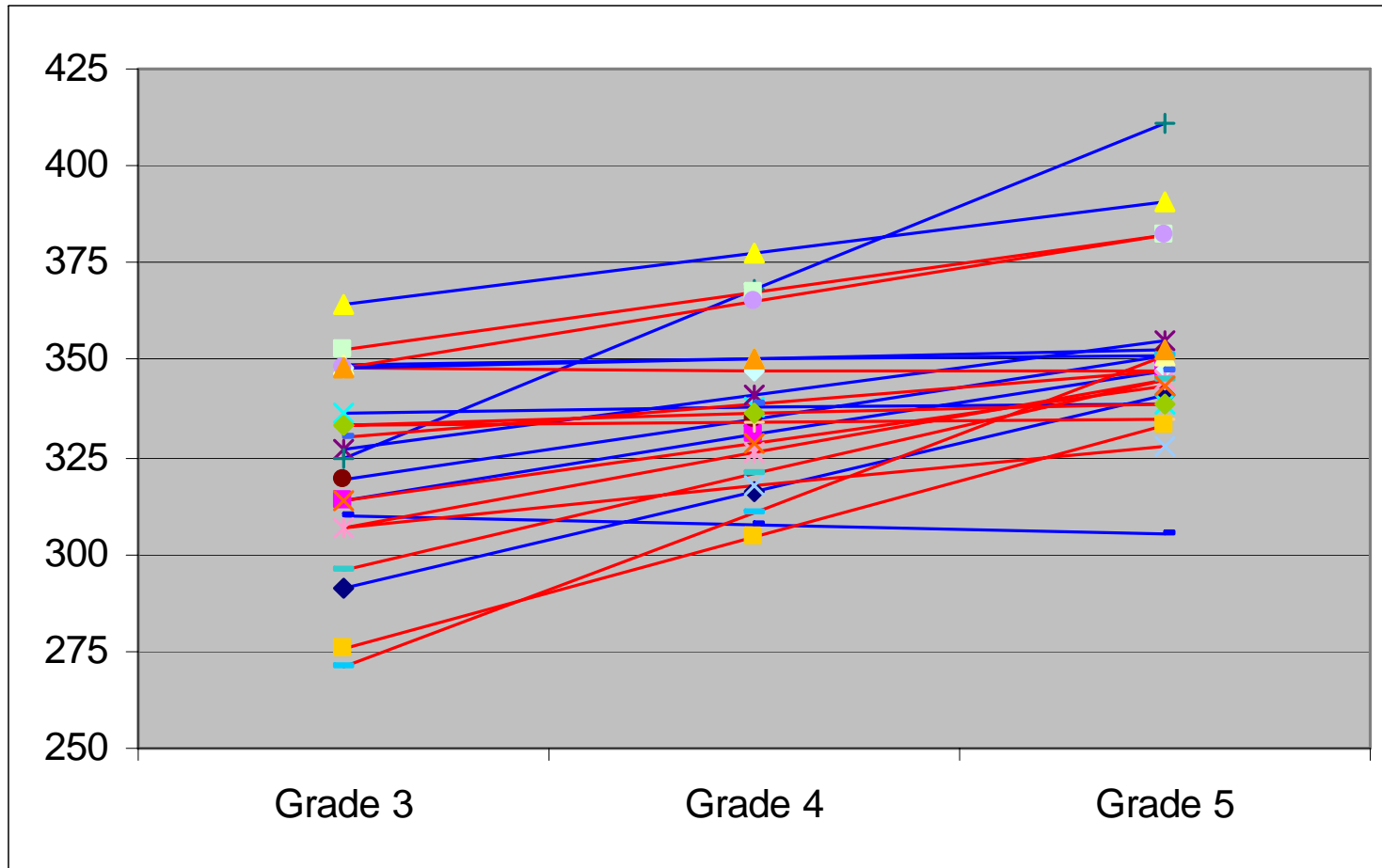


# Study 3: You don't get everything you want.

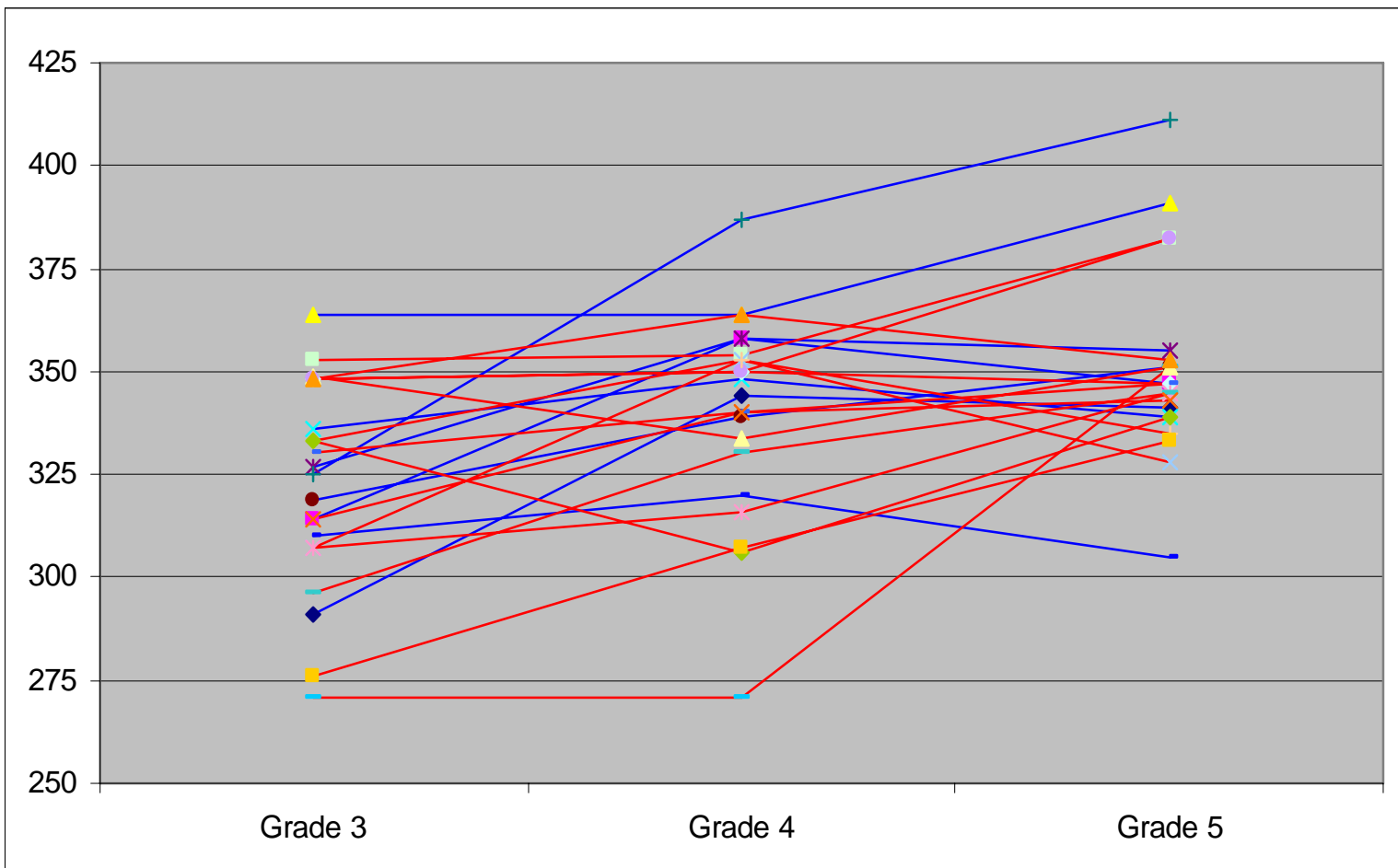
- State data sets had no identifiers for poverty at student level (i.e., no FRL status), no variables for ELL's in school
- Needed to get missing variables (CCD) but at contextual levels (i.e., schools)
  - Collected school % FRL, % ELL & teacher student ratio by school



# Remember this?



# Study 3: Growth is often NOT linear



# Study 3: Morale of the Story

- You may not get everything you want. See if you can obtain other associated variables elsewhere.
- When you have  $\geq 3$  data point, growth is often not linear. You need to account for that in your statistical models.



# What We've Learned from Studies

- Unique identifiers greatly supports (often requires) conducting longitudinal analyses
- Things change. In longitudinal studies you need to prepare for this.
- You may not have all you need in the datasets. But there may be other sources.
- Check to see the shape of growth.



# Longitudinal Analysis

- Is very powerful!!
- Requires more thoughtful data set up and management;
- Requires more sophisticated analyses;
- Has unique caveats, that are best thought out before hand;
- Can address more sophisticated questions.



# Thanks!

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Value-added Research Center

Wisconsin Center for Education Research

University of Wisconsin

