# Study of Dual-Language Immersion in the Portland Public Schools

## Year 4 Briefing

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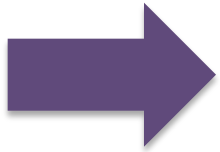
# Outline



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- Empirical Strategy and Data
- Student Achievement Effects
- Mediators and Cost
- Principals' and Teachers' Perspectives
- Instructional Practice
- Summary

# Dual-Language Immersion (DLI) Study is Product of a Research-Practice Partnership

- Among largest 2 districts in Pacific Northwest
- Has operated immersion programs for almost 30 years
- About ¼ of schools are part of a DLI cluster
- About 10% of students are enrolled in DLI

- Non-profit, expert on 2nd language learning and immersion programs around the globe
- Team includes two language researchers and Portland-area graduate students

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- Non-profit, non-partisan research firm
- Team includes a policy researcher, two economists, and an applied linguist

# Current Study Is Federally Funded

- 3-year research grant from the U.S. Department of Education
- Now in year 4 (no-cost extension year)
- We leverage immersion lottery to estimate causal impact of DLI on student achievement in reading, math, and science
- We also document program costs, principal and teacher perspectives, and instructional practice


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# Study Is Nationally Relevant as Number of Dual-Language Immersion Programs Grows

- DLI programs provide **core content instruction in two languages**, generally from kindergarten onward

- Number of public immersion schools appears to be growing; some estimate it at 1,000 to 2,000 nationally (Maxwell, 2012, Watanabe, 2011)

- Examples of recent expansion efforts include
  - Utah (118 schools as of 2014-15)
  - North Carolina  (94 schools as of 2014-15)
  - New York City (175 programs, 93 added since 2012-13)

# Link Between Bilingualism and Cognitive Advantages May Contribute to Public Demand

- Improved working memory
- Superior executive control (ability to choose among alternatives)
- Better selective attention

(Bialystok, 2001; Bialystok, Craik, and Luk, 2008)

# Studies of Native English Speakers In Immersion Have Been Small or Non-Randomized

- **Randomized studies have shown positive or neutral effects**
  - In Canada, Lambert et al. (1973) found *positive effects* on English reading and math by grade 5
  - In the U.S., Barnett et al. (2007) found *no detriment* to English reading for preschoolers after 1 year

- **Though randomized, the studies had key limitations**
  - Samples of <150, and focused on single schools
  - Students not tracked beyond grade 5

- **Non-randomized studies have shown positive immersion effects but did not thoroughly adjust for selection into programs** (Barik & Swain, 1978; Caldas & Boudreaux, 1999; Marian, Shook, & Schroeder, 2013; Padilla et al., 2013;Turnbull, Hart, & Lapkin, 2003)

# Studies of ELLs in Immersion Are Promising But Have Lacked Randomization

- **U.S. Studies Have Focused on English Language Learners (ELLs) in Two-Way Immersion**
  - Immersion students have outperformed ELLs in monolingual English classes or transitional bilingual programs (Thomas & Collier, 2003; Collier & Thomas, 2004; Lindholm-Leary & Block, 2010; Marian et al., 2013)
- **But studies have not carefully attended to selection bias**
- **Two recent studies that attempted to control for selection found**
  - Higher ELL reclassification rates to proficient by high school (Umansky & Reardon, 2014), and
  - Faster growth in English reading performance (Valentino & Reardon, 2015)

# What Makes This Study Important

- Portland's lottery system reduces selection bias to which most other studies are vulnerable
- Study incorporates 19 schools (10 ES, 5 MS, 4 HS)
- Breadth of Portland's programs allows us to disaggregate estimates for:
  - Native speakers of English vs. other languages (including classroom "partner" language)
  - Two-way and one-way programs
  - Spanish vs. other languages (Mandarin, Japanese, Russian)
- Mixed-methods approach lets us examine implementation across the district

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# Our Preferred Estimation Strategy Leverages the District's Immersion Lottery

- Families apply to up to three schools in the spring before pre-K or kindergarten
- Slots are filled in the first round
- Our analysis compares students who won slots to those who did not
- Analytic comparisons are made *within* lottery year, target school, and preference category (e.g., inside or outside of neighborhood, native language, etc.)

# We Employ Three Modeling Approaches to Put the Lottery Estimates in Context

***Inclusive*** of non-randomized students and of non-lottery schools

***Causal estimates:*** *Apple-to-apples comparisons* of families who apply to same programs in same years

***Causal estimates adjusted*** to reflect those who comply with their random-assignment status

All three focus on the 7 kindergarten cohorts of 2004-05 through 2010-11

- **Full-Sample Generalized Least Squares (GLS)** (n=27,741)
  - DLI students vs. all other students, with demographic controls
- **Intent-to-Treat (ITT)** (n=1,625)
  - Students who won immersion lottery vs. those who did not
- **Instrumental Variables (IV)** (n=1,625)
  - Adjustment of lottery-based (ITT) estimates for noncompliance with assigned lottery status

# We Focus on Academic Outcomes in English, and on Implementation

**Outcomes**

- *Achievement in Mathematics, English Language Arts, and Science* (Oregon Assessment of Knowledge and Skills [OAKS], gr. 3-8)

- Probability of *English Language Learner classification* in each year after kindergarten (based on English Language Proficiency Assessment [EPLA] scores, gr. 1-8), conditional on initial status

- We describe limited evidence on partner language proficiency where available (Spanish, Mandarin, Japanese)

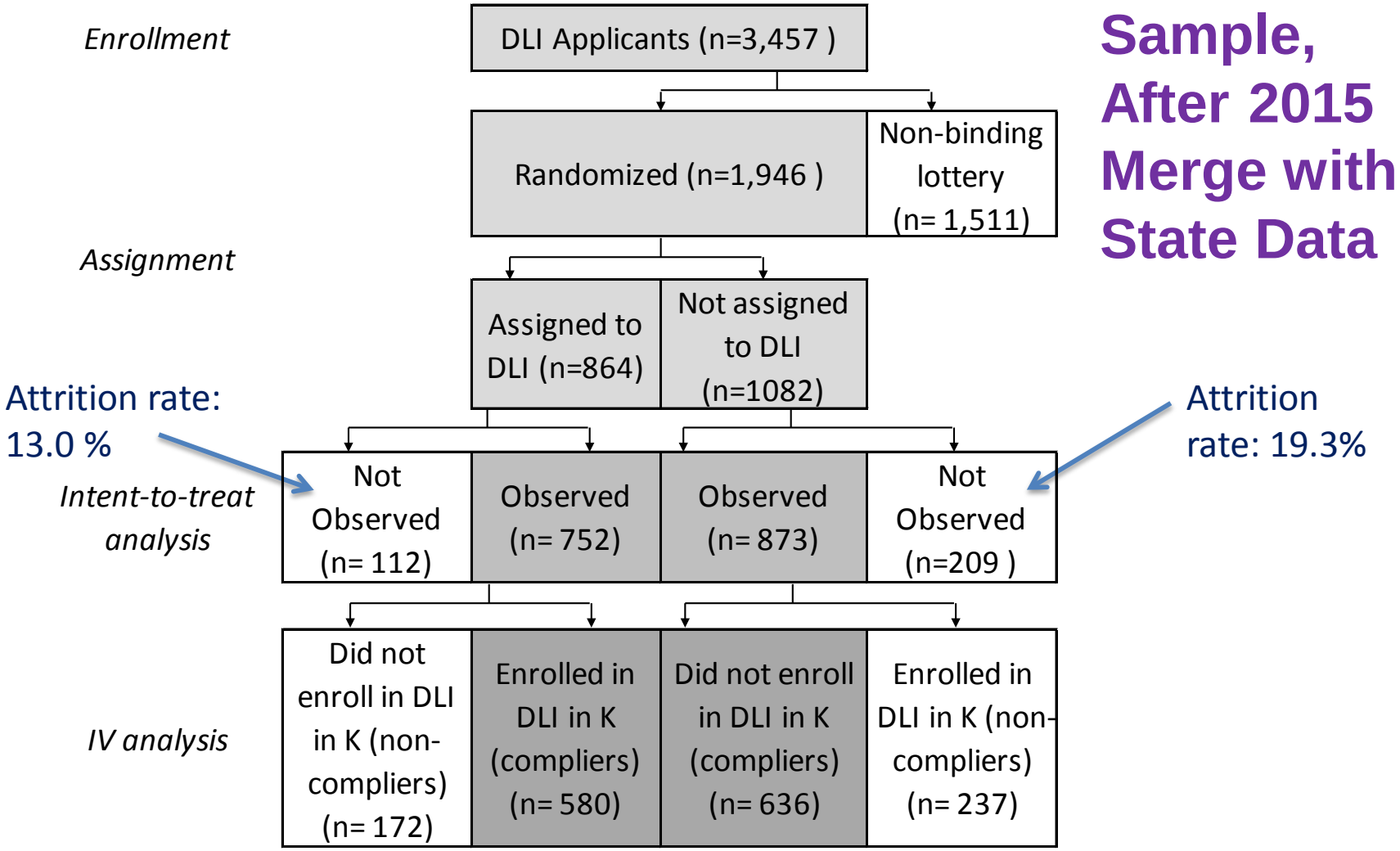
**Cost and Implementation**

- We also document dual-language immersion *costs and instructional practices*

# Study Examines a Diverse Array of DLI Programs

| Program Type | Native Language of Students | % of Instruction in Partner Language | Language | Schools | Students in 2012-13 (and % of total) |
|---|---|---|---|---|---|
| **90/10 Two-Way** | ≈ ½ English | 90% in Grade K<br>80% in Grade 1<br>70% in Grade 2 | *Spanish* | 7 ES<br>3 MS<br>2 HS | 1,644 (42.6%) |
| **90/10 Two-Way (previously 70/30)** | ≈ ½ Partner Language | 60% in Grade 3<br>50% in Grade 5<br>2 periods in MS<br>1-2 periods in HS | *Russian* | 1 ES | 193 (5.0%) |
| **50/50 One-Way** | Mostly English (no native speaker set-aside slots) | 50% in Gr. K-5<br>2 periods in MS<br>1 period in HS | *Spanish* | 1 ES<br>1 MS<br>1 HS | 614 (16.0%) |
| | | | *Japanese* | 1 ES<br>1 MS<br>1 HS | 920 (23.8%) |
| | | | *Mandarin* | 1 ES<br>1 MS<br>1 HS | 489 (12.7%) |

# Final Sample, After 2015 Merge with State Data



# Lottery Sample Is More Observably Balanced than Full Sample

| Variable (%) | Binding Lottery Applicants | | | | | All PPS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | All | Win | Lose | Diff | p (adj) | All | DLI | Non DLI | Diff | p |
| N | 1,625 | 752 | 873 | | | 27,741 | 2,500 | 25,241 | | |
| Proportion | | 46.3 | 53.7 | | | | 9.0 | 91.0 | | |
| Female | 52.9 | 50.8 | 54.6 | -3.8 | 0.15 | 49.8 | 54.3 | 49.3 | 5.0 | 0.00 |
| Asian | 14.4 | 17.8 | 11.5 | 6.4 | 0.61 | 9.8 | 13.4 | 9.4 | 3.9 | 0.00 |
| Black | 5.6 | 5.2 | 6.0 | -0.8 | 0.77 | 13.3 | 4.4 | 14.2 | -9.8 | 0.00 |
| Hispanic | 17.0 | 17.7 | 16.4 | 1.3 | 0.65 | 15.7 | 29.6 | 14.3 | 15.3 | 0.00 |
| White | 54.0 | 51.7 | 55.9 | -4.2 | 0.25 | 54.8 | 45.1 | 55.8 | -10.7 | 0.00 |
| Other/Miss Race | 6.8 | 6.3 | 7.3 | -1.1 | 0.01 | 4.2 | 6.0 | 4.0 | 2.0 | 0.00 |
| FARMS | 26.0 | 27.3 | 25.0 | 2.3 | 0.63 | 24.8 | 28.8 | 24.4 | 4.4 | 0.00 |
| Sp. Needs in K | 4.1 | 5.2 | 3.2 | 2.0 | 0.29 | 8.6 | 5.7 | 8.9 | -3.2 | 0.00 |
| Gifted in K | 4.0 | 4.4 | 3.7 | 0.7 | 0.63 | 3.0 | 3.3 | 2.9 | 0.4 | 0.25 |
| EL in K | 12.7 | 5.3 | 10.5 | 4.8 | 0.91 | 16.1 | 24.1 | 15.3 | 8.8 | 0.00 |
| First Lang Not Eng. | 17.8 | 20.6 | 15.3 | 5.3 | 0.58 | 17.1 | 29.1 | 15.9 | 13.1 | 0.00 |
| First Lang Partner | 6.3 | 9.2 | 3.8 | 5.4 | 0.01 | 2.0 | 21.8 | - | 21.8 | - |

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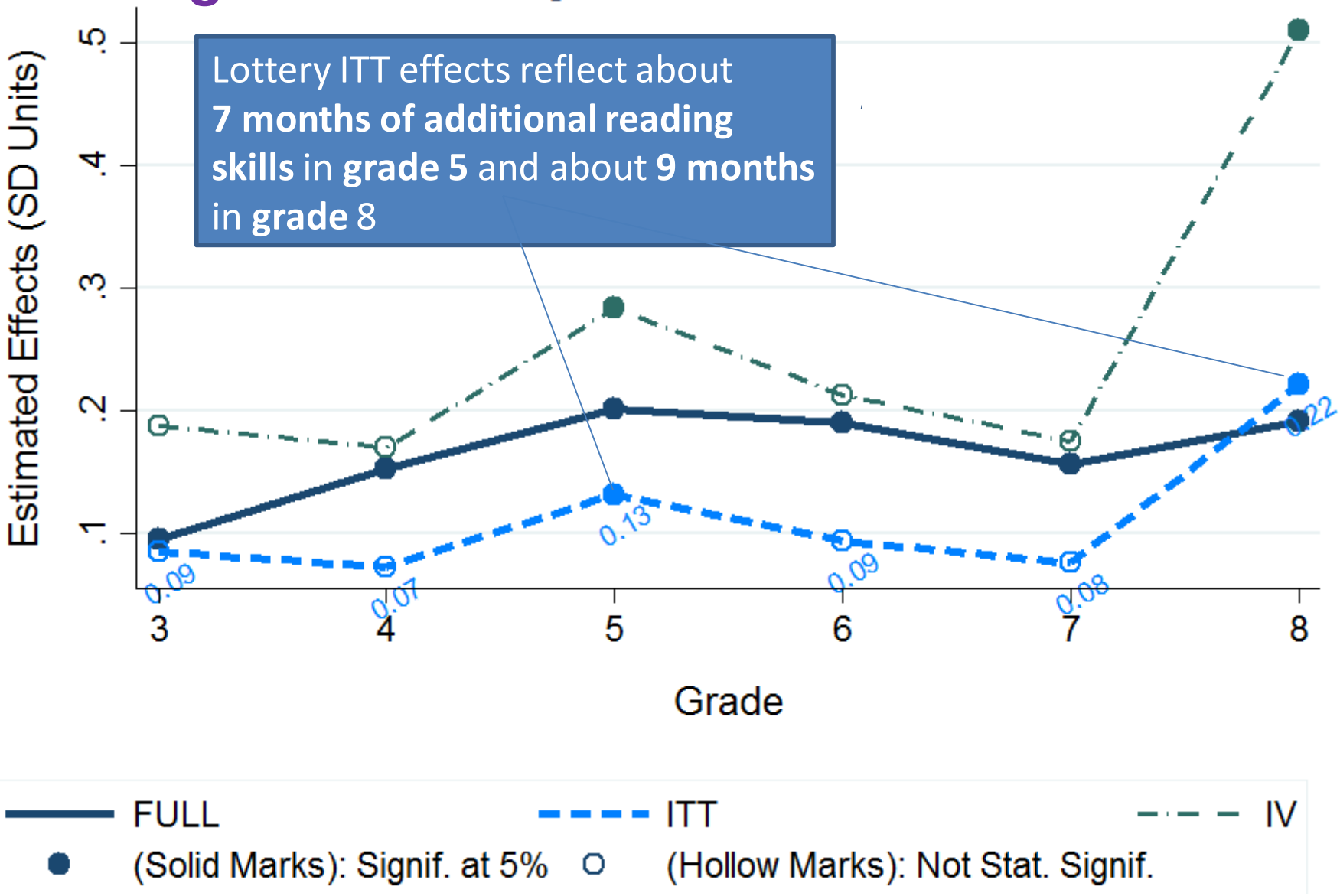
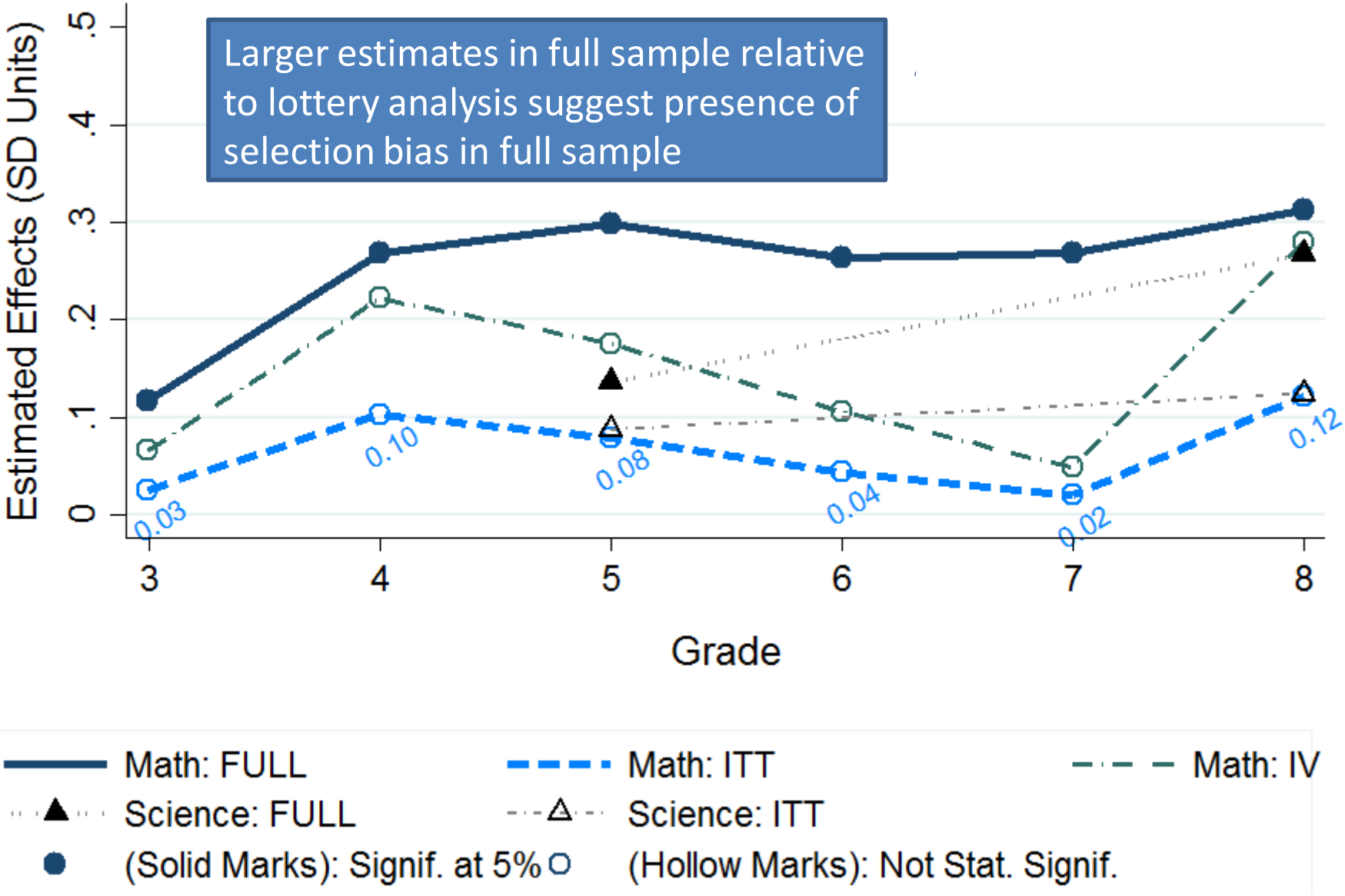
# In Reading, Lottery Estimates are Positive and Significant in Grades 5 and 8



# In Math and Science, Lottery Estimates are Not Statistically Distinguishable from Zero



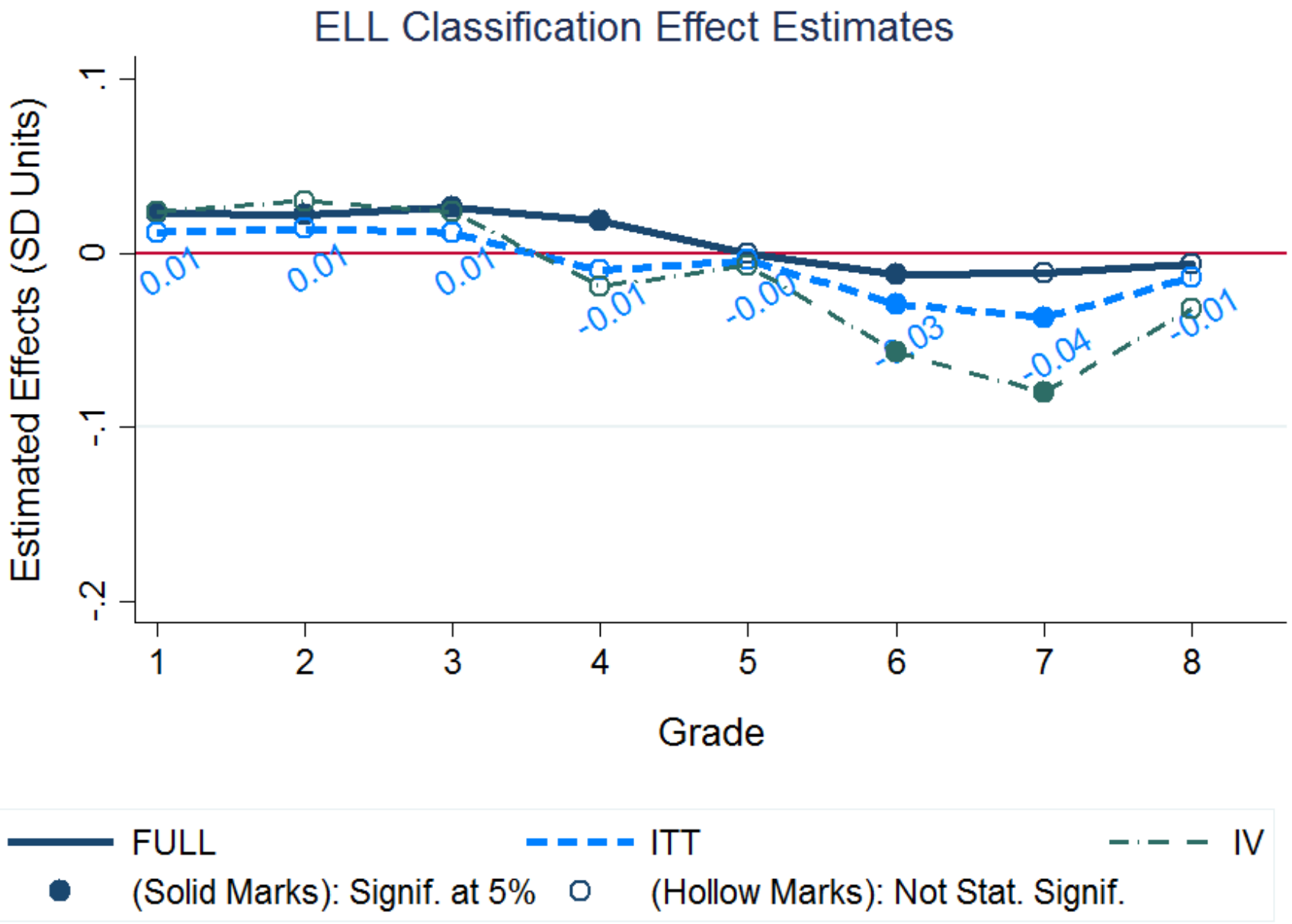
# Estimates Do Not Differ Significantly by Program Type or Native Language Status

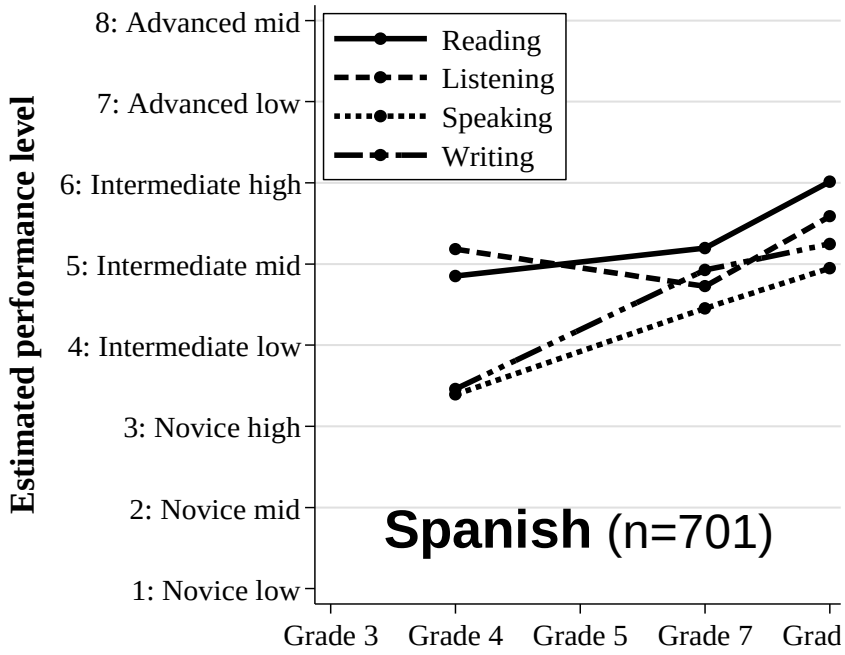
- Reading, math, and science estimates are statistically similar for
  - two-way vs. one-way programs
  - Spanish vs. other languages (Mandarin, Japanese, Russian)
  - native speakers of English vs. native speakers of other languages
  - students whose native language matches vs. does not match the partner language

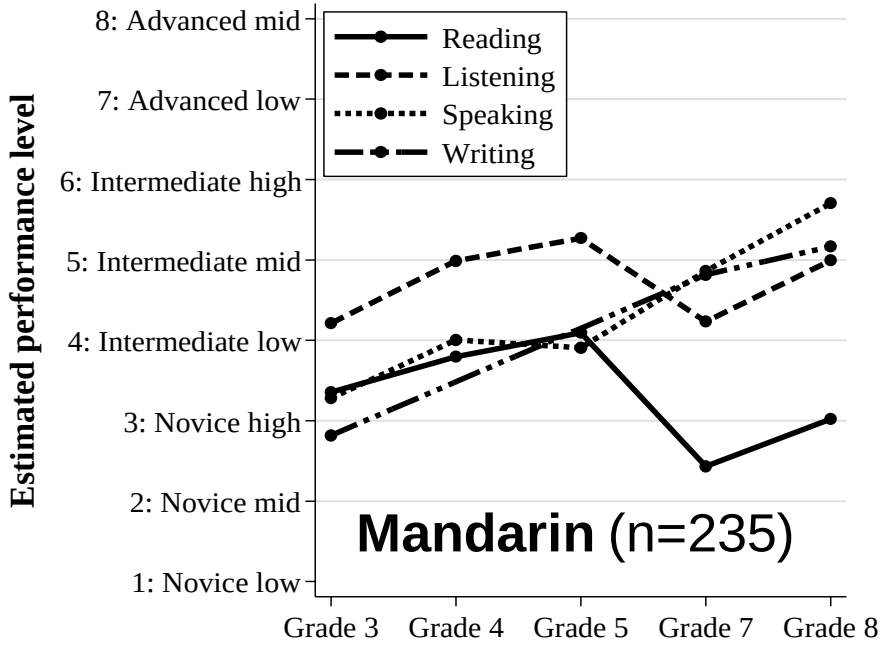
- Modest but statistically non-significant evidence that *immersion benefit in reading* is higher for students in Spanish programs, and *immersion benefit in math* is higher for students in less-commonly-taught languages

- Reading effects for students *whose native language matches partner language* appear as high as or higher than for native English speakers

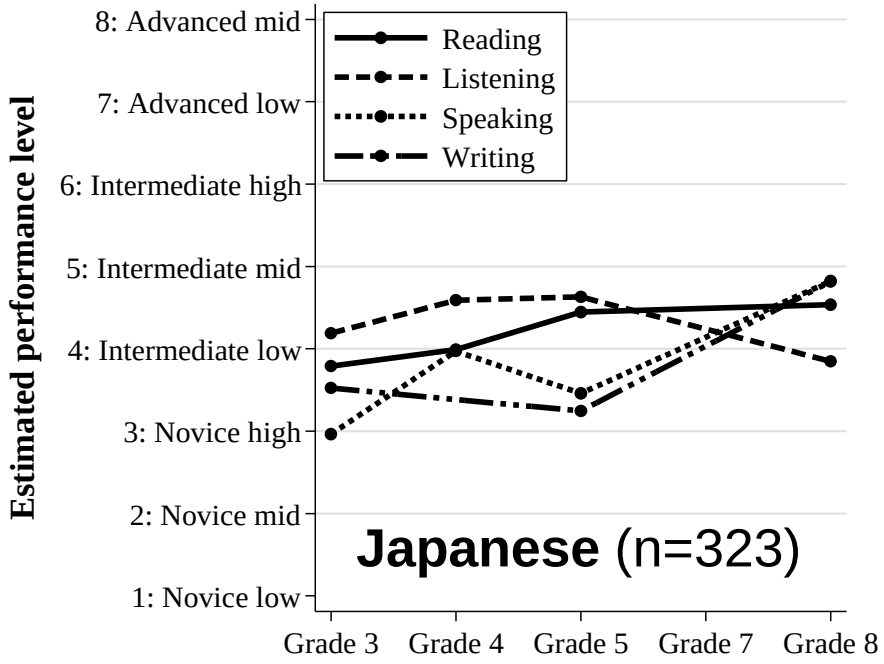
# Immersion Students Less Likely to be ELL by Gr. 5 & 6






# Immersion Students Reach Intermediate Partner Language Proficiency by Gr. 8



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# Immersion Effects Are Not Explained by Peer or Teacher Characteristics or Class Size

- Based on 2012-13 data, winning the immersion lottery yields:
  - 1.8 percentage points more ELLs in classroom
  - 3.0 percentage points fewer special education peers
  - 1.3 fewer years of teacher experience
  - 1.8 percentage points lower probability that teacher is "highly qualified" under NCLB
  - No significant difference in subsidized meal eligibility, share of talented & gifted peers, or class size
- None of these differences help account for the estimated effects of winning the immersion lottery

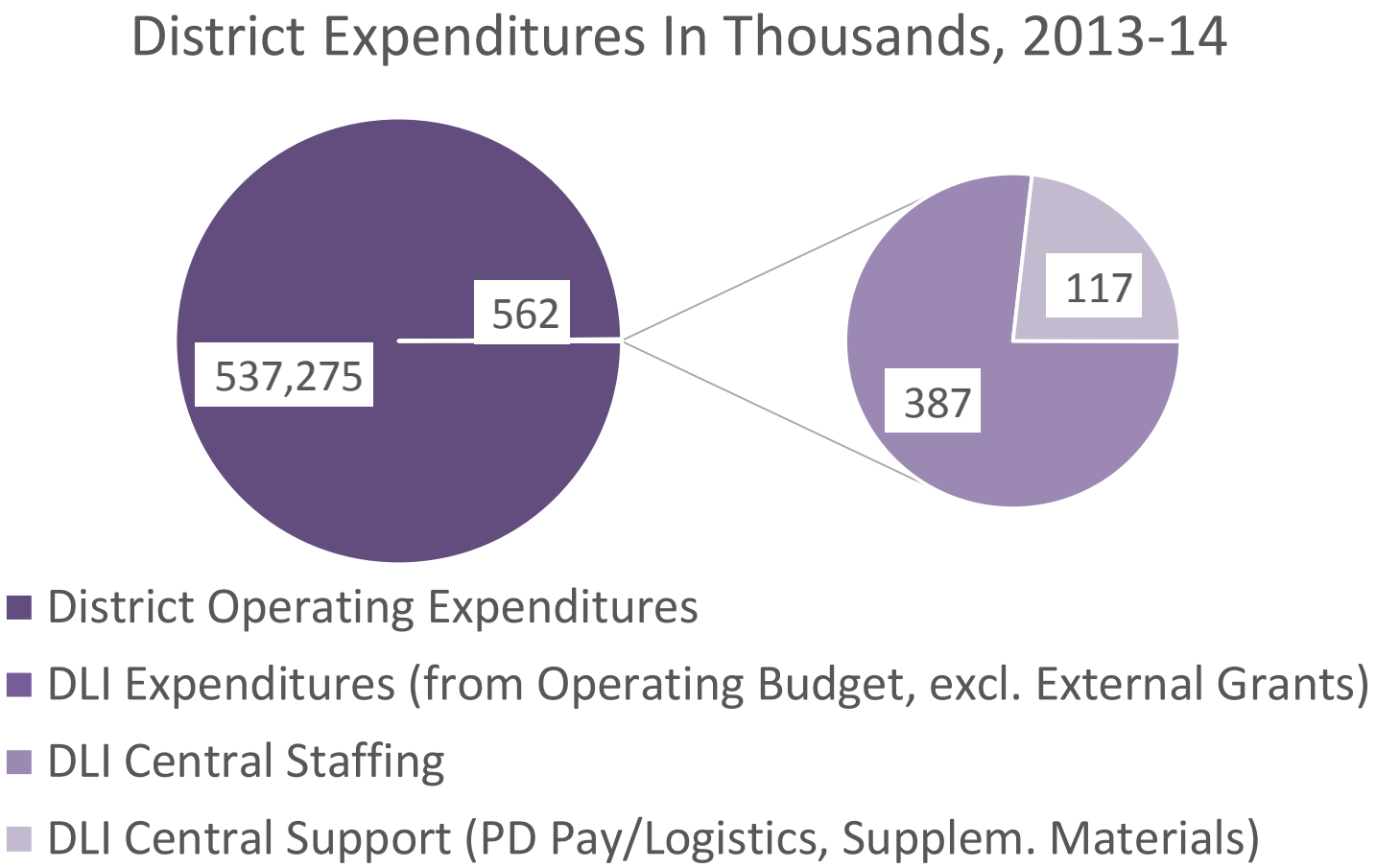
# DLI Principal Interviews Addressed Relative Inputs in DLI and English-Only Programs

- In 2014, 14 principals were interviewed at length about relative inputs in DLI and non-DLI programs
  - Principals' time devoted to particular tasks
  - Teacher workload
  - Parent volunteerism
  - Field trips
  - Technology
  - External funding sources
  - Other resource differences

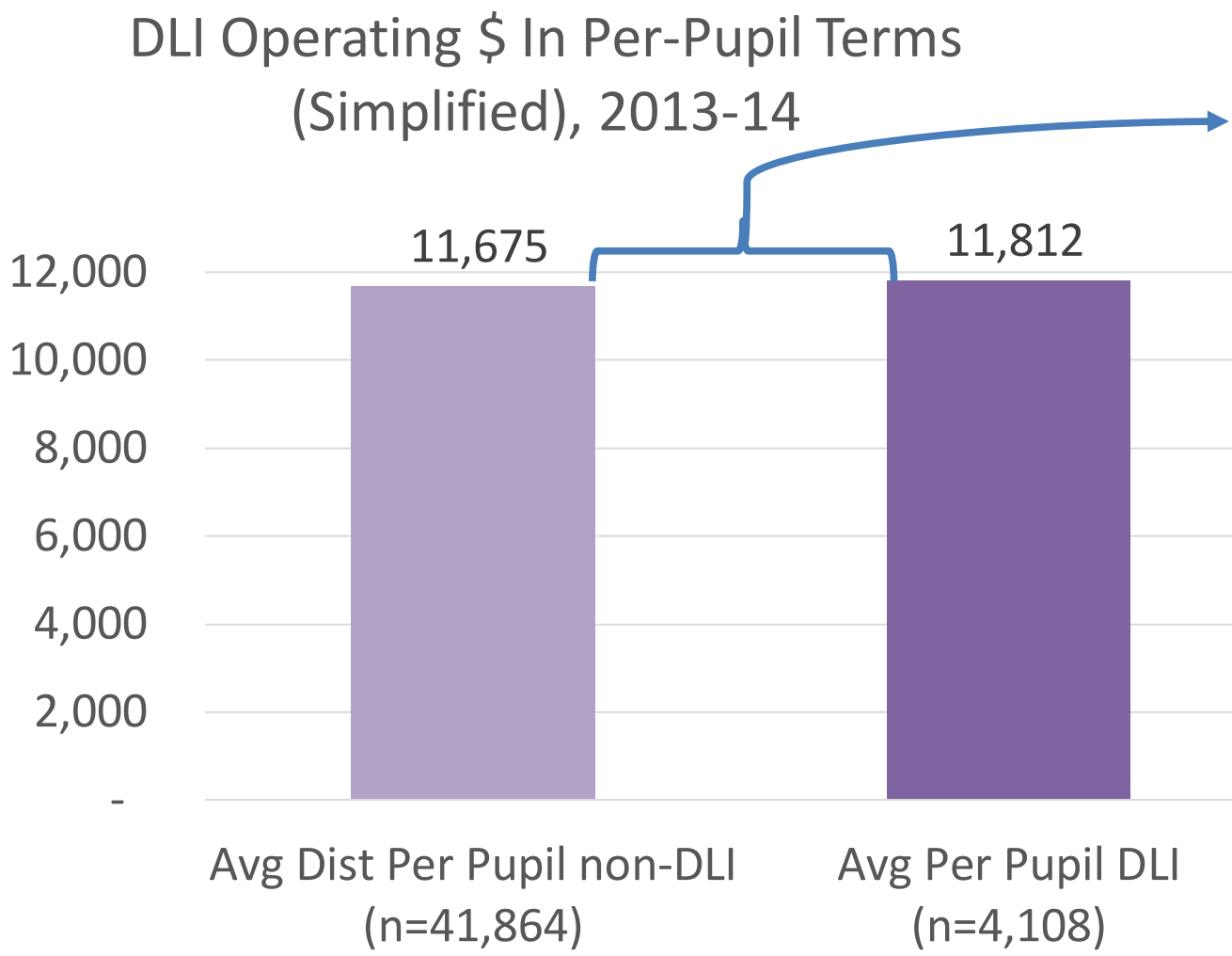
# No Evidence of Differential DLI Costs at School Level

- Principals of immersion schools reported **proportional** effort on their immersion and non-immersion programs
- Principals' reports of fundraising, volunteering, and other resources suggest **proportional** immersion and non-immersion resources
- Our analyses of **class sizes** within and between schools by grade suggests **few differences** between immersion and non-immersion classes
- DLI-specific expenditures appear concentrated in **district-level support**, and are modest

# DLI Operating Costs in 2013-14 Were About 0.1% of District Budget



# DLI Operating Costs Per Pupil Were Also Modest




$137 (1.2%) differential, but prior years were lower

Based on 2013-14, $10 per pupil across K-8 would've bought **about a day of additional reading skills in grade 5,** and **about 1.3 days in grade 8**

Actual costs since 2004-05 were likely much less

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# We Collected Feedback from Principals

- Year 1: Interviewed 17 principals
- Year 2: Interviewed 15 principals
- Key topics
  - Teacher quality
  - Resources

# Principals Emphasized the Importance of Hiring the Right Teachers

- Limited number of licensed candidates with adequate language proficiency
  - Even greater concern in middle and high schools
- Competition for qualified teachers
- Need to hire freely, rather than seniority-based
- Principals emphasized the link between teacher quality and the success of the immersion program
  - Families tend to opt out when dissatisfied with teaching quality

# We Also Collected Feedback from Teachers

- Year 1: Conducted focus groups with 32 of the 107 DLI teachers
  - Including teachers from elementary, middle, and high school
  - Across all partner languages
- Year 2: Interviewed 32 teachers individually about workload and support from the district

# Teachers Reported the Challenges They Face

- Immersion teachers face additional challenges related to materials
  - Often need to create them themselves
- Additional prep time can be substantial and risks teacher burnout
- Average hours of additional prep time: 15 hrs/wk
  - Ranged from 2 to 40 hours
- Collaboration is especially important, but hard to find time

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# To Document Instruction, We Observed 198 Class Periods in DLI Schools

| Language | Year 1 | Year 2 |
|---|---|---|
| English | 33 | 0 |
| Spanish | 26 | 72 |
| Japanese | 9 | 16 |
| Mandarin | 7 | 16 |
| Russian | 4 | 15 |
| TOTAL | 79 | 119 |

**YEAR 2**

- March-June 2014
- Grades 1-7; 13 schools
- Selected by school level, vertical cluster, and grade (odd #s)
- Four 45-minute periods per teacher, over two separate days
- Focused on language use and classroom activities

**YEAR 1**

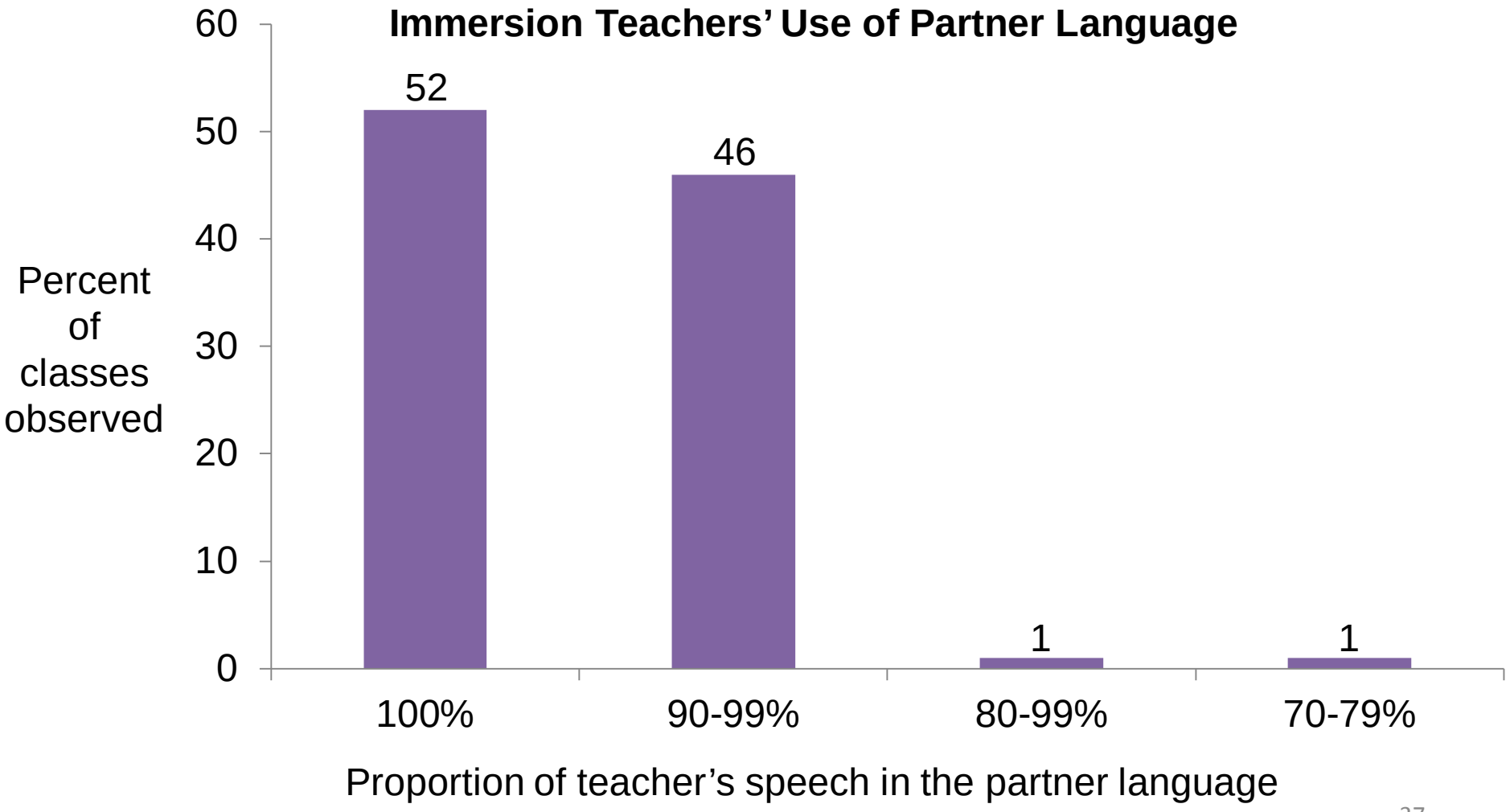
- March-April 2013
- Grades K-12; 19 schools
- Randomly drawn by grade (odd #s) / subject
- One 45-minute period per teacher
- Focused on teaching practices

# We Found Strong Use of District-Recommended Teaching Practices

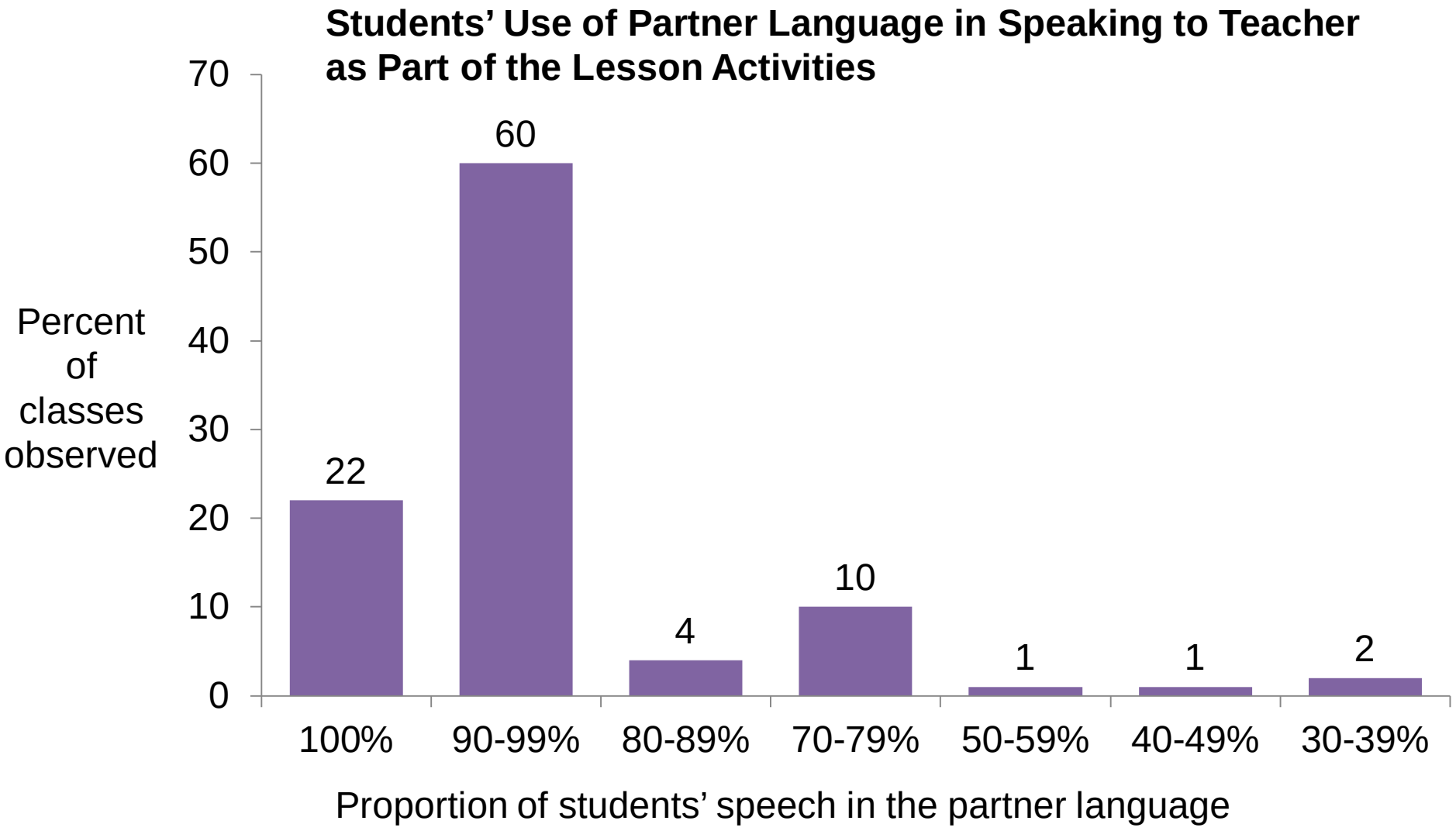
- Objectives defined, displayed, and reviewed
- Emphasizing key vocabulary
- Frequent opportunities for interaction
- Lessons tap all language skills (read, write, speak, listen)

- Ratings averaged 3 or higher on a 4-point scale

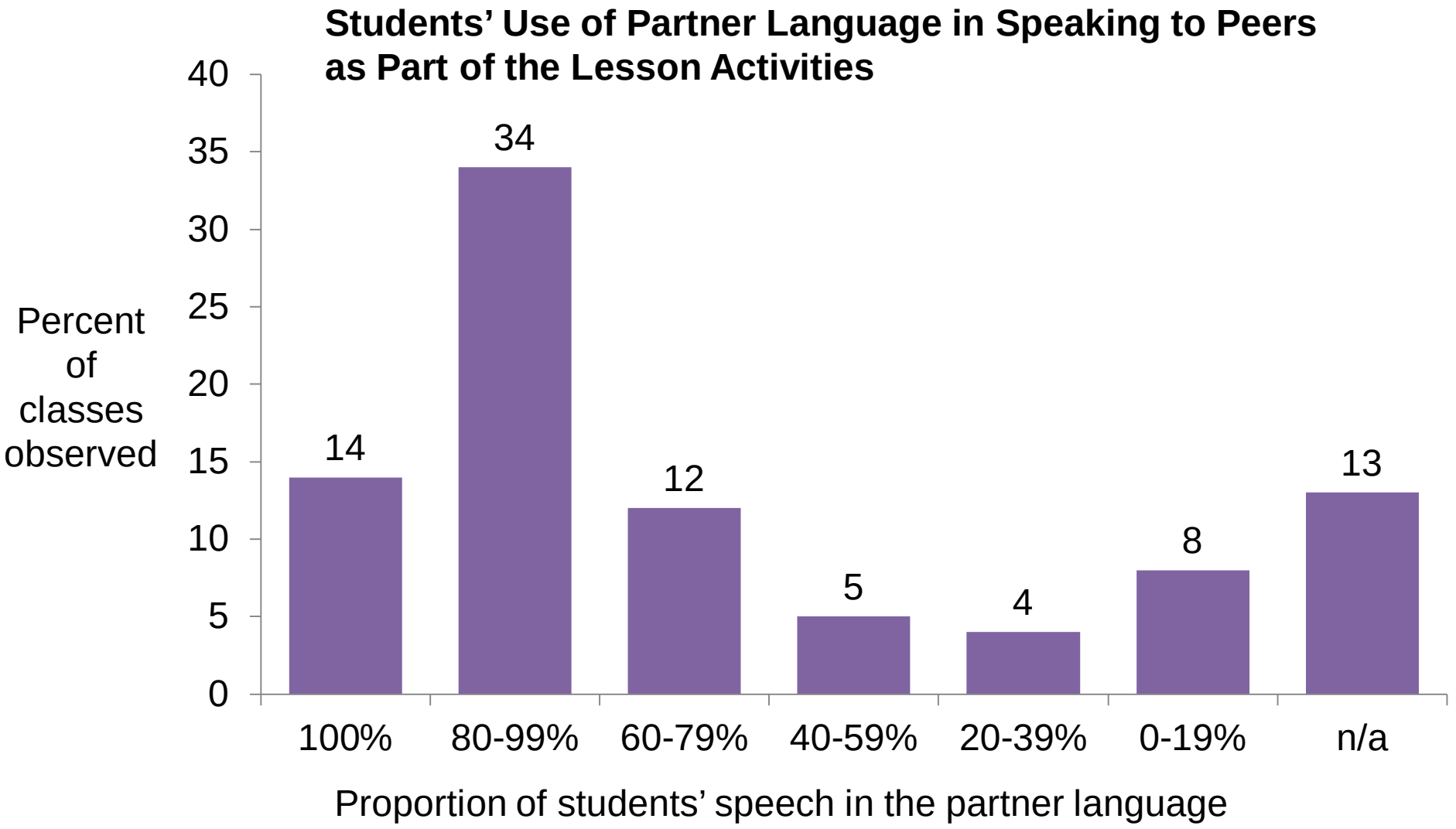
# Teachers Adhered Closely to the Partner Language During Lessons



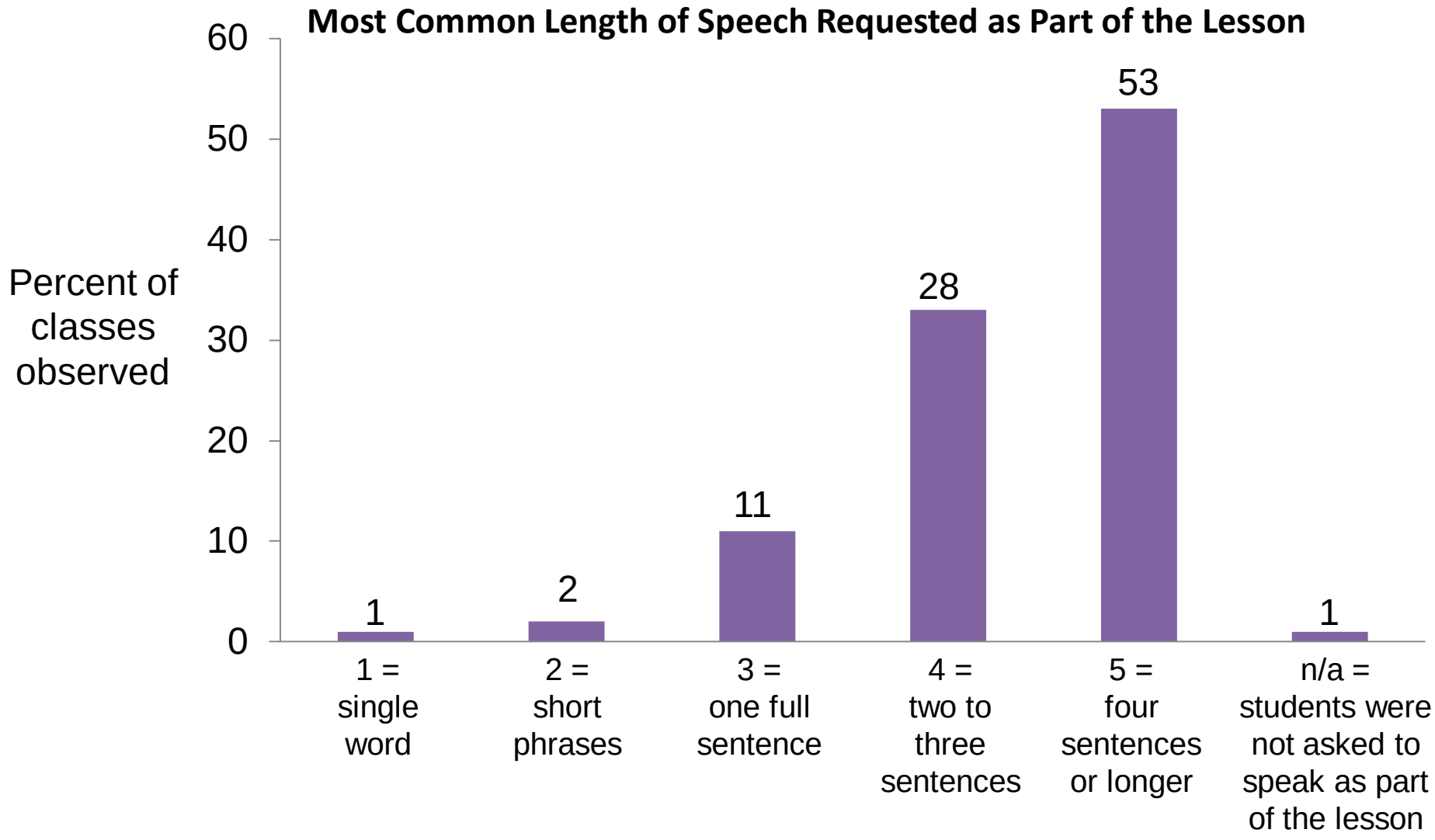
# Students Varied More In Their Use of the Partner Language With Teachers



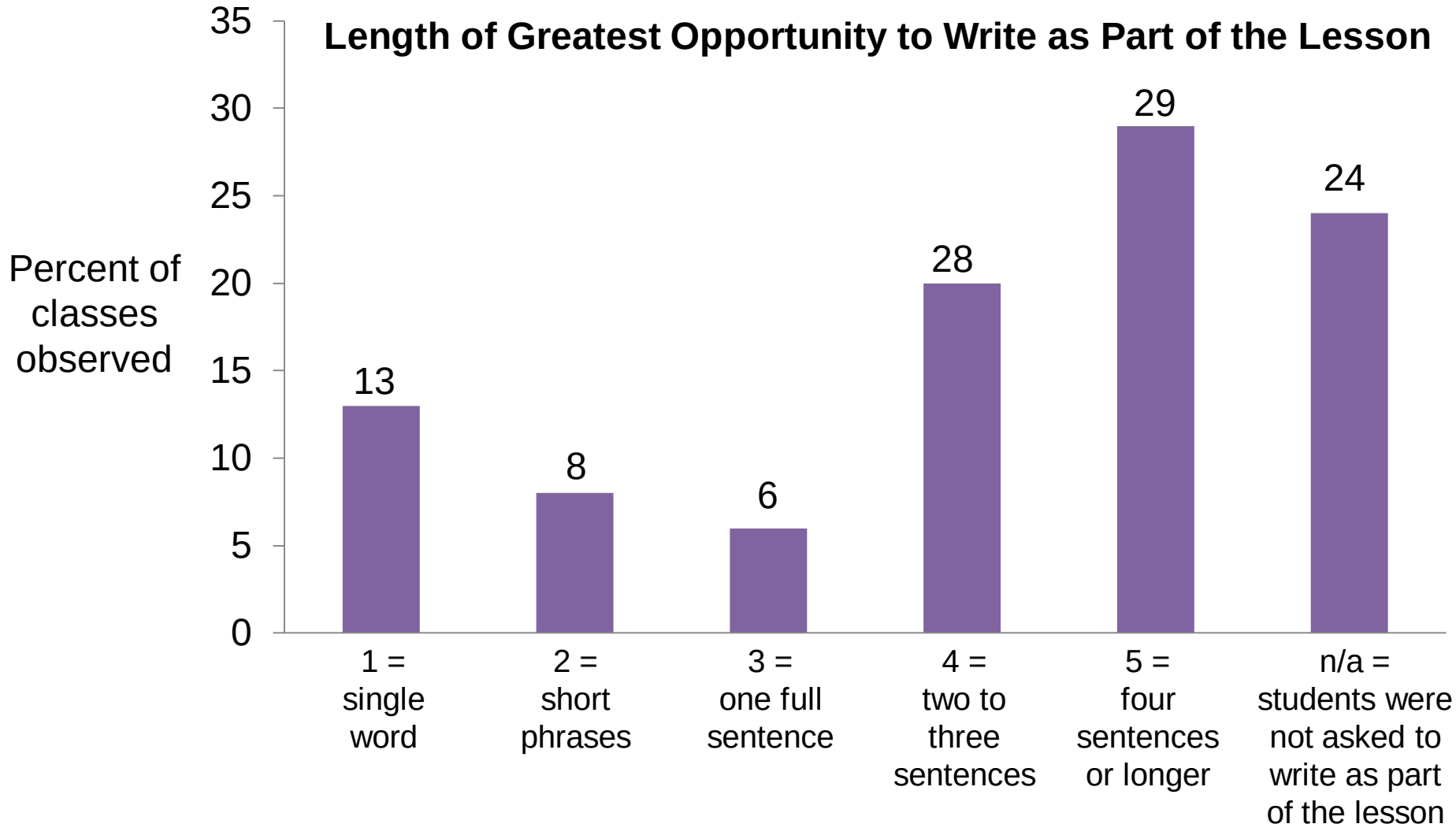
# Students Varied Even More In Their Use of the Partner Language With Peers



# Lessons Provided Students Substantial Opportunities to Speak



# A Large Proportion of Lessons Gave Students Substantial Opportunities to Write



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- Students randomly assigned to immersion outperformed their peers in English reading by about 7 months in grade 5 and 9 months in grade 8
- No significant benefit, but also no detriment, for math and science performance
- Immersion students have 3-point lower ELL classification rates by 6th grade (14 points if native language matches partner languages)
- Immersion students reach intermediate levels of partner-language proficiency by grade 8, with some variation by partner language
- No evidence that peer, teacher, or class size characteristics drive immersion effects

# Summary

- Additional costs of immersion have been a small fraction of per-pupil spending in the district
- Principals emphasized the challenge of finding the right teachers and the importance of doing so
- Teachers reported substantial need for prep time and the importance of collaboration
- Observation data (limited to participating teachers on observed days) show more variation in students' than teachers' adherence to partner language
- Effective scaling depends on maintenance of quality, including provision of opportunities for students to use partner language in the classroom

# Looking Ahead: Next Steps for DLI Research

- Examining transitions from elementary to middle and high school: What motivates students and families to persist in immersion programs?
- Expanding our knowledge of partner language proficiency by the end of middle school and high school
- Estimating long-term impacts of DLI on high school graduation rates, college preparedness, and career plans and success
- Improving our understanding of the impact of DLI on "non-cognitive" (e.g., interpersonal and cross-cultural) skills
- Further examining the impacts of DLI on English Learners
- Associating school effectiveness with school and classroom practices
- Understanding the role of DLI in supporting urban school diversity and closing achievement gaps


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