Value-Added Research Center: Roles and Roadmaps

January 28, 2011

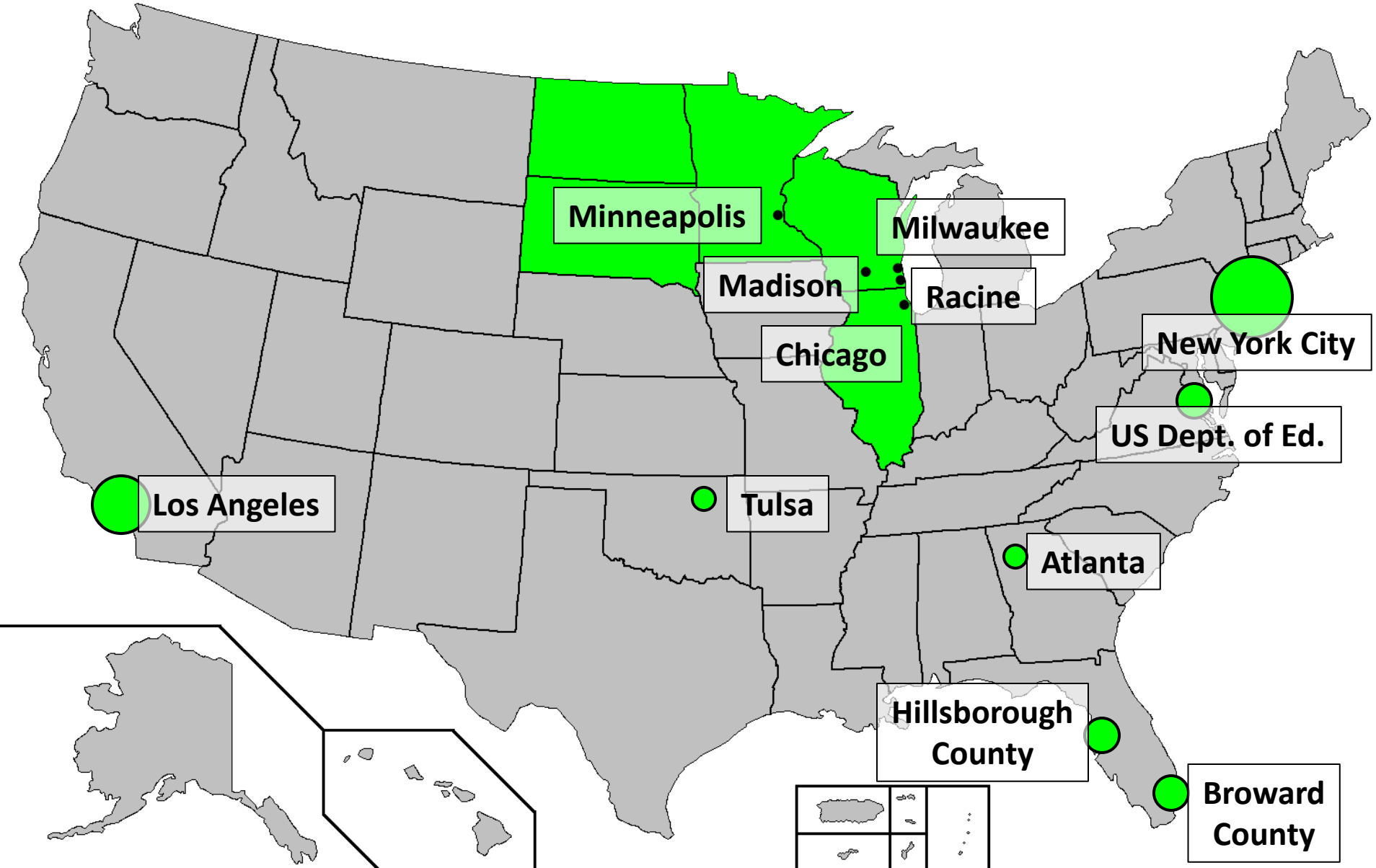
Topics for Today

- Welcome
- Project Update
- Value-Added Overview
- Discussion of statewide model
- Value-Added Reports and Discussion
- Other data to consider
- Next Steps

VARC Overview

- VARC core mission is to advance analytic methods known generally as Value-Added analysis
- Places where we work
- Areas of work
  - Data systems, data quality, professional development, reporting systems, evaluation, mixed methods

Districts and States working with VARC



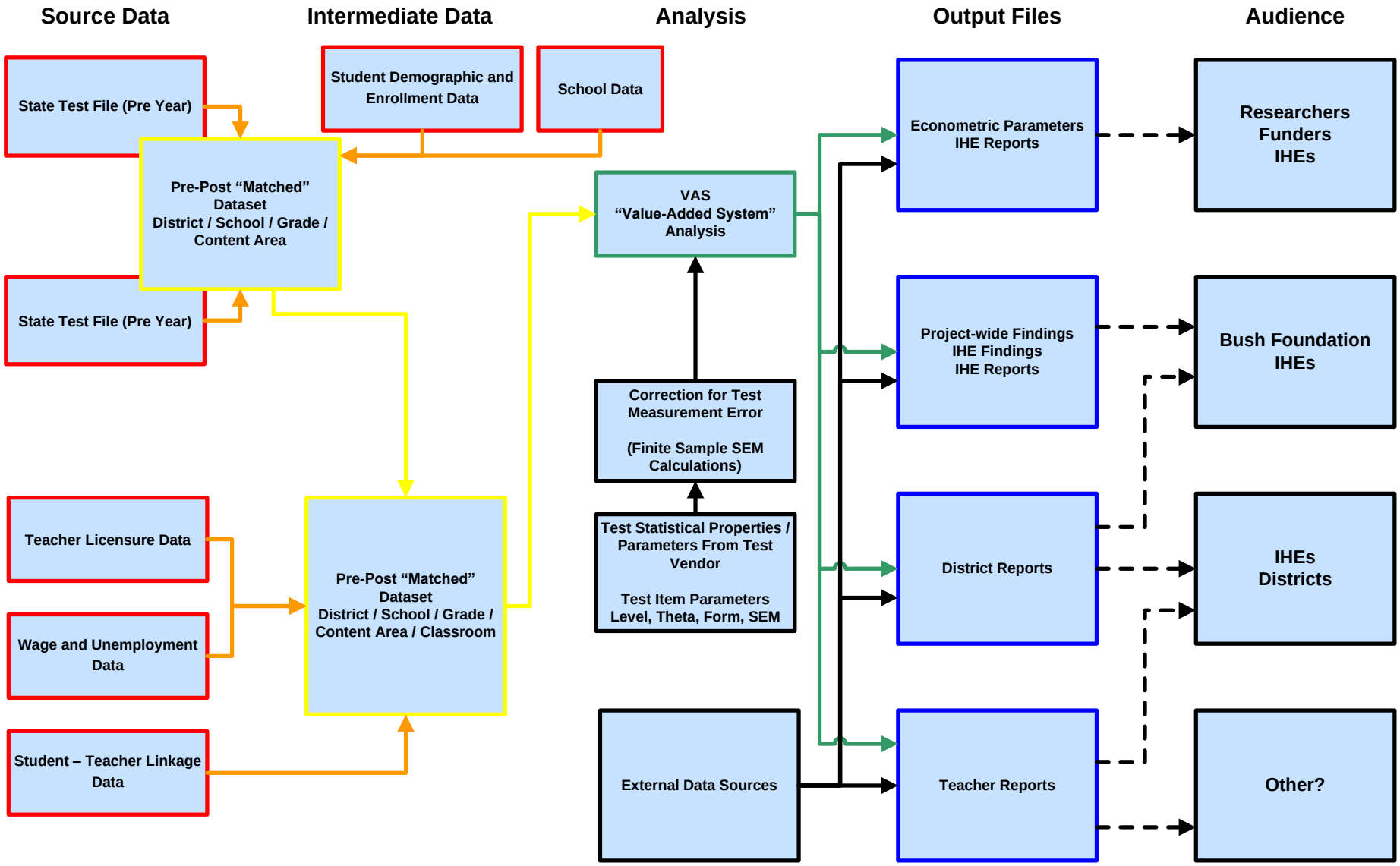
VARC's Role

- Provide analytic support to the Bush Foundation's Teacher Effectiveness Project
  - VA analysis
  - Reporting
  - Professional development
  - Data systems development and management
  - Not research, analytic support for program improvement

VARC's Relationships

- Consultant and VA analytics provider to the Bush Foundation and IHEs
- Current strategic partnerships that support the TEI project
  - MDE
  - NWEA
  - Others tbd

Bush Teacher Initiative Value Added System – Data Flow Overview



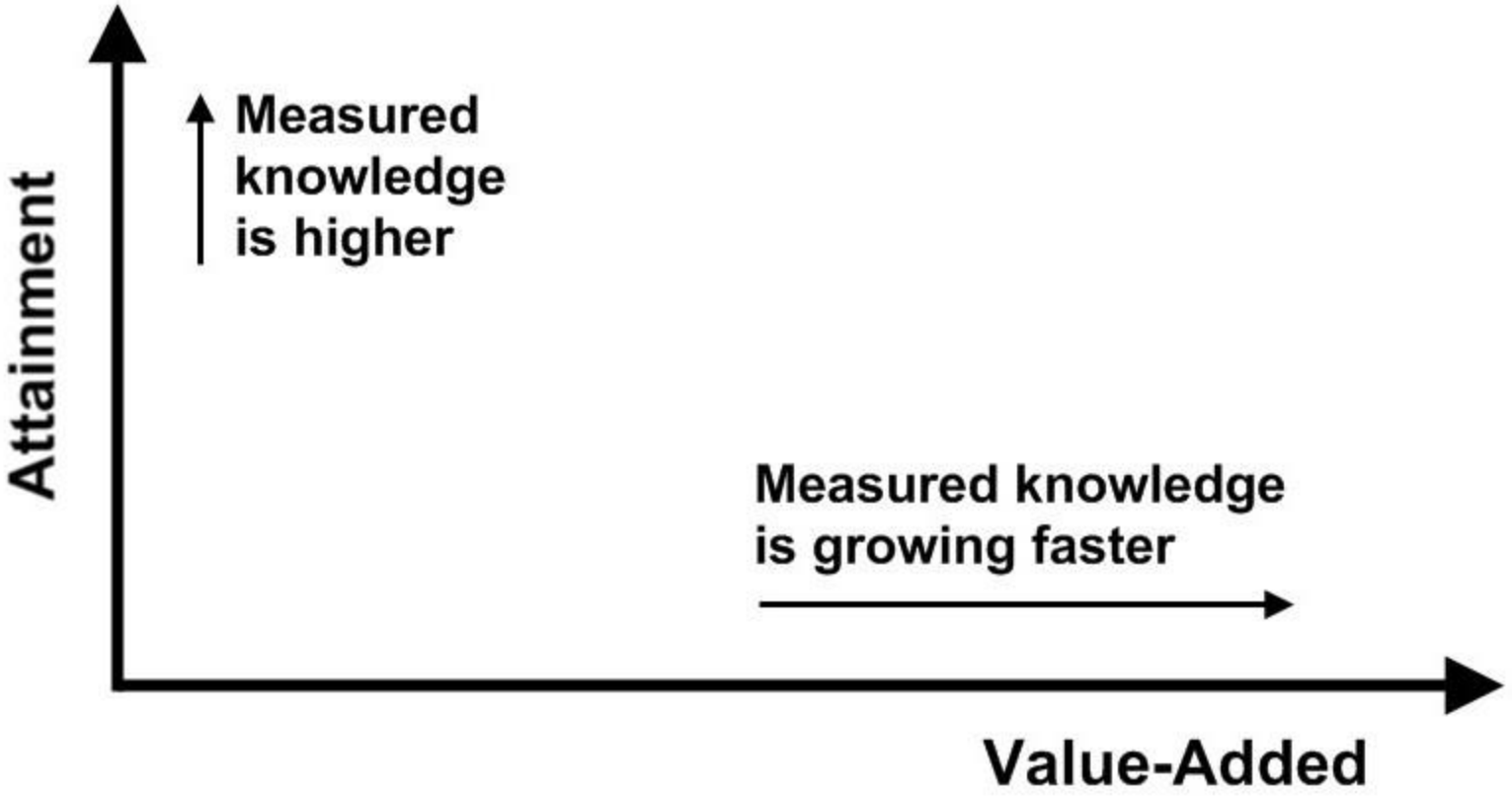
Bush Initiative Requirements: Types of Data

- Several disparate types of data are required:
  - Student assessment data
  - Student demographics and enrollment
  - Teacher demographics and assignment
  - Student – teacher linkages
  - District / School entity data
  - Course / Period data
  - Teacher licensure data
  - Wage and employment data
  - IHE programming and transcript data

Questions

VALUE ADDED: INTRODUCTION AND OVERVIEW

Measuring Student Learning: Growth versus Attainment



How do we measure student performance?

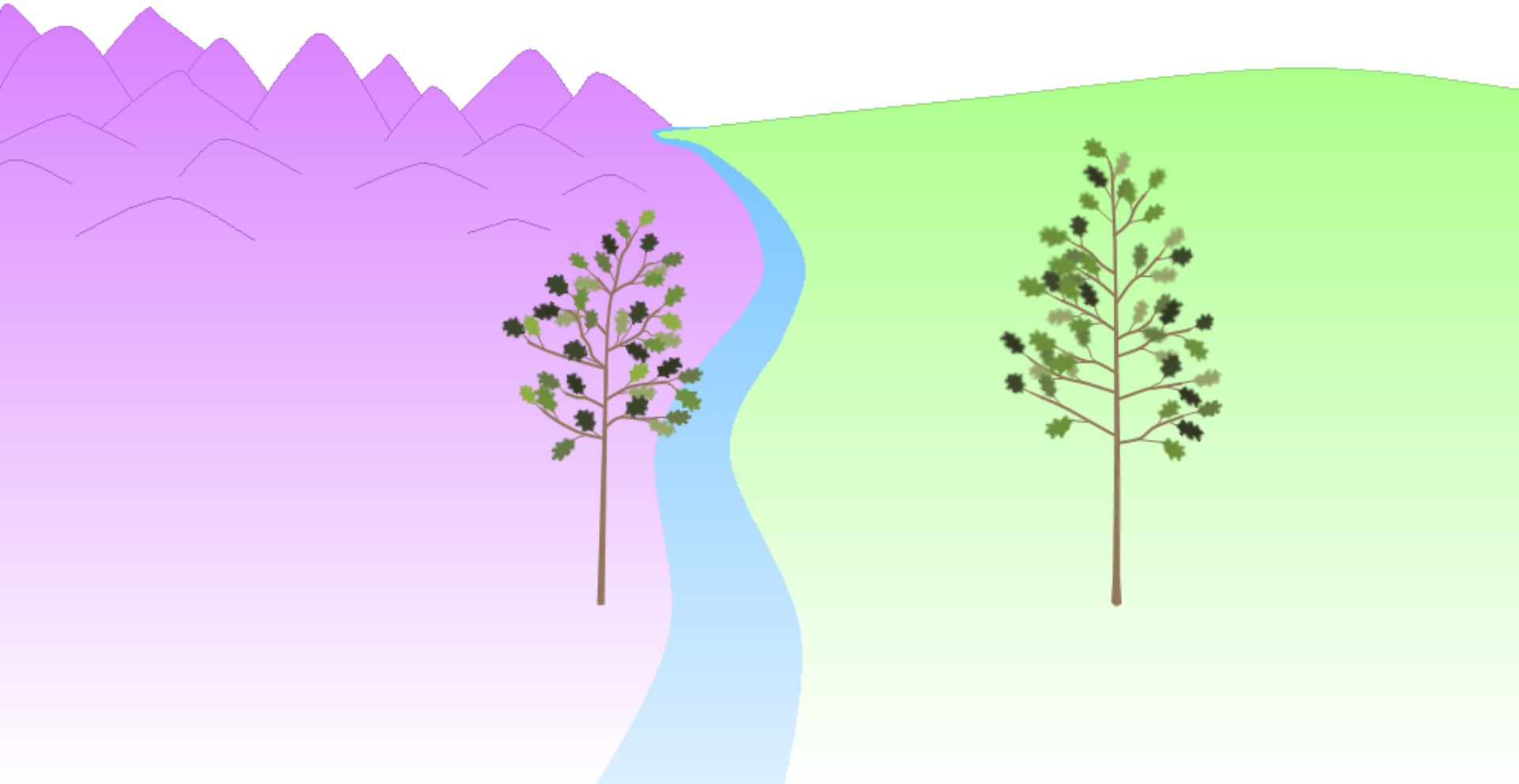
- What do we want to do?
  - Evaluate based on student testing performance
    - Student outcomes determine whether the school is performing well
  - Evaluate schools for meeting the needs of all students
    - Accept students wherever they start and help students learn as much as possible from that starting point
  - Hold schools accountable for what they can control
    - Do not reward or penalize schools based on aspects of student performance they do not control
    - Measure should be valid regardless of differences in student population

How do we measure student performance?

- How do we do this?
  - **Attainment**
    (example: the current NCLB method… percent proficient)
  - **Gain / Growth**
    (example: Colorado Growth Model)
  - **Value-Added**
    (example: VARC's Value-Added Analysis)

- The following non-education example tries to illustrate the difference between these measures.

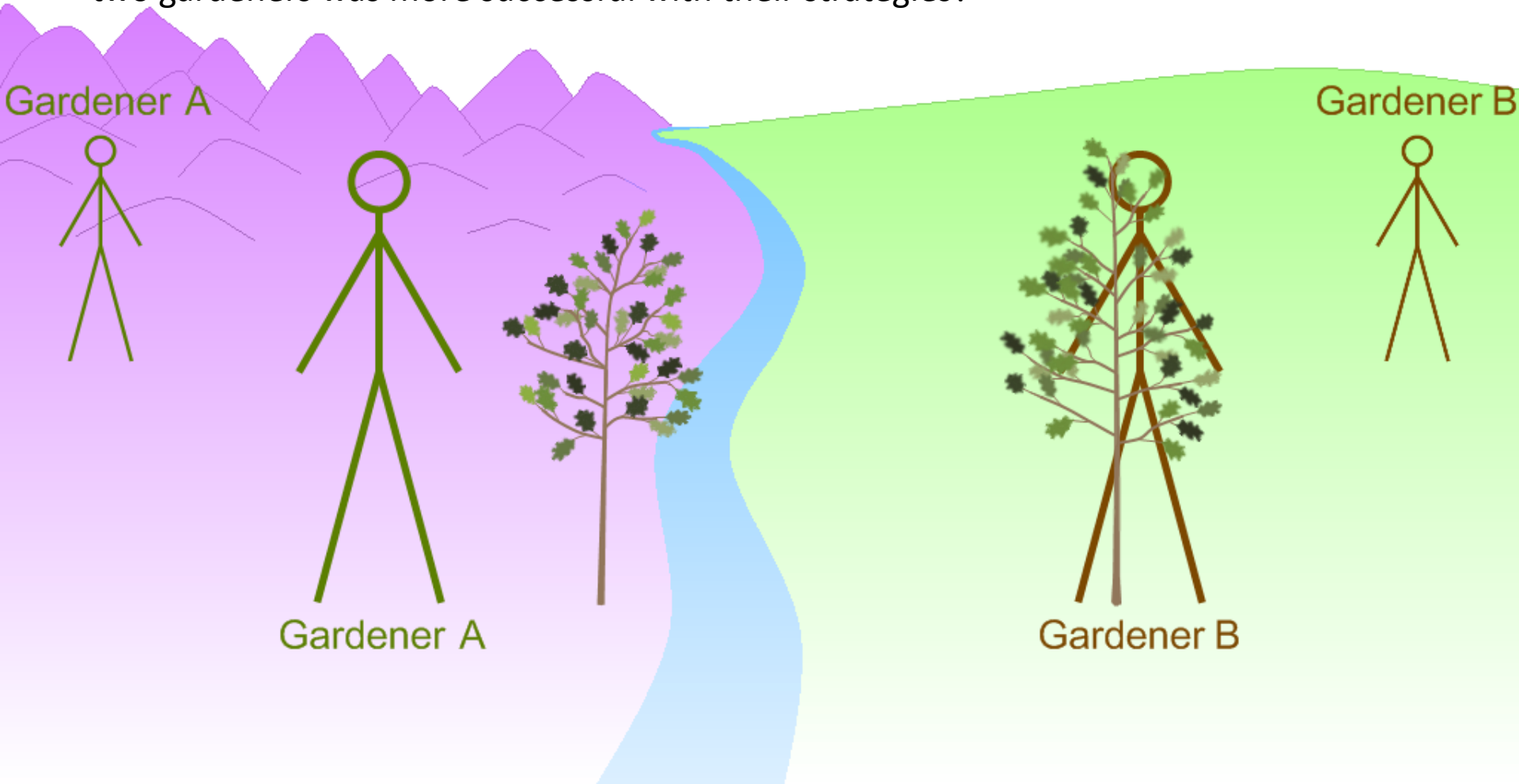
The Oak Tree Analogy



Explaining the concept of Value-Added by evaluating the performance of two gardeners

• For the past year, these gardeners have been tending to their oak trees trying to maximize the height of the trees.

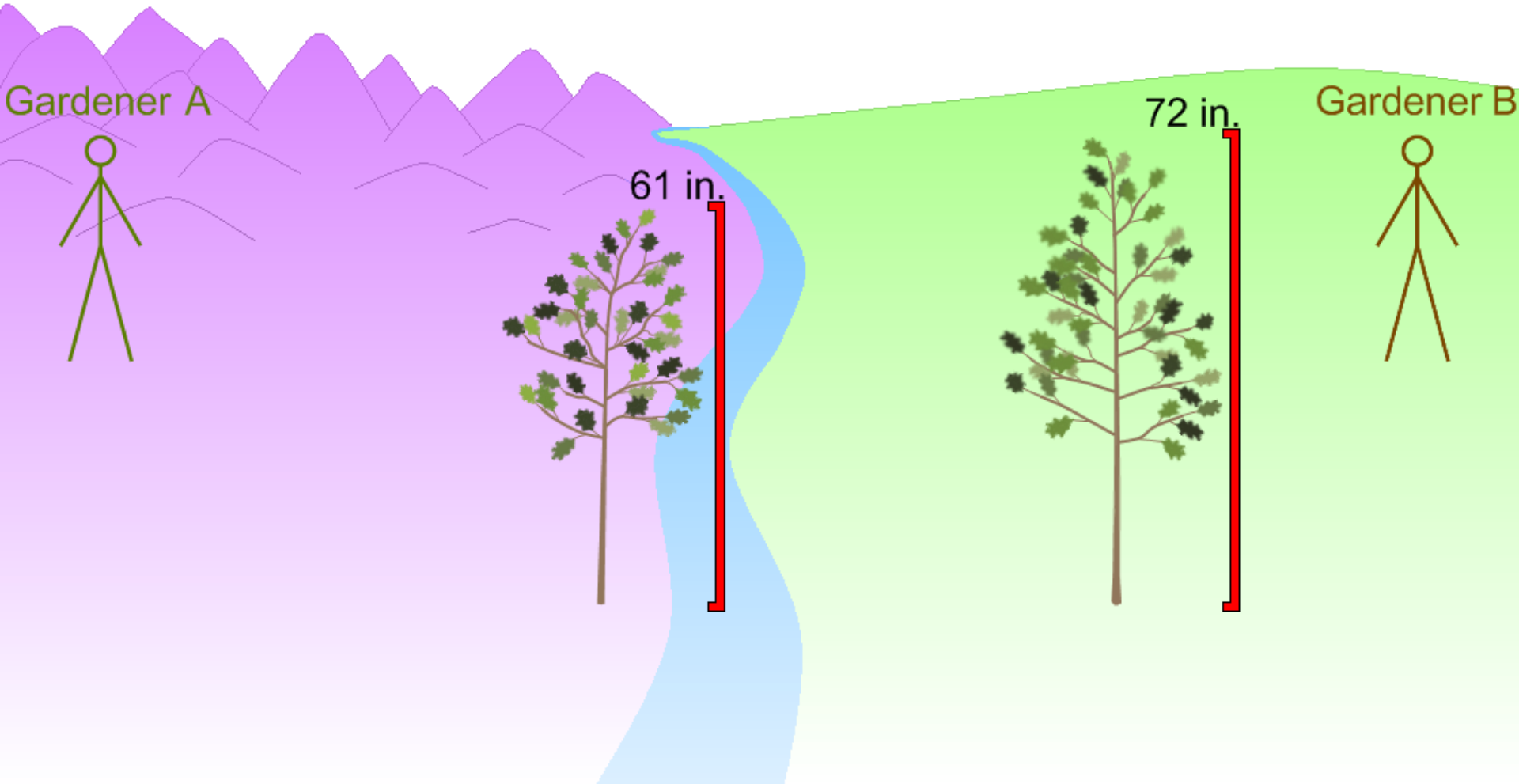
• Each gardener used a variety of strategies to help their own tree grow… which of these two gardeners was more successful with their strategies?



To measure the performance of the gardeners, we will measure the height of the trees today (1 year after they began tending to the trees).

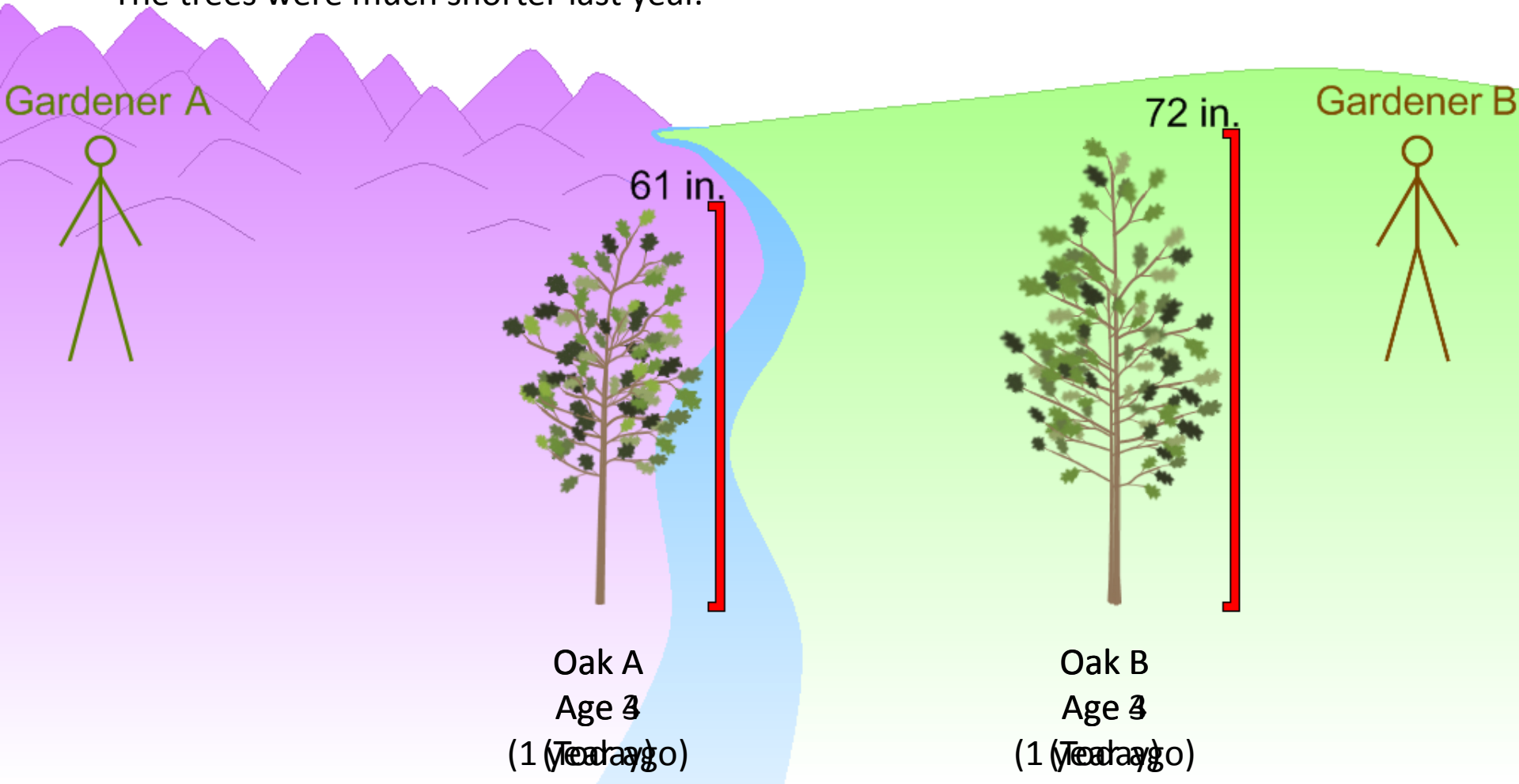
- Using this method, Gardener B is the superior gardener.

This method is analogous to using an **Attainment Model**.



… but this attainment result does not tell the whole story.

- These trees are 4 years old.
- We need to find the starting height for each tree in order to more fairly evaluate each gardener's performance during the past year.
- The trees were much shorter last year.

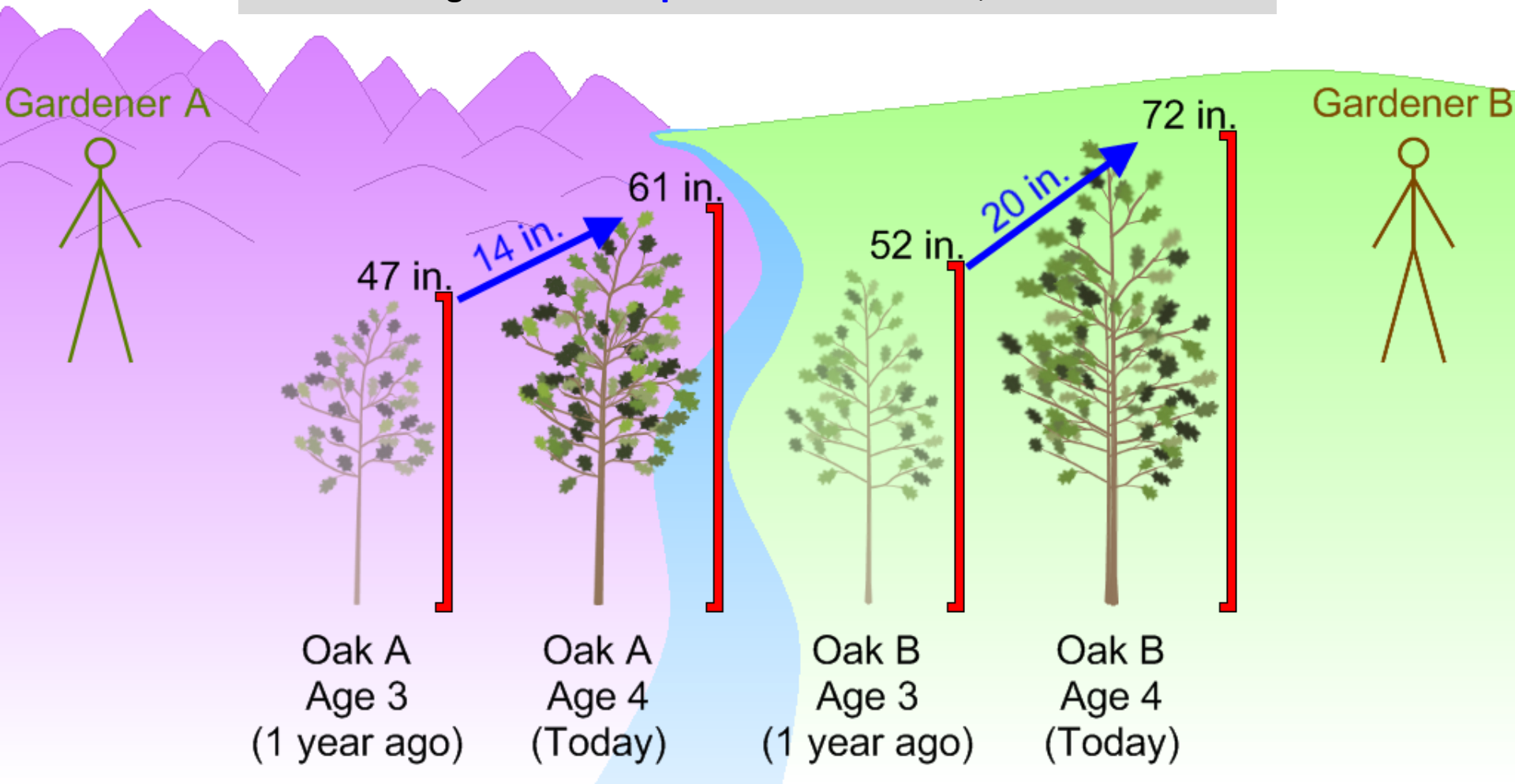


We can compare the height of the trees one year ago to the height today.

- By finding the difference between these heights, we can determine how many inches the trees grew during the year of gardener's care.

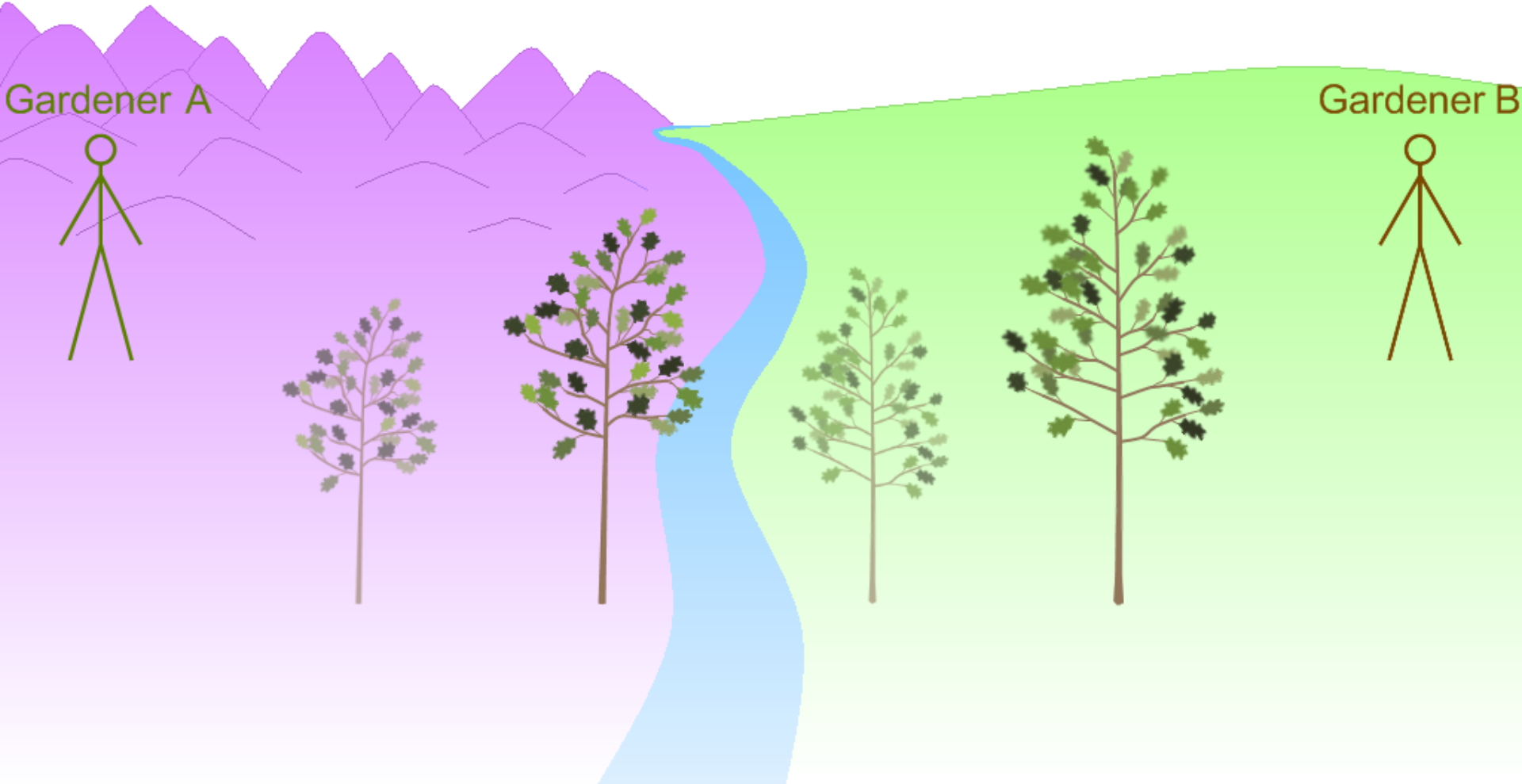
- Oak B had more growth this year, so Gardener B is the superior gardener.

This is analogous to a **Simple Growth Model**, also called **Gain**.

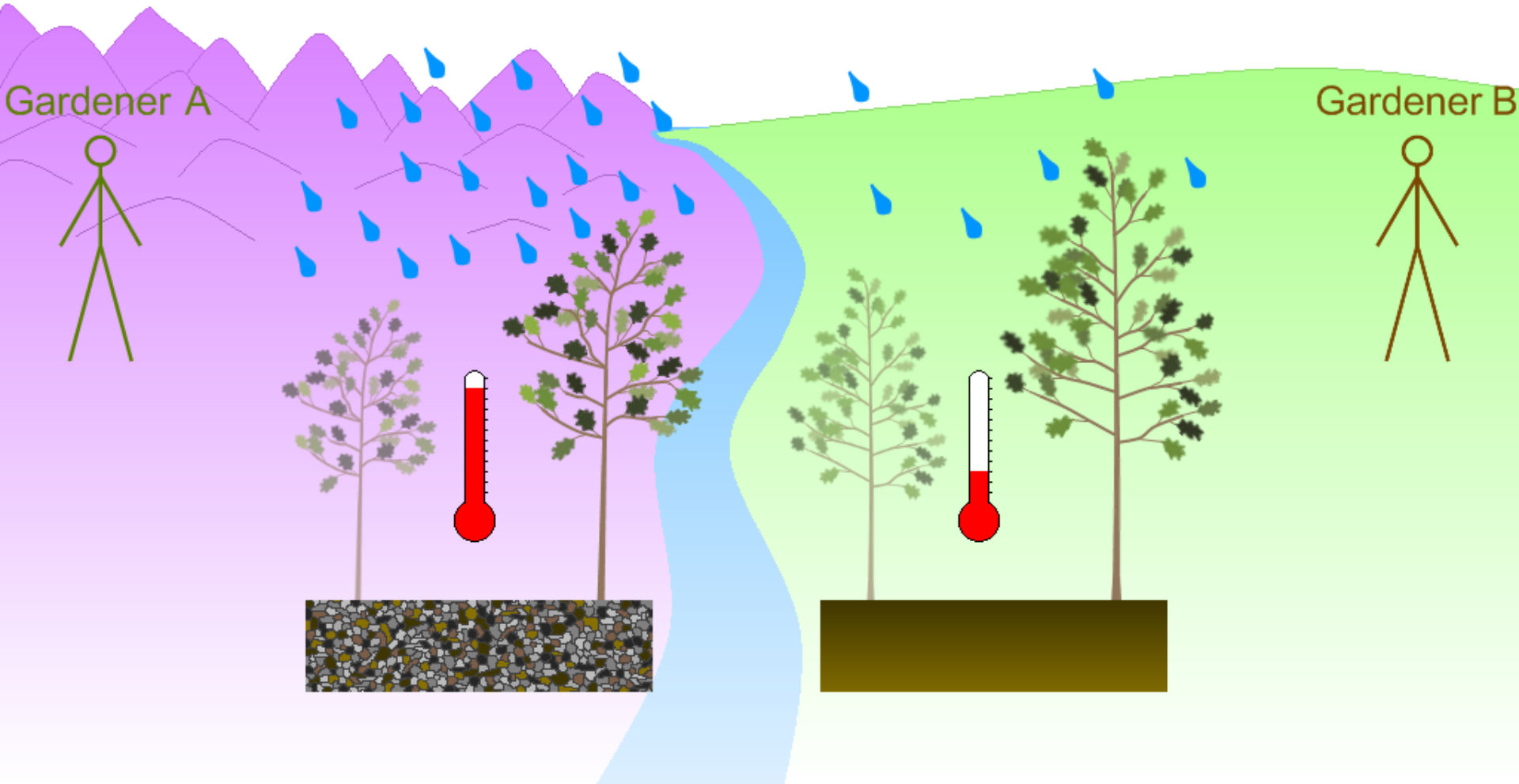


… but this simple growth result does not tell the whole story either.

- We do not yet know how much of this growth was due to the strategies used by the gardeners themselves.
- This is an “apples to oranges” comparison.
- For our oak tree example, three environmental factors we will examine are: **Rainfall**, **Soil Richness**, and **Temperature**.

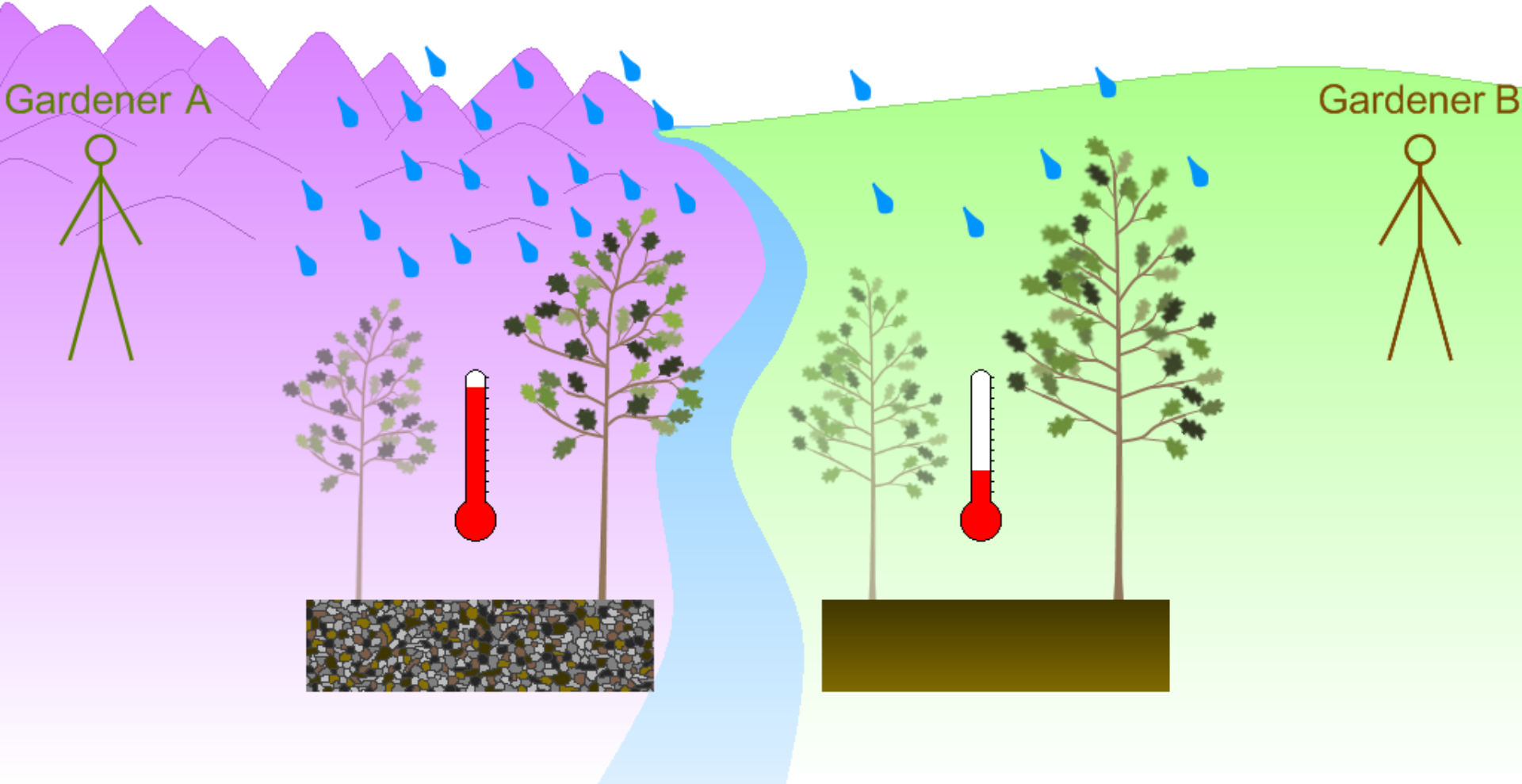


External condition	Oak Tree A	Oak Tree B
Rainfall amount	High	Low
Soil richness	Low	High
Temperature	High	Low

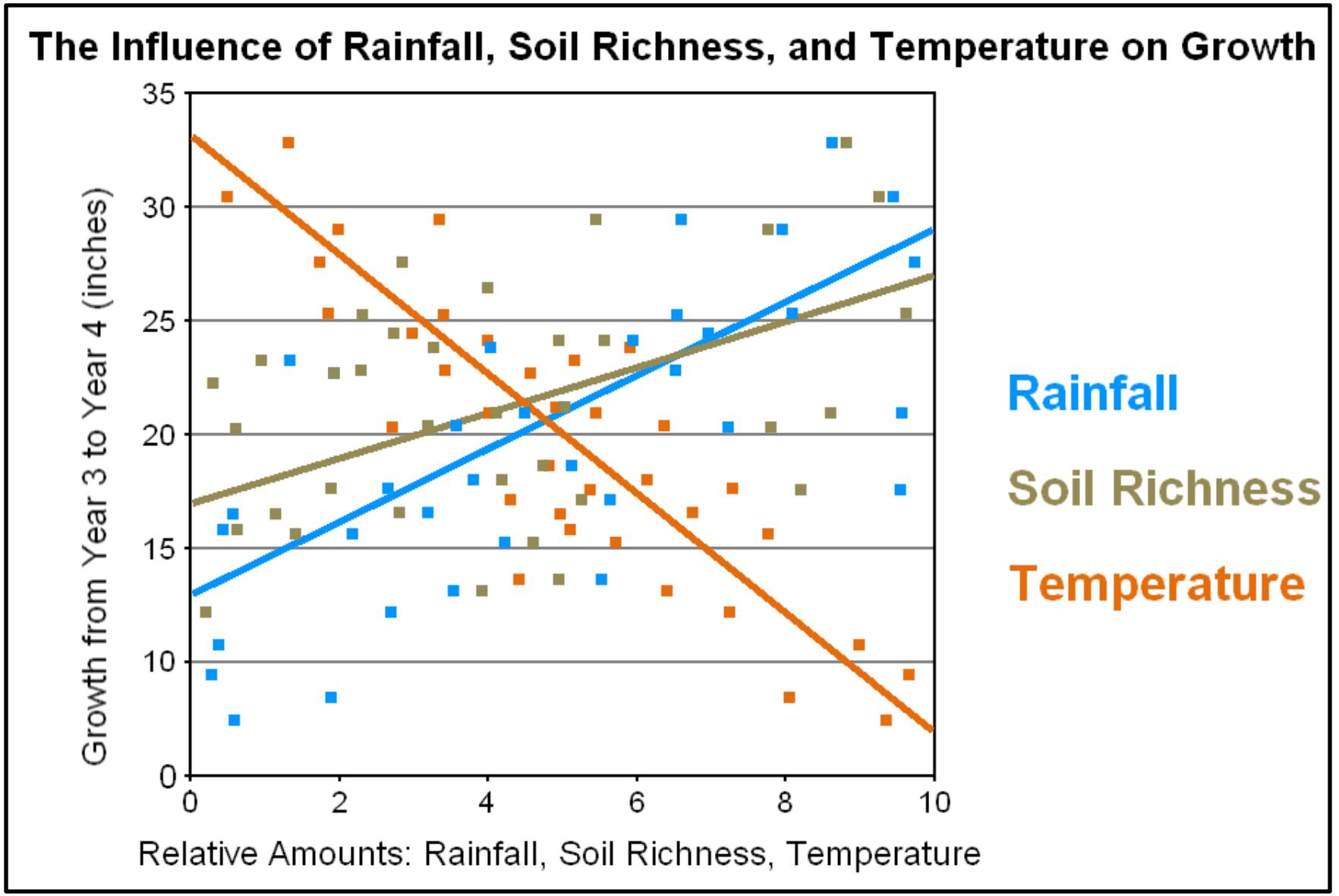


How much the gardeners' own strategies contributed to the growth of the trees…

- We can take out each environmental factor's contribution to growth.
- After these external factors are accounted for, we will be left with the effect of just the gardeners.
- To find the correct adjustments, we will analyze data from **all oaks** in the region.



In order to find the impact of rainfall, soil richness, and temperature, we will plot the growth of each individual oak in the region compared to its environmental conditions.



Now that we have identified growth trends for each of these environmental factors, we need to convert them into a form usable for our calculations.

Rainfall	Low	Medium	High
Growth in inches relative to the average	-5	-2	+3

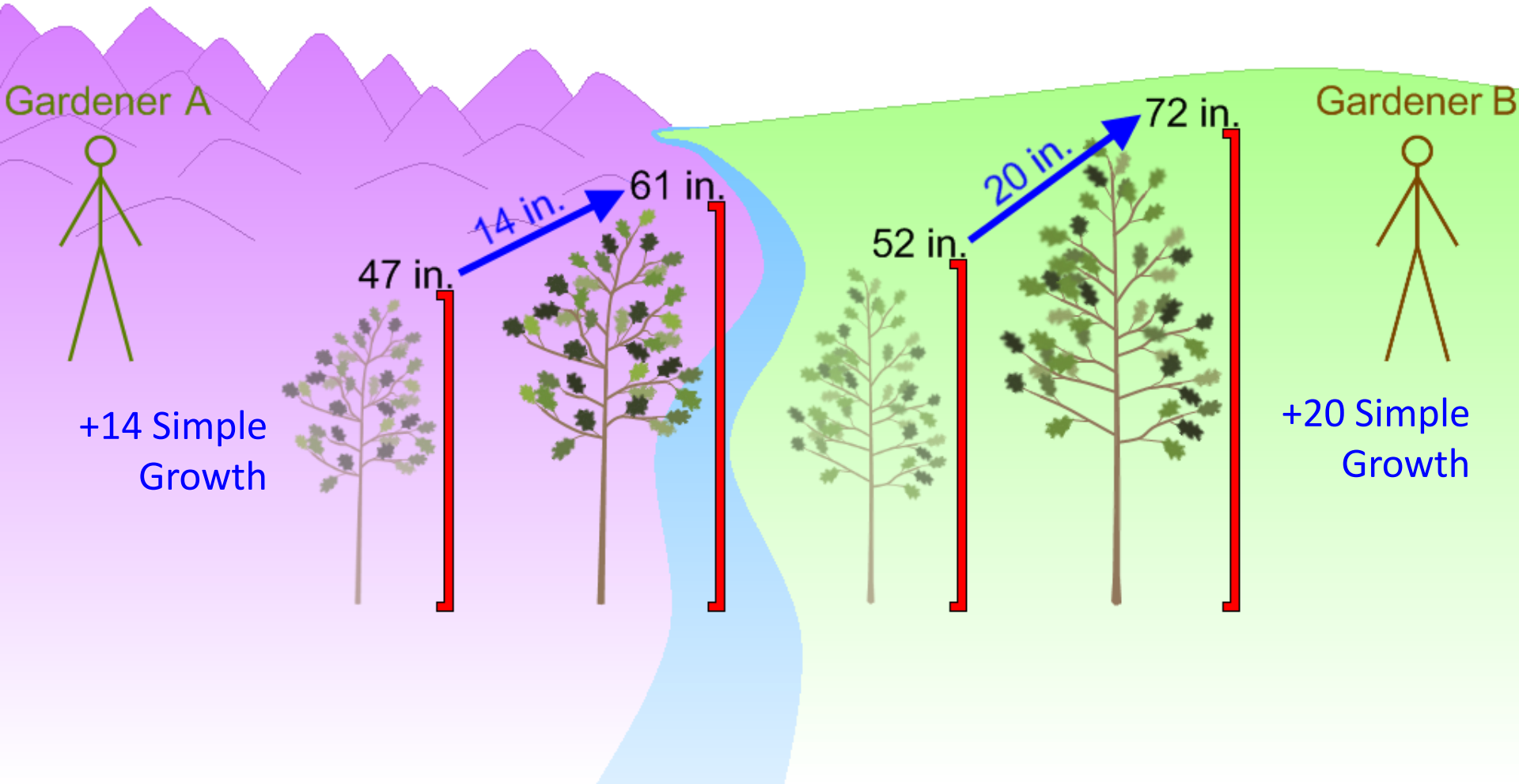
Soil Richness	Low	Medium	High
Growth in inches relative to the average	-3	-1	+2

Temperature	Low	Medium	High
Growth in inches relative to the average	+5	-3	-8

Now we can go back to **Oak A** and **Oak B** to **adjust for their growing conditions**.

To calculate our new adjusted growth, we start with simple growth.

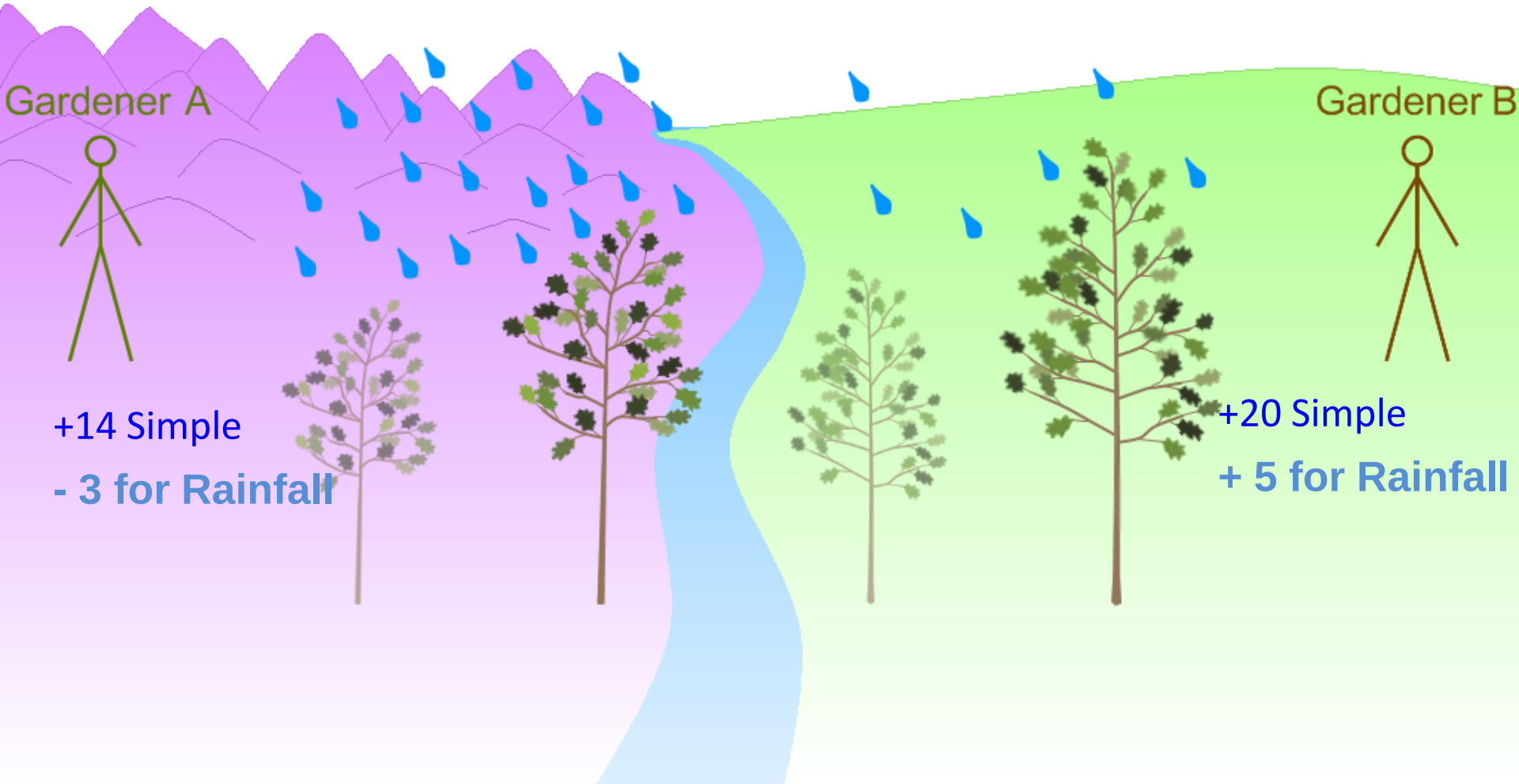
- Next, we will use our numerical adjustments to account for the effect of each tree's environmental conditions.
- When we are done, we will have an "apples to apples" comparison of the gardeners' influence on growth.



Based on data for all oak trees in the region, we found that high rainfall resulted in 3 inches of extra growth on average.

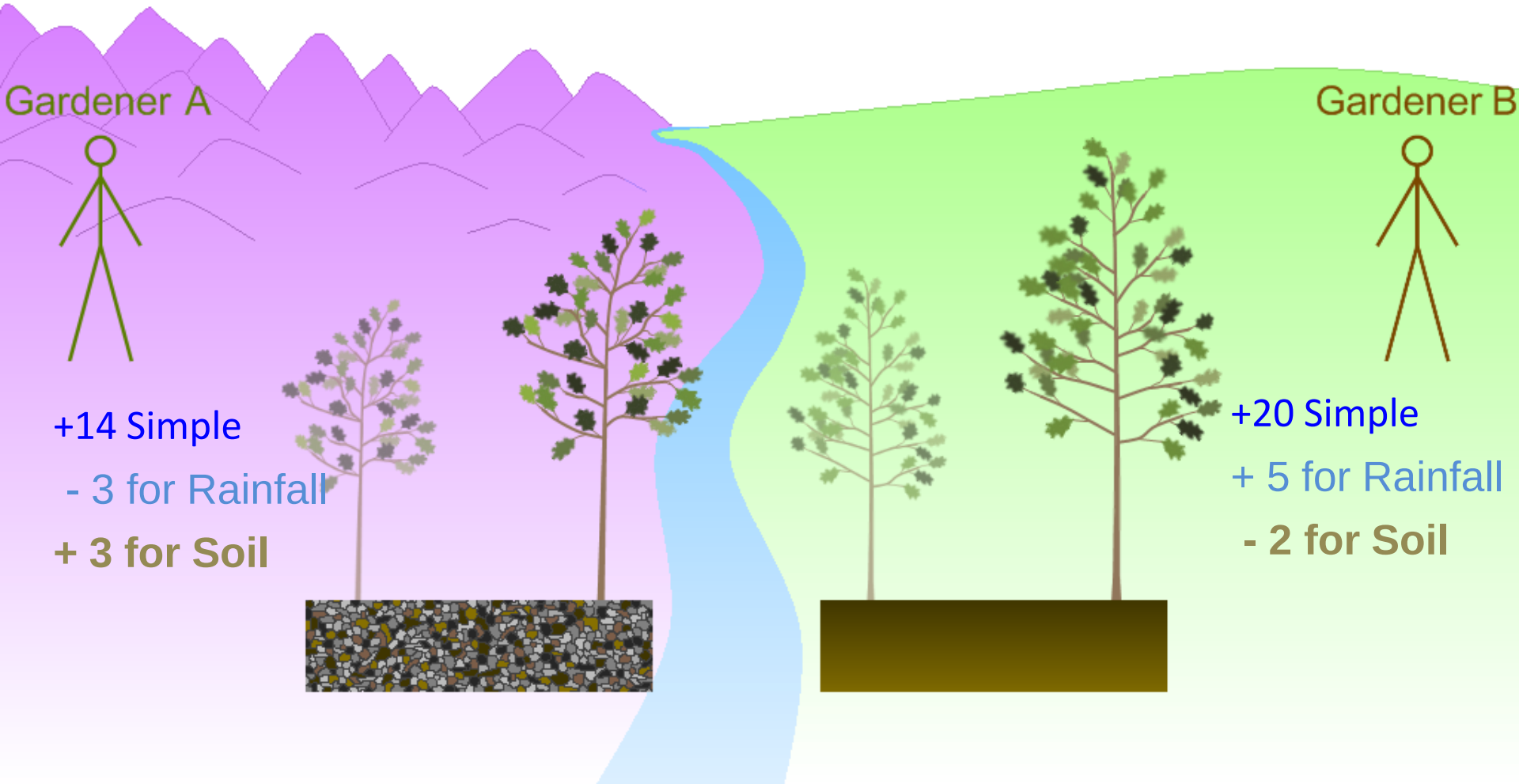
For having high rainfall, Oak A's growth is adjusted by -3 to compensate.

Similarly, for having low rainfall, Oak B's growth is adjusted by +5 to compensate.



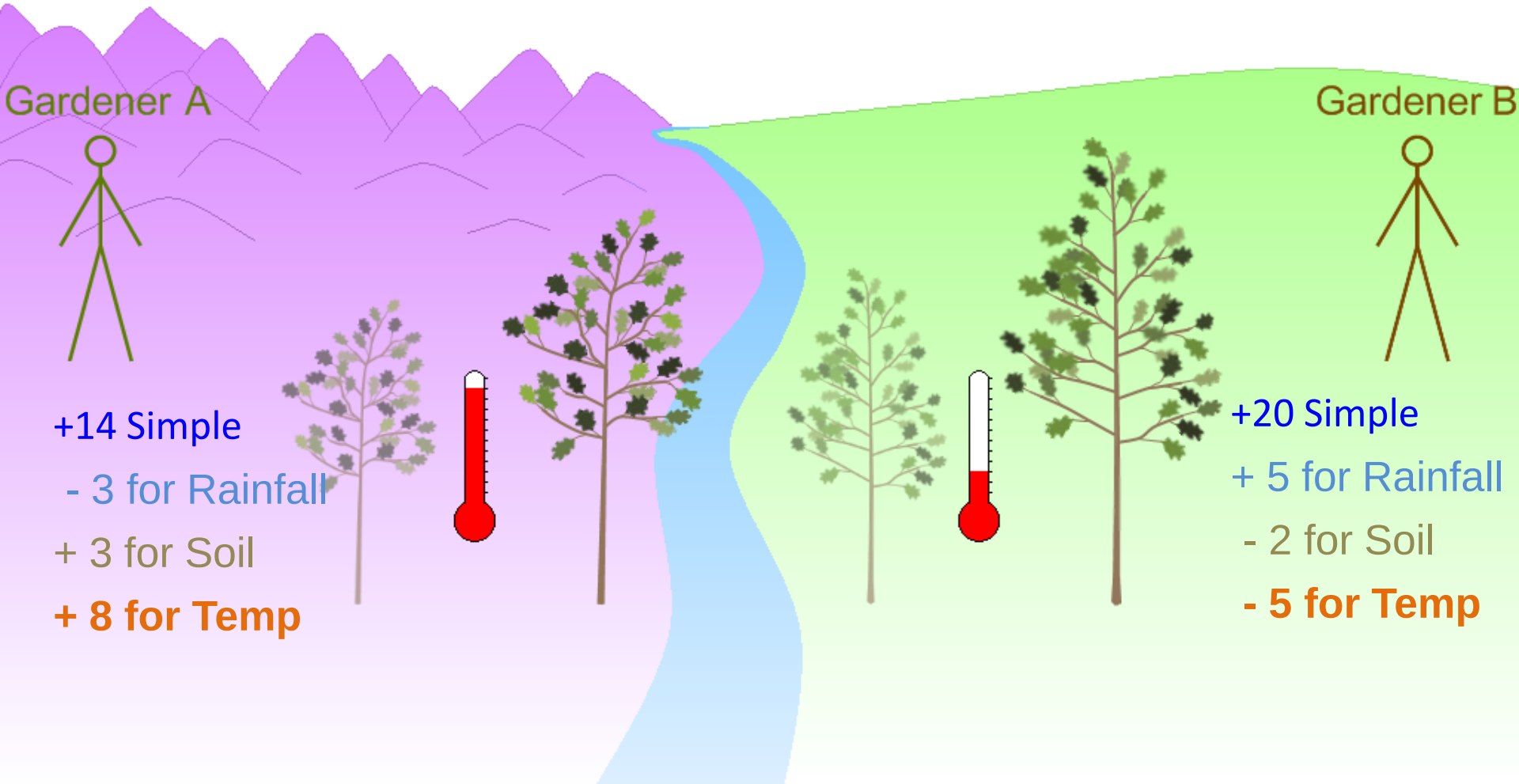
For having poor soil, Oak A's growth is adjusted by +3 to compensate.

For having rich soil, Oak B's growth is adjusted by -2 to compensate.



For having high temperature, Oak A's growth is adjusted by +8 to compensate.

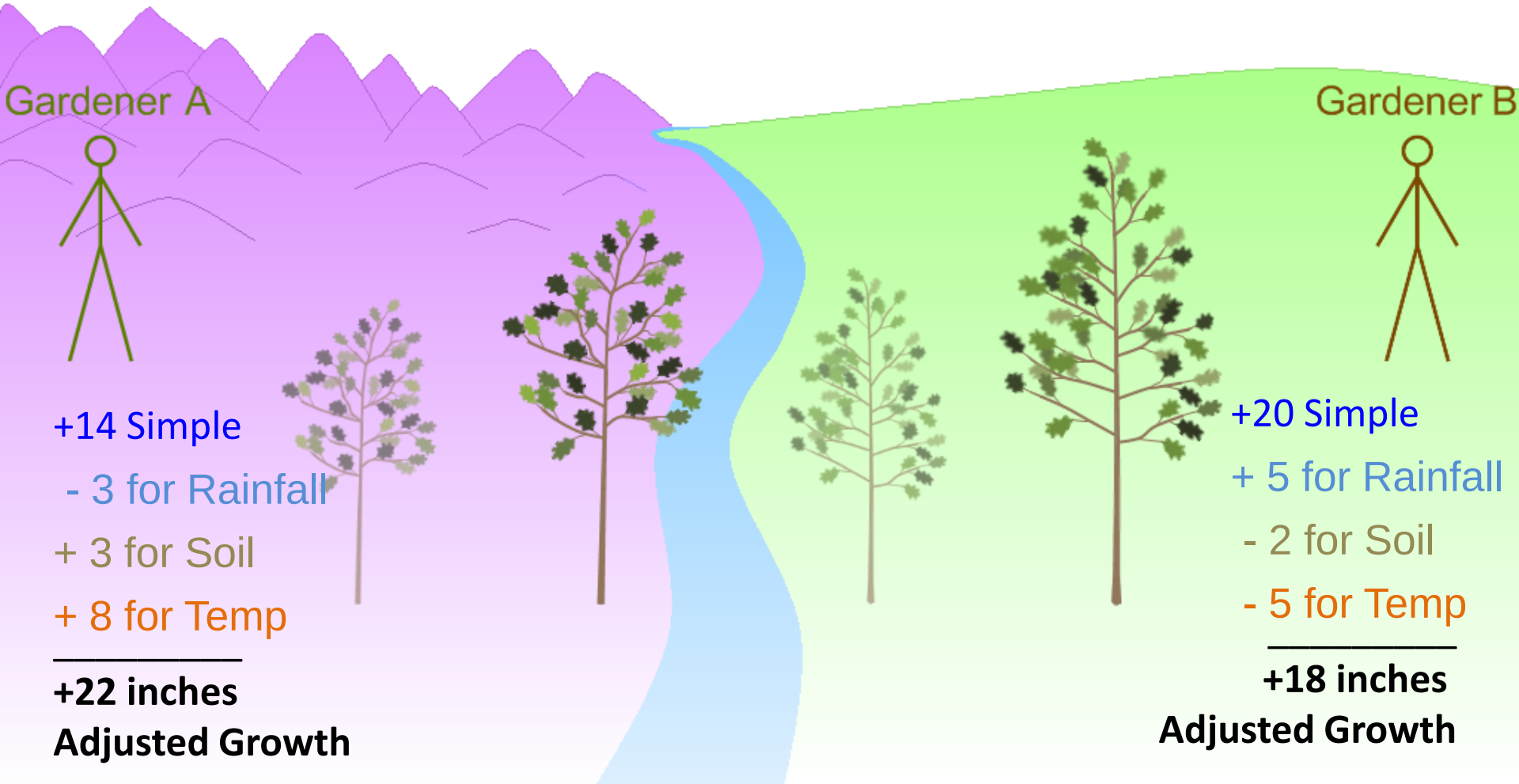
For having low temperature, Oak B's growth is adjusted by -5 to compensate.



Now that we have removed the effect of environmental conditions, our adjusted growth result puts the gardeners on a level playing field.

We calculate that Gardener A's effect on Oak A is +22 inches

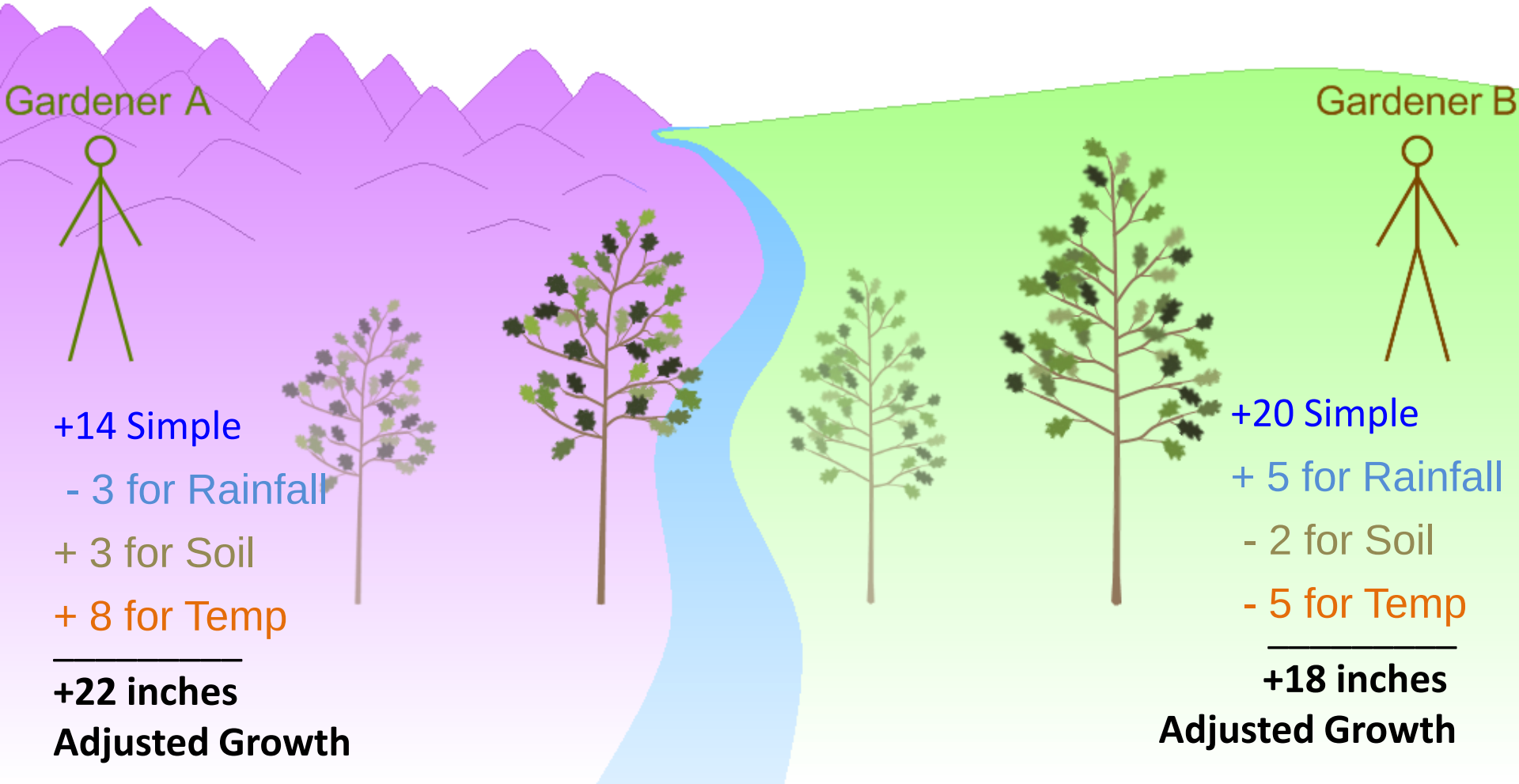
We calculate that Gardener B's effect on Oak B is +18 inches



Using this method, **Gardener A is the superior gardener.**

By accounting for last year's height and environmental conditions of the trees during this year, we found the "value" each gardener "added" to the growth of the tree.

This is analogous to a **Value-Added Model**.



How does this analogy relate to Value-Added calculations in the education context?

	Oak Tree Analogy	Value-Added in Education
Level of analysis?	• Gardeners	• IHE • Districts/Schools • Grades • Classrooms • Programs and Interventions
What are we using to measure success?	• Growth in Inches	• Relative Growth in Scale Score Points
Sample	• Single Oak Tree	• Groups of Students
Control Factors	• Rainfall • Soil Richness • Temperature	• Students' Prior Performance (most significant predictor) Potential other variables collected for ALL students • Free/Reduced Lunch Status • English Language Learner Status • IEP / Special Education Status • Race • Gender

North Dakota, Minnesota Covariates

- Previous year test scores
- Free/reduced price lunch
- Special Education
- English Language Learner
- Disability Status
- Race/ethnicity
- Gender

Covariates

- Several ways of thinking about including race/ethnicity
  - Determined by data
  - Predictive power
  - Evaluating teachers, not students
  - Should be addressed, not ignored

Questions

VALUE ADDED: STANDARDS OF PRACTICE

Standards of Practice

- Policy Context
- Hot topics in Value-Added analysis
- Communication and collaboration for IHE – K12 partnerships
- Controversial uses and criticisms

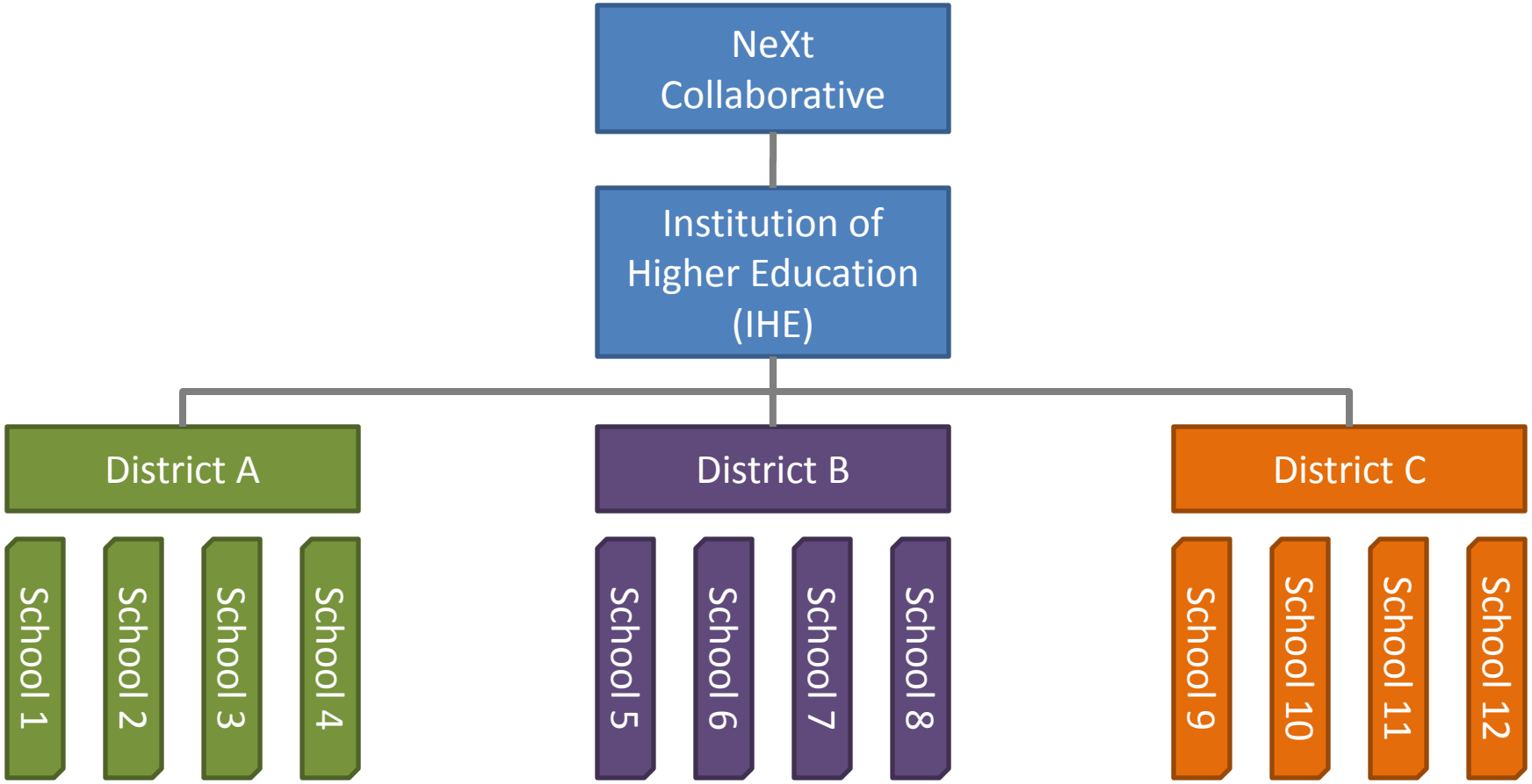
Policy Context

- Identifying best practice; recognizing effectiveness
- IHE program Improvement for teacher preparation
- Supporting teachers and students
- Improving IHE-K12 linkages within a K-20 system

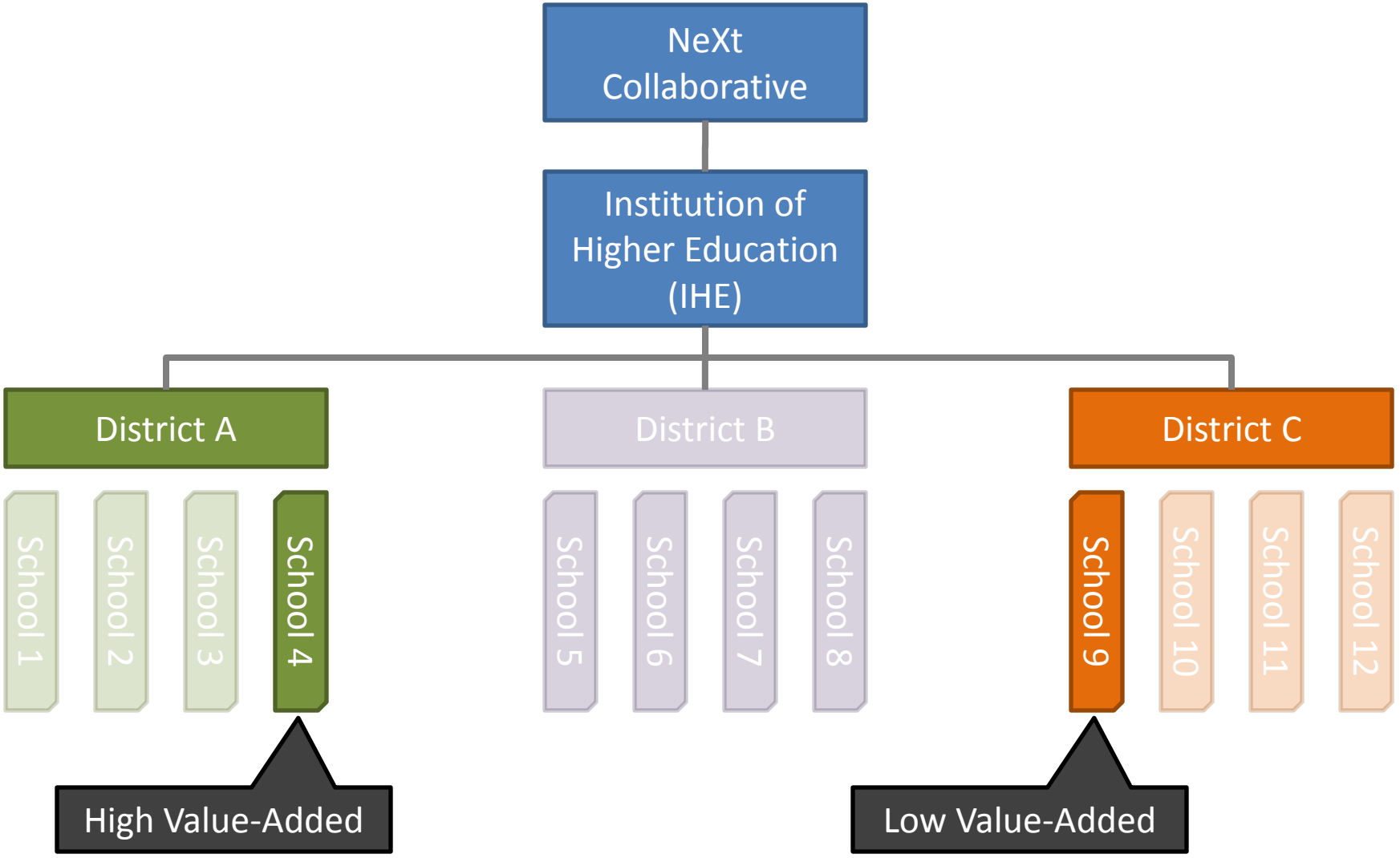
VAA Issues and Hot Topics

- VAA modeling decision making
- Fair and open methodology
- Dealing with complex nature of IHEs, districts, schools, and classrooms
- Understanding tests strengths and weaknesses
- Data detail appropriate for analysis
- Planning for intended and unintended consequences

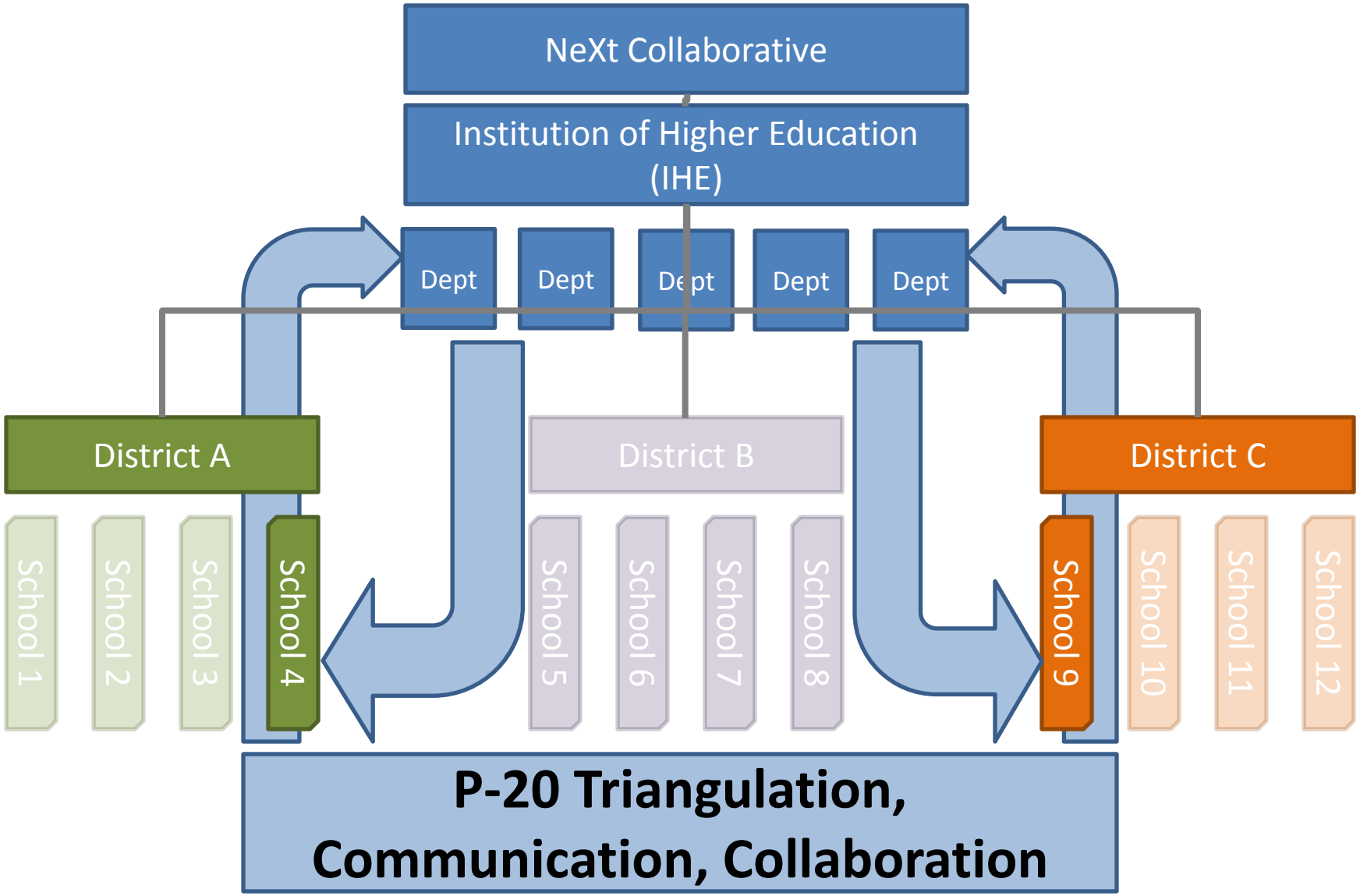
Communication and Collaboration



Communication and Collaboration



Communication and Collaboration



VA Criticisms

- Classification Errors
- Technique is too new
- Over-emphasis on test scores
- Poor data quality
- Limits associated with NCLB assessments (e.g, grades tested, noise, lag)

Controversial Uses of Value-added

- Some districts are using Value-added for more than 50% of the weight for teacher personnel decisions
- The Value-added Research Center (VARC) in Madison recommends teacher performance assessment (e.g., TPA), observations, portfolios, and supervisor judgment as critical additional measures for teacher personnel decisions.

Issues in the Use of Student Test Scores to Evaluate Teachers (EPI Briefing Paper)

- " …These approaches that measure growth using 'value-added modeling' are fairer comparisons of teachers than judgments based on their students' test scores at a single point in time or comparisons or student cohorts that involve different students at two points in time…

  Nonetheless, there is broad agreement among statisticians, psychometricians, and economists that test scores alone are not sufficiently reliable and valid indicators or teacher effectiveness to be used in high-stakes personnel decisions…

Issues in the Use of Student Test Scores to Evaluate Teachers (EPI Briefing Paper)

- One year teacher value-added coefficients can be very unstable.
  - Small n (number of students which pre and post tests) results in large “margins of error” around the teacher coefficient
  - Aggregation of results across two or three years provides much more reliable estimates
- Multiple teachers can influence student achievement growth
  - Value-added models at the individual teacher level must include teacher linkage information on all teachers responsible for instruction including specialists, tutors, team teachers, and controls for after school academic programs.

Issues in the Use of Student Test Scores to Evaluate Teachers (EPI Briefing Paper)

- Well educated and supportive parents can help students with homework and secure a wide variety of other advantages for (students)
  - In addition for free/reduced price lunch, other SES indicators may be used in the Value-added models:
    - Mother's education
    - Homeless/highly mobile indicators
    - Family income
    - New to the country
    - Gifted and Talented indicators
    - Census tract data

Issues in the Use of Student Test Scores to Evaluate Teachers (EPI Briefing Paper)

- Value-added evaluations in low-income communities can be distorted by summer learning loss
  - Fall pretesting can control for this
  - Minneapolis Public Schools (MPS) and many districts around the state use the Measures of Academic Progress (MAP) in Fall and Spring.
- Non-random assignment of students to classrooms may bias some teacher's Value-added estimates
  - Behavior problems from the previous school year can be used as a control variable. Levels of ELL and Special Education service can also be used in the model.

Value-added Models Should Be Built Locally and Collaboratively

- Teachers groups (e.g., unions) should be at the table from the beginning.
- Context variables should be identified and controlled
- Measures of effectiveness need to meet reliability and validity standards
- Use of value-added (e.g., who sees the coefficients) needs to be negotiated
- Unintended consequences should be anticipated
- Perhaps laws and regulations need to be promulgated to prevent public display of teacher value-added coefficients.

Links

- EPI Briefing Paper: http://epi.3cdn.net/b9667271ee6c154195_t9m6iij8k.pdf
- Value-added Research Center (VARC): http://varc.wceruw.org/
- Quality Performance Awards:

http://rea.mpls.k12.mn.us/uploads/2008-09_qpa_description_10-20-2009.pdf

- Kindergarten Teachers who “Beat the Odds”:

http://rea.mpls.k12.mn.us/BEAT_THE_ODDS_-_Kindergarten_Teachers.html

Questions

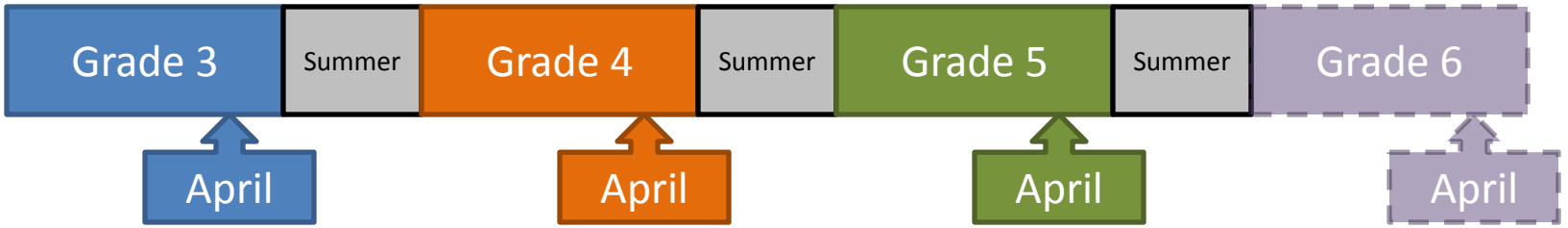
VALUE ADDED: ANALYSIS AND REPORTING

Analysis and Reporting Overview

- Testing windows and reporting periods
- History of VA in a large urban district
- School-level VA Report

Testing Windows and Reporting Periods

MN



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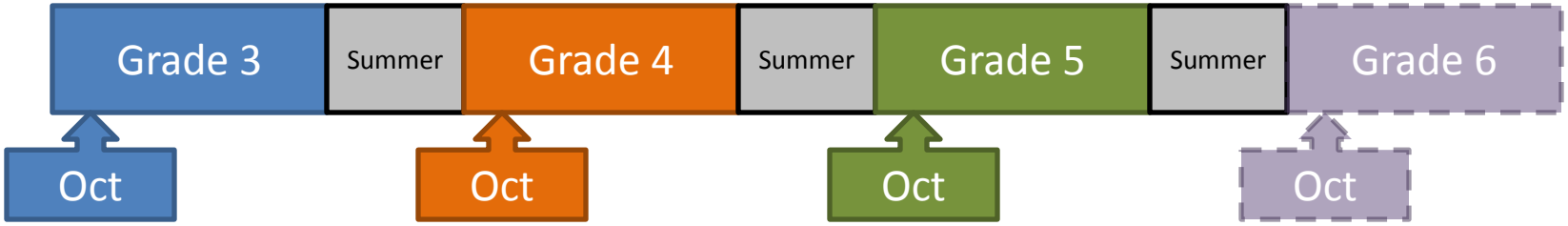
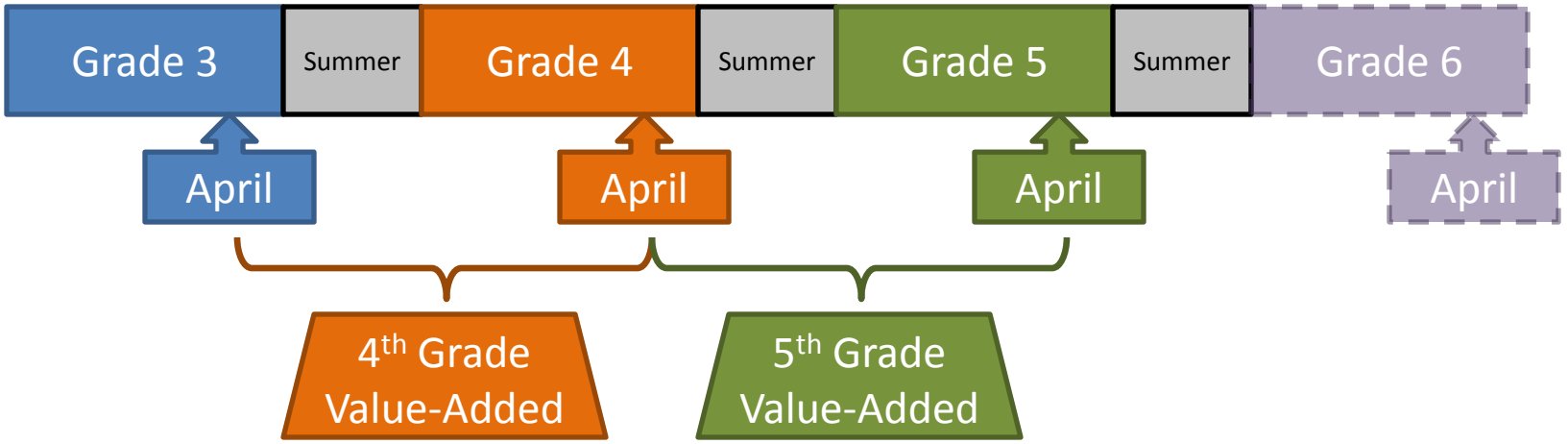


Two K-5 Elementary Schools

MN



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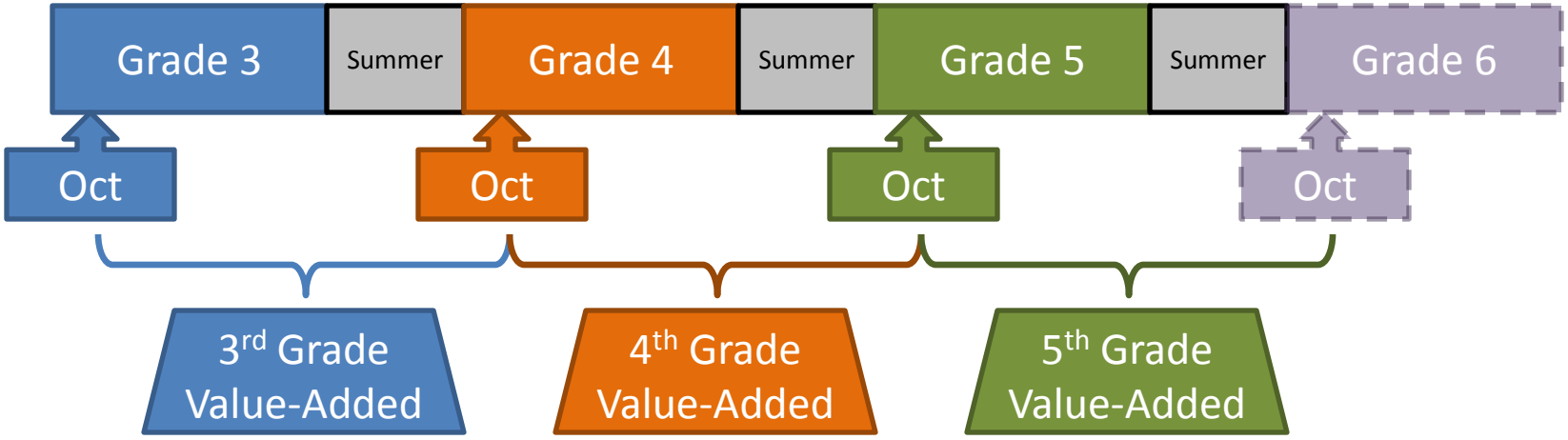


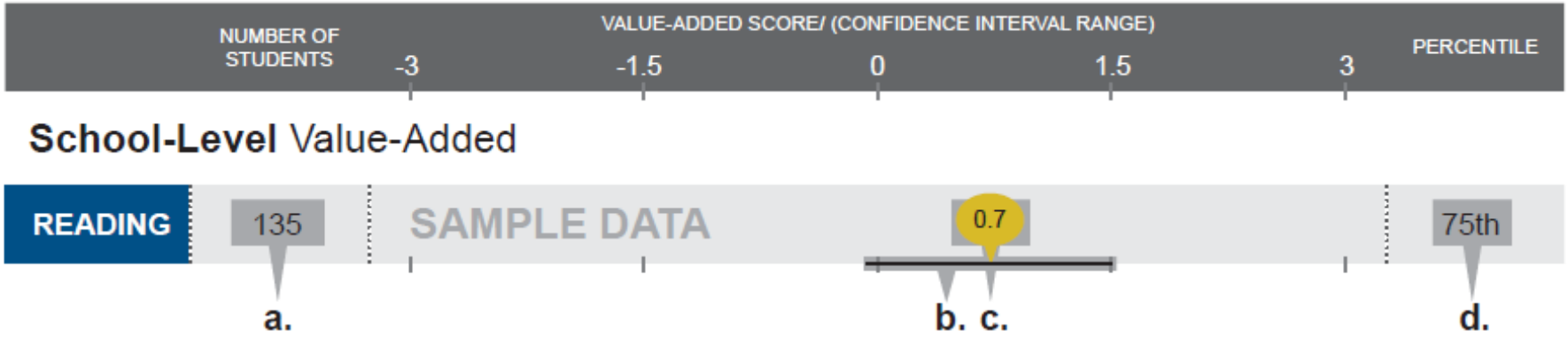
History of Value-Added Use in Minneapolis Public Schools

- Evaluation of the Public School Academy (1992-94) Longitudinal Achievement Effects
- Teachers who Beat the Odds in 2nd Grade Reading (1997-99)
- Quality Performance Awards (1995–2005) Multiple Measures with School Awards
- Teacher Advancement Program (TAP) School, Grade level and individual teacher bonuses (2006-2010)
- Teachers who Beat the Odds in Kindergarten Literacy (2006-2010)
- Grade level value-added to all Principals (2010-11)

Value-Added School Report

- This report may help you answer the following questions:
  - How much does a school contribute to student learning?
  - How does this impact differ across grade levels?
  - How does your school compare to other schools in your district and state in terms of proficiency and growth?

How to read the Value-Added tables



a. Number of Students: This is the number of students included in the calculation.

b. Confidence Interval Range: The line under the bubble is the statistical confidence interval for that score. We are 95% confident that the Value-Added score falls within the confidence interval.

c. Value-Added Score: On each line, the red, yellow and green bubbles include the school's standardized Value-Added score. ***The state average is zero.*** Please see the back page for information on the standardized Value-Added scale.

d. Percentile: Percentile is the percent of Value-Added scores in the state that are lower than this score. Percentiles range from 0th to 99th.

3.0 **Green** bubbles mean the entire confidence interval is above zero. The score is statistically significant and positive.

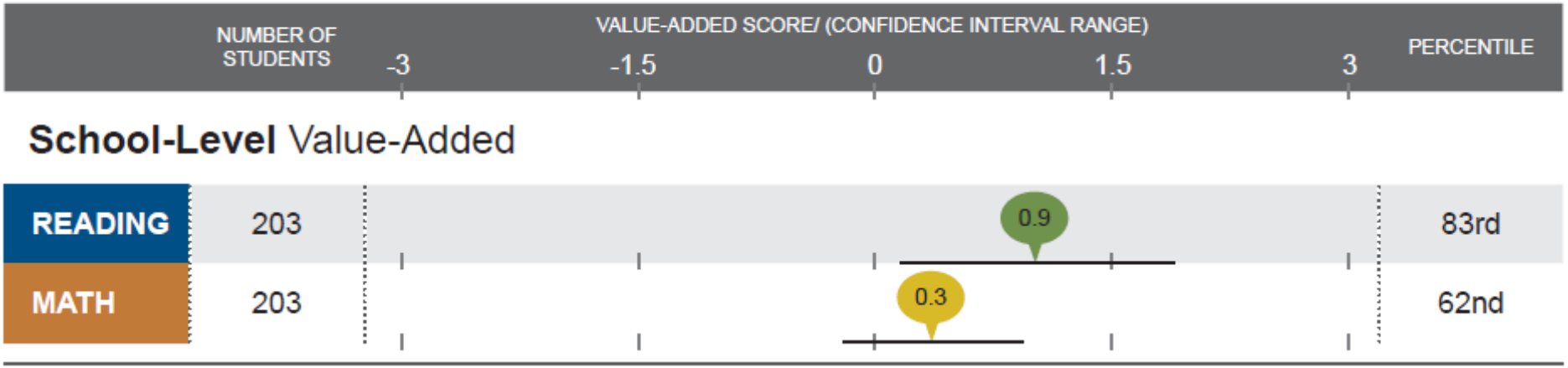
-0.5 **Yellow** bubbles mean the confidence interval includes zero. The school's impact is about the same as the state average.

-3.0 **Red** bubbles mean the entire confidence interval is below zero. The score is statistically significant and negative.

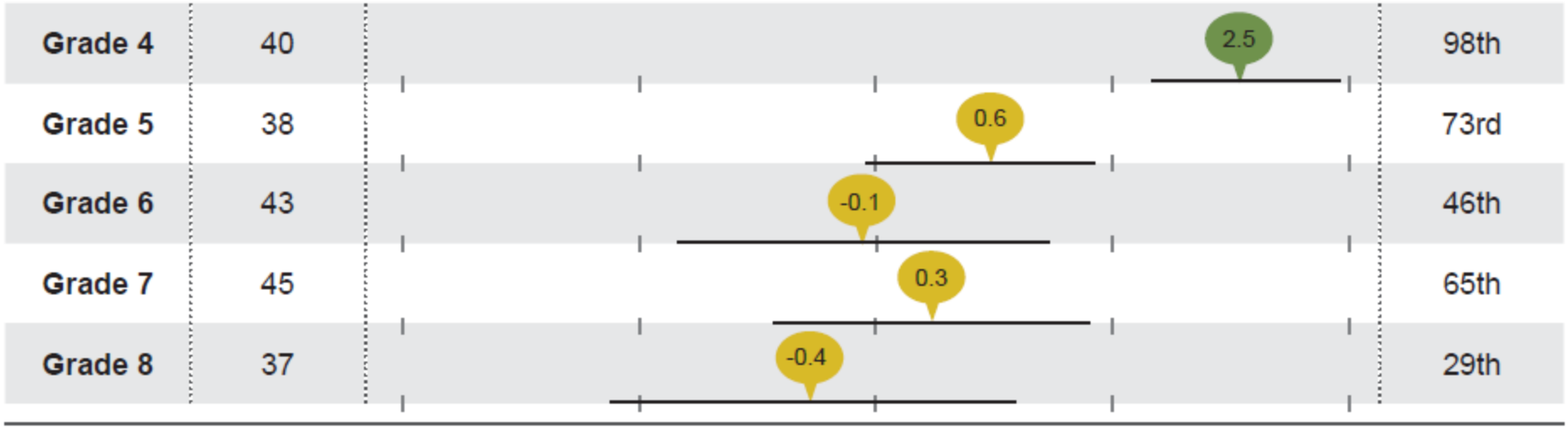
2010 Value-Added Results

The tables below include the school-level and grade-level standardized Value-Added scores for your school. See the cover page of this report for tips on how to read these tables. Value-Added scores measure your school's impact on student academic growth. Because student progress varies by grade, prior performance and demographics, the Value-Added score controls for these factors (see page 6 for a list). The result is a score that measures the difference between the growth of students in your school and the growth of similar students across the state.

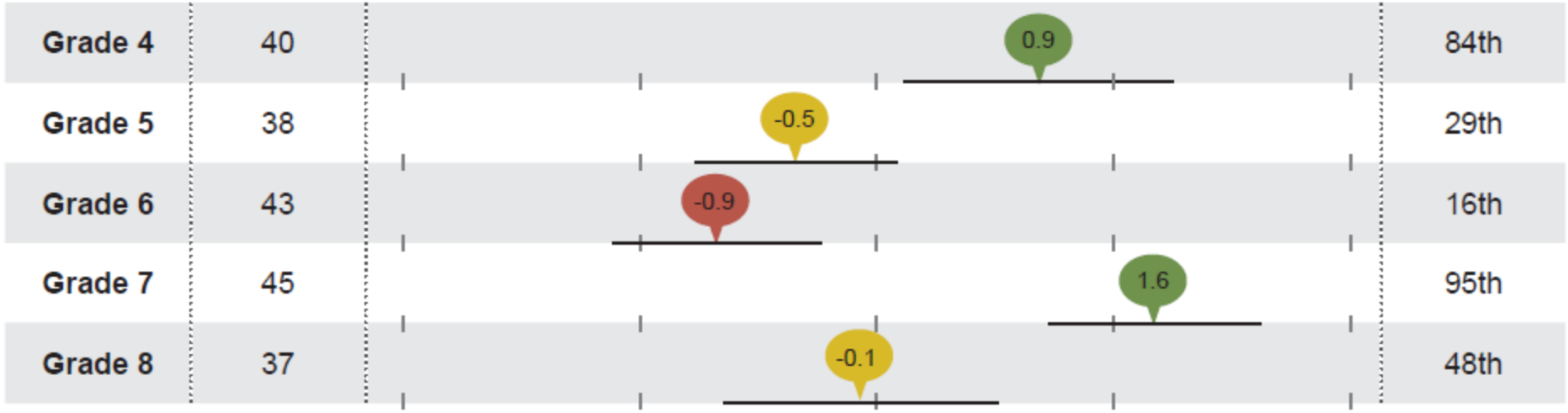
School-Level Value-Added



READING Grade-Level Value-Added



MATH Grade-Level Value-Added

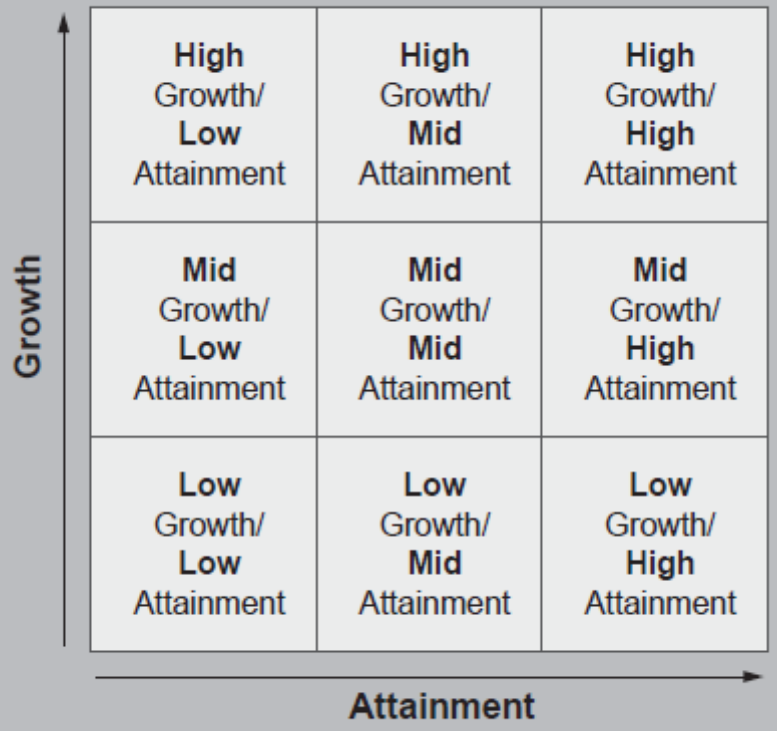


How to read the scatter plots

- The blue dot represents your school.
- The orange squares represent schools in your district.
- The green circles represent schools elsewhere in the state.

Schools can be classified into one of nine categories, where Value-Added and percentage meeting/exceeding standards are divided into "low," "mid," and "high" scores. The areas above and below, and to the left and the right of the state average represent one standard deviation away from the state average.

Note: In the scatter plots above, the percentage of students who meet or exceed state standards is based on 2009 data. The purpose is to show the school's "starting position" for attainment.

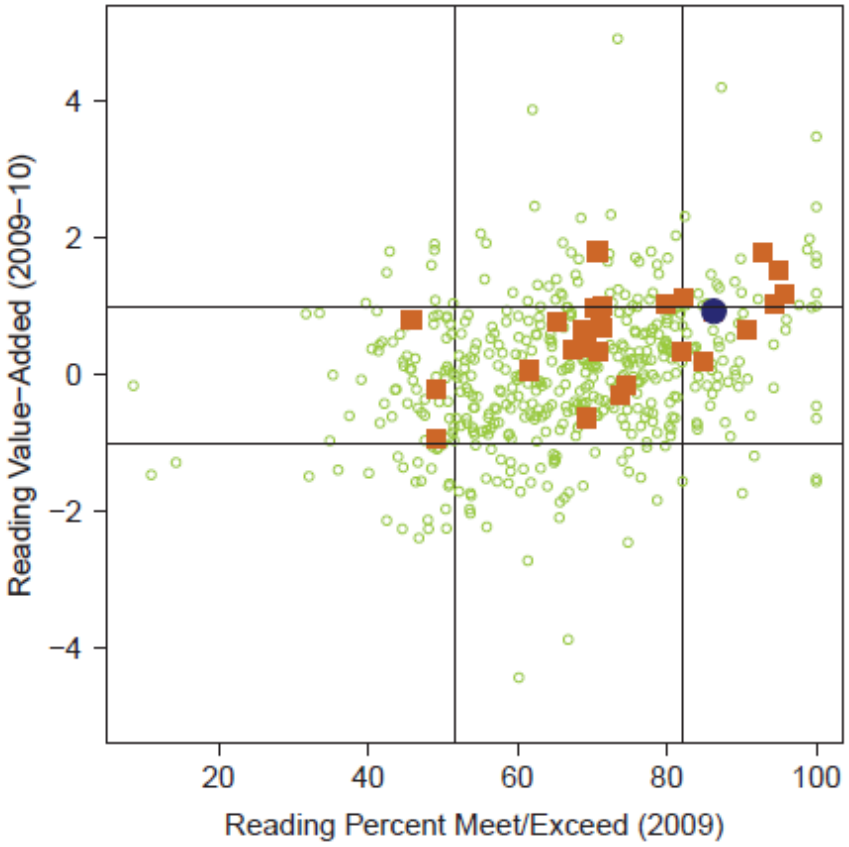


Your School Compared to the Rest of the State

The charts below compare your school's student growth (Value-Added) in reading and mathematics to student attainment (percentage of students who meet or exceed the MCA standards). Value-Added scores are read along the left-hand side, and percentage meeting/exceeding standards are read along the bottom.

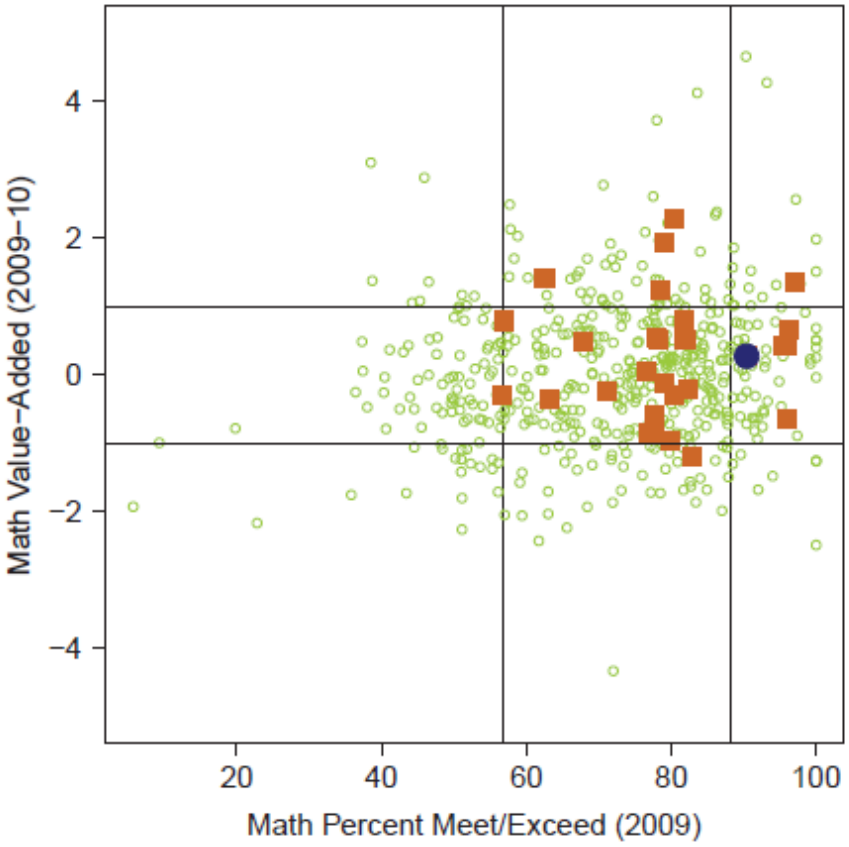
READING

Your School Has Mid Value−Added (0.9) and
High Percent Meet/Exceed (86.3%)



MATH

Your School Has Mid Value−Added (0.3) and
High Percent Meet/Exceed (90.4%)



School-Level VA: Discussion Questions

- As you review your value-added school reports, consider the following:
  - What does the addition of the value-added 'lens' add to your understand of the schools in your district?
  - How do the value-added results for your schools relate to other performance measures used in your district?
  - Given the value-added results for your schools, what conversation might be initiated regarding the data?

Questions

VALUE ADDED: NEXT STEPS

Looking Forward – VARC next steps

- Develop and disseminate VA professional development
- Develop generation II VA models: dosage, teacher level, differentiated effects
- Develop labor market analyses
- Developing data resources for next steps
  - Labor analysis
  - Student – teacher linkage data for teacher support and IHE guarantee
  - Reporting system
- Feedback and design of IHE and Graduate reports
- Continue to support IHE – K12 partnerships
- Refine and develop best practices

Value-Added Analysis: Next Steps

- Starting with:
  - State assessments
  - Grades 3-8, math and reading
  - Grade-level
- Moving towards the following enhancements:
  - Classroom – level
  - Alternative assessments (e.g., MAP)
  - Refining methods, differential effects

Timelines

- Spring 2011 – introduce grade-level VA for partnering sites
- Summer 2011 – begin analyzing student teacher linkage data (e.g., data quality)
- Summer 2011 - run VA on alternative assessments
- Fall 2011 – finalize content and layout for IHE and teacher-level reports
- Winter 2011 – develop classroom level value added models for pilot sites

Questions