The Effects of Ability Grouping of Gifted Students on Gifted and Non-gifted Achievement Growth

Abstract: Teachers, administrators, and policymakers regularly need to decide on the best organization for the instruction of gifted students. Should they use heterogeneous or homogeneous instructional groups? Should grouping be done between classes or within classes? And what is the impact of within class and between class grouping of gifted students on the academic growth of gifted and non-gifted students? To examine these questions about the influence of ability grouping we estimate a series of multi-level growth curve models based on student administrative data, and surveys of school and district policies to in three states. We also examine whether these effects of ability grouping differ by socio-economic status, race/ethnicity, and English learner status.

AERA Proposal (about 1900 words now)

Ability grouping is a controversial technique with a contentious history. Generally, the gifted education literature portrays grouping as a useful pedagogical tool to efficiently allocate the appropriate level of instruction for students of differing abilities, thereby reducing teachers' workloads, and increasing the academic achievement of all students (Kulik and Kulik 1982, Steenbergen-Hu, Makel, & Olszewski-Kubilius, 2016). In contrast, more equity focused educational literature argues that ability grouping provides limited or no improvement of academic achievement for students in higher-level groups and leads notably reduced achievement for students in low ability groups due to differences in opportunities to learn and the negative effects of labeling (Slavin 1985, Gamoran et al 1996, Alexander and Entwisle 2018).

Objectives

In this paper, we use multilevel growth curve modeling to examine whether between-class or within-class ability grouping for students identified as gifted influences the academic growth of gifted and non-gifted students in a school. We also examine the influence of multiple forms of grouping and differentiated instruction for gifted students such as clustering, pull out programs, push in programs, and homogeneous between class grouping. We examine whether these effects differ by socio-economic status, race/ethnicity, and English learner status. Last we also examine whether ability-grouping effects are influenced by the gifted curriculum of a school or the autonomy of gifted instructors in a school. To examine these questions about the influence of ability grouping we estimate a series of multi-level growth curve models based on student administrative data, and surveys of school and district policies in three states.

Perspectives or theoretical framework

In this paper, we examine the influence of within and between class ability grouping from the research traditions of both the gifted education literature and the sociology of education literature. The gifted education literature argues that grouping provides an effective and efficient approach to improving student achievement by providing a curriculum that is appropriate for academically advanced students. The gifted literature focuses on the best ways to use grouping to improve student achievement and has examined the influence of pull-out grouping, homogeneous grouping, push-in grouping, and cluster grouping. In this paper, we examine all four options as examples of the impact of the frequency of grouping (i.e. one or two times a week for pull-in and push-out programs vs. all week for cluster and homogeneous between class grouping) and the location of grouping (in the regular class or in a separate class outside of the regular class) (see table 1).

There are multiple strategies used to group gifted students. In some cases, gifted students are grouped together in classes that are separated from non-gifted students (i.e. homogeneous grouping). These classes provide gifted instruction all day every day during the week. In other cases, students are pulled out from their regular classes for instruction with other gifted students only a couple times a week (i.e. pull-out instruction). Other schools, provide gifted instruction by clustering gifted students together within regular classes. For example cluster grouping in a school with three fourth grade classes and six gifted students could consist of grouping all six of the gifted students in fourth grade in one regular class and none would be placed in the other two classes. Last, schools might provide gifted in instruction by having a gifted education teacher visit a regular class and provide additional instruction within a class (i.e. push-in instruction)

<insert table 1 here>

Our paper adds to the gifted research on grouping by specifically modeling the impact of frequency vs location (see table 1) on the impact of grouping using a multilevel growth curve approach. Also, some literature notes that other factors might have a stronger impact on gifted achievement such as a subject-specific curriculum, whether a gifted curriculum provides accelerated instruction, and the role of teacher autonomy. These factors might lead to grouping effects being spurious.

We also examine the efficiency and equity impacts of grouping as discussed in the sociology of education tradition. There is a long tradition in the sociology of education literature examining the impact of grouping and tracking on both high and low ability students. In this paper, we add to this literature by focusing specifically on gifted student grouping, an area that is under-examined in the sociology of education literature. We examine the potential equity implications of grouping by examining the impact of grouping on gifted students and non-gifted students. We also further examine the equity implications of grouping by examining the interaction of grouping effects with socio-economic status, English learner status, and race/ethnicity.

Methods

We use four-level multilevel growth curve modeling to examine the influence of school-level reports of between-class and within-class grouping on student academic growth from third to fifth grade. The levels consist of time at level one, students at level two, school at level three, and the school district at level four. We estimate growth curve models for both gifted and non-gifted students. We estimate these growth curve models separately for math and reading achievement and for each of the three states in our study.

For gifted students only the models are:

- Between class grouping models
  - Model 1: Math = f(pull-out, homogenous groups, pull-out by homogenous groups, race/language/ses)
  - Model 2: Reading = f(pull-out, homogenous groups, pull-out by homogenous groups, race/language/ses)
- Within class grouping models
  - Model 3: Math = f(push-in, cluster groups, cluster groups by push-in, race/language/ses)
  - Model 4: Reading = f(push-in, cluster groups, cluster groups by push-in, race/language/ses)

In models 5-8, we next examine whether these effects of within and between class ability groups differ by race/language/SES groups (i.e. ELL, FRPL, and underrepresented race/ethnicity groups) for each of models 1-4 above for gifted students.

For Models 9-16, we repeat models 1-8 for non-gifted students to examine if the grouping of gifted students has a positive or negative effect on non-gifted students

The current paper only has a random effect at the intercept. The final paper will also include models with time as a random effect at the school and district level.

Data Sources

This analysis is based on both student level administrative data on achievement and identification from three states and a 2014/15 school and district surveys of all schools and districts in these three states. The state level response rates for the district survey varied between 83 and 9% and the response rate for the school survey was between 48% and 73%. The surveyed schools have a lower SES than non-surveyed schools based on common core data.

The longitudinal student-level administrative data consists of data for all of the 2011-12 3rd-grade cohort from three states. We gathered longitudinal data from these students from 3rd, 4th, and 5th grades on identification as gifted, FRPL status, EL status, race/ethnicity, math achievement and reading achievement for three academic years from 2011/12, 12/13, and 13/14.

We included students that stayed in the same school in fourth and fifth grade. We merged school and district data based on the school that the students attended for fifth grade.

Variables

In our four-level growth curve models, our dependent variable is math or reading achievement. In all three states, the reading achievement scores are vertically scaled, allowing for across grade level comparisons However, only states 2 and 3 have vertically scaled mathematics scores; therefore, we could not conduct growth models using State 1's mathematics scores.

The independent variables at level one are year and at level two FRPL status, ELL status, and race/ethnicity (with white and Asian coded as zero and underrepresented groups of Latinx, Black, and others coded as one). At level three the within-class or between-class grouping variables are included (see table 2). In the final paper, we will include school and district level demographic and SES variables. We will also examine alternative pedagogical and teacher factors that might influence the performance of gifted students such as the existence of a subject-specific gifted curriculum, whether a gifted curriculum provides accelerated instruction, and the role of teacher autonomy.

<insert table 2 here>

Results

We found that most grouping arrangements for gifted students had no statistically significant impact on the growth of academic achievement. Of the 30 possible grouping estimates for math and language arts across three states (see table 3), only one was statistically significant and negative with a p-value<.01 and one was statistically significant and positive with p-value<.01.

<insert table 3 here.>

In our interaction models (5-8) with race, SES, and ELL status we find very similar findings in math and reading for between-class grouping (models 5 and 6) and in math for within-class grouping (model 7) as in our models without interactions.

In models 9-12, we reexamined models 1-4 with students who are NOT identified as gifted to examine if the grouping of gifted students has a positive or negative effect on the performance of non-gifted students (see table 4). For non-gifted students, there also is almost no-effect of within-class and between-class grouping with only 3 of the 30 estimates statistically significant at the .01 level (see table 4). However, for mathematics

achievement growth of non-gifted students, we find a negative effect for cluster grouping in state two and for the push-in effect on reading achievement we find a positive effect for state two an a negative effect for state three.

<insert table 4 here>

The final paper will examine the influence of additional school covariates such as curriculum, teacher autonomy, and school and district covariates. The final paper will also estimate models with time varying random effects.

Scientific or scholarly significance of the study or work

This paper can help policymakers and school administrators evaluate the effectiveness of grouping policies for gifted students and the potential unintended consequences of the grouping of gifted students on non-gifted students in the same school. In addition, this paper adds to the research literature by helping clarify the reasons for the dramatically divergent arguments about grouping in the gifted education research on ability grouping versus the sociology of education research on ability grouping.

This study adds to the literature on gifted pedagogy and the literature on ability grouping in several ways. We first find that in most cases there is little effect of ability grouping on the academic growth of gifted students. While much of the gifted literature has been critical of short-term pull out classes and favored more intensive instruction (such as homogenous grouping), our data did not support these claims. Also, with respect to within-class ability grouping, we found almost no advantage, nor disadvantage of ability grouping for gifted students. This is consistent with much of the sociology of education literature on grouping effects but contradicts the gifted education literature on grouping. Specifically, Steenbergen-Hu et al. (2016) review of 100 years of research on ability grouping finds a statistically significant effect of grouping with a Hedges g of 0.37. In contrast, we find no effect of grouping in the three states studied.

In the final paper, we will expand on this finding by examining the gifted ability grouping papers cited by Steenbergen-Hu et al. (2016) compared to the growth curve models in this study. We will conclude with an exploration of the differences between these studies and we will propose recommendations for further study to reconcile the competing evidence about the effects of ability grouping for gifted students.

References:

Alexander, K. L., & Entwisle, D. R. (2018, March 5). Educational Tracking during the Early Years: First Grade Placements and Middle School Constraints. Retrieved July 10, 2018, from https://www.taylorfrancis.com/

Boaler, J., Wiliam, D., & Brown, M. (2000). Students' experiences of ability grouping-disaffection, polarisation and the construction of failure. *British Educational Research Journal*, *26*(5), 631–648.
Burris, C. C., & Allison, K. E. (2013). Review of Does Sorting Students Improve Test Scores? *National Education Policy Center*. Retrieved from https://nepc.colorado.edu/thinktank/review-does-sorting-students
Collins, C. A., & Gan, L. (2013). *Does sorting students improve scores? An analysis of class composition*. National Bureau of Economic Research.
Decristan, J., Fauth, B., Kunter, M., Büttner, G., & Klieme, E. (2017). The interplay between class heterogeneity and teaching quality in primary school. *International Journal of Educational Research*, *86*, 109–121. https://doi.org/10.1016/j.ijer.2017.09.004
Deunk, M. I., Smale-Jacobse, A. E., de Boer, H., Doolaard, S., & Bosker, R. J. (2018). Effective differentiation Practices:A systematic review and meta-analysis of studies on the cognitive effects of differentiation practices in primary education. *Educational Research Review*, *24*, 31–54. https://doi.org/10.1016/j.edurev.2018.02.002
Downey, D. B., & Condron, D. J. (2016). Fifty Years since the Coleman Report: Rethinking the Relationship between Schools and Inequality. *Sociology of Education*, *89*(3), 207–220. https://doi.org/10.1177/0038040716651676
Francis, B., Connolly, P., Archer, L., Hodgen, J., Mazenod, A., Pepper, D., … Travers, M.-C. (2017). Attainment Grouping as self-fulfilling prophesy? A mixed methods exploration of self confidence and set level among Year 7 students. *International Journal of Educational Research*, *86*, 96–108. https://doi.org/10.1016/j.ijer.2017.09.001
Gamoran, A., Nystrand, M., Berends, M., & LePore, P. C. (1995). An Organizational Analysis of the Effects of Ability Grouping. *American Educational Research Journal*, *32*(4), 687–715. https://doi.org/10.2307/1163331
Gentry, M., & MacDougall, J. (2008). Total school cluster grouping: Model, research, and practice. *Systems and Models for Developing Programs for the Gifted and Talented*, 211–234.
Herrmann, J., Schmidt, I., Kessels, U., & Preckel, F. (n.d.). Big fish in big ponds: Contrast and assimilation effects on math and verbal self-concepts of students in within-school gifted tracks. *British Journal of Educational Psychology*, *86*(2), 222–240. https://doi.org/10.1111/bjep.12100
Kulik, C.-L. C., & Kulik, J. A. (1982). Effects of Ability Grouping on Secondary School Students: A Meta-Analysis of Evaluation Findings. *American Educational Research Journal*, *19*(3), 415–428. https://doi.org/10.2307/1162722
Kenny, D. A. K. F. X. A., Jr.Bryan W.Hallmark. (n.d.). The Effects of Group Composition on Gifted and Non-Gifted Elementary Students in Cooperative Learning Groups. Retrieved June 7, 2018, from https://nrcgt.uconn.edu/wp-content/uploads/sites/953/2015/04/rm95116.pdf
Loveless, T. (2013). Ability Grouping, Tracking, and How Schools Work. Retrieved July 10, 2018, from https://www.brookings.edu/research/ability-grouping-tracking-and-how-schools-work/
Marsh, H. W., Trautwein, U., Lüdtke, O., Baumert, J., & Köller, O. (2007). The Big-Fish-Little-Pond Effect: Persistent Negative Effects of Selective High Schools on Self-Concept After Graduation. *American Educational Research Journal*, *44*(3), 631–669. https://doi.org/10.3102/0002831207306728
McGillicuddy, D., & Devine, D. (2018). "Turned off" or "ready to fly" – Ability grouping as an act of symbolic violence in primary school. *Teaching and Teacher Education*, *70*, 88–99. https://doi.org/10.1016/j.tate.2017.11.008
Preckel, F., Schmidt, I., Stumpf, E., Motschenbacher, M., Vogl, K., Scherrer, V., & Schneider, W. (n.d.). High-Ability Grouping: Benefits for Gifted Students' Achievement Development Without Costs in Academic Self-Concept. *Child Development*, *0*(0). https://doi.org/10.1111/cdev.12996
Slavin, R. E. (1987). Ability Grouping and Student Achievement in Elementary Schools: A Best-Evidence Synthesis. *Review of Educational Research*, *57*(3), 293–336. https://doi.org/10.2307/1170460
Slavin, R. E., & Karweit, N. L. (1985). Effects of Whole Class, Ability Grouped, and Individualized Instruction on Mathematics Achievement: *American Educational Research Journal*. https://doi.org/10.3102/00028312022003351
Steenbergen-Hu, S., Makel, M. C., & Olszewski-Kubilius, P. (2016). What One Hundred Years of Research Says About the Effects of Ability Grouping and Acceleration on Students' Academic Achievement: Findings of Two Second-Order Meta-Analyses . *Review of Educational Research*, *86*(4), 849–899. https://doi.org/10.3102/0034654316675417

van der Meulen, R. T., van der Bruggen, C. O., Spilt, J. L., Verouden, J., Berkhout, M., & Bögels, S. M. (2014). The Pullout Program Day a Week School for Gifted Children: Effects on Social–Emotional and Academic Functioning. *Child & Youth Care Forum, 43*(3), 287–314. https://doi.org/10.1007/s10566-013-9239-5

Tables

Table 1: Frequency vs. Location of Ability Grouping

		Frequency	
		All week, all day	Less than once a week (often only once or twice a week for only a couple hours)
Location	Within-Class	Cluster grouping *	Push-in instruction
	Between-Class	Homogeneous between class grouping	Pull-out instruction

* = Cluster grouping fits in this category if it is done administratively for classroom assignment. Some respondents might have viewed cluster grouping simply as within class differentiated instruction for ability groups.

Table 2: Descriptive Statistics

State 1					
Variable	Obs	Mean	Std. Dev.	Min	Max
Pull Out Gifted Class	210,122	0.80	0.40	0	1
Push In Gifted Class	208,451	0.43	0.50	0	1
Clustered Gifted Students	202,448	0.64	0.48	0	1
Homogeneous Between Class Grouping	200,009	0.46	0.50	0	1
MATH	297,108	417.24	49.23	315	475
READ	297,108	445.56	10.27	410	472
Student Ever ELL	313,644	0.11	0.32	0	1
Student Ever FRPL	313,644	0.61	0.49	0	1
Under-represented racial/ethnic group	313,644	0.42	0.49	0	1
State 2					
Pull Out Gifted Class	58,827	0.68	0.47	0	1
Push In Gifted Class	57,953	0.33	0.47	0	1
Clustered Gifted Students	54,961	0.67	0.47	0	1
Homogeneous Between Class Grouping	54,837	0.56	0.50	0	1
MATH	145,504	492.80	83.72	150	800
READ	145,329	587.87	71.95	150	843
Student Ever ELL	151,848	0.21	0.41	0	1
Student Ever FRPL	151,848	0.51	0.50	0	1
Under-represented racial/ethnic group	151,848	0.41	0.49	0	1
State 3					
Pull Out Gifted Class	182,341	0.65	0.48	0	1
Push In Gifted Class	181,189	0.21	0.41	0	1
Clustered Gifted Students	166,447	0.41	0.49	0	1
Homogeneous Between Class Grouping	167,100	0.49	0.50	0	1
MATH	499,677	214.47	22.52	140	279
READ	499,677	212.96	21.83	140	277
Student Ever ELL	499,677	0.19	0.40	0	1
Student Ever FRPL	499,677	0.67	0.47	0	1
Under-represented racial/ethnic group	499,677	0.52	0.50	0	1

Table 3: The Effects of Between Class and Within-Class grouping on academic achievement of gifted students

	Mathematics Achievement			Reading Achievement			
	Model	Slope	Slope	Model	Slope	Slope	Slope
		State 2	State 3		State1	State 2	State 3
Between Class Grouping							
Year	1	18.35*	8.76*	2	4.71*	19.25*	8.98*
Year by Pull Out Classes		-.23	-.64*		.35*	1.49	.04
Year by Homogeneous grouping in separate classes		-4.37*	-.31		.22	.56	.56
Year by Interaction between pull out classes and homogenous grouping		2.43	.66		-.10	-.07	-.28
Within Class Grouping							
Year	3	16.95*	8.43*	4	5.15*	19.54*	9.30*
Year by Push In Classes		-.21	.05		-.04	-.88	.12
Year by Cluster Grouping		.21	-.19		-.19*	.41	-.06
Year by Interaction between Push in and cluster grouping		-.79	.07		.17	3.13	-.39

(Notes: * =p-value<.01)

Table 4: The Effects of Between Class and Within-Class grouping on the academic achievement of non-gifted students

	Mathematics Achievement			Reading Achievement			
	Model	Slope State 2	Slope State 3	Model	Slope State1	Slope State 2	Slope State 3
Between Class Grouping							
Year	9	23.67*	9.61*	10	5.07*	23.14*	9.35*
Year by Pull Out Classes		1.03	-.20		.07	1.79*	-.33*
Year by Homogeneous grouping in separate classes		-.44	-.25		.13	1.21	.07
Year by Interaction between pull out classes and homogenous grouping		-1.08	.28		.06	-.41	.07
Within Class Grouping							
Year	11	24.53*	9.50*	12	5.15*	25.10*	9.19*
Year by Push In Classes		.09	.24		.12	0.0	-.13
Year by Cluster Grouping		-1.66*	-.19		.06	-.78	.04
Year by Interaction between Push in and cluster grouping		1.04	-.36		-.08	1.84	.00

(Notes: * =p-value<.01)

Appendix Tables

Table A1: Effect of Between-Class Grouping on the Achievement Growth of Gifted Students

	Model 1					Model 2					
	Mathematics Achievement					Reading Achievement					
	State 2		State 3			State 1		State 2		State 3	
Level 1: Time											
Year (0,1, or 2)	18.35	***	8.76	***		4.71	***	19.25	***	8.98	***
Level 2: Student											
EVER_ELL	-9.94	**	-1.19			-2.96	***	-14.56	***	-3.18	***
EVER_FRL	-27.77	***	-4.04	***		-1.14	***	-17.96	***	-4.01	***
Underrepresented racial/ethnic group	-18.87	***	-2.46	***		-1.47	***	-11.04	***	-1.79	***
Year by EVER_ELL	5.63	***	0.96	*		0.45	**	5.07	***	0.94	**
Year by EVER_FRL	2.71		-0.35			-0.24	***	2.31	*	-0.48	*
Year by Under	1.5		0.08			-0.15		-0.95		0.18	
Level 3: School											
Pull-out	5.47		1.39			-0.65	*	5.52		-0.52	
Homogeneous grouping	14.47		1.05			-0.58		1.21		-0.66	
Pull-out by Homogeneous grouping	-12.64		-2.08			0.83	*	-4.2		0.68	
year by Pull-out	-0.23		-0.64	*		0.35	***	1.49		0.04	
year by Homogeneous grouping	-4.37	*	-0.31			0.22		0.56		0.56	
year by Pull-out by Homogeneous grouping	2.43		0.66			-0.1		-0.07		-0.28	
_cons	578.93	***	231.64	***		451.36	***	641.5	***	231.81	***
lns1_1_1, constant	2.26	***	1.16	***		0.15		1.79	***	0.96	***
lns2_1_1, constant	2.65	***	1.54	***		-0.08		2.21	***	1.15	***
lns3_1_1, constant	3.64	***	2.4	***		1.33	***	3.26	***	2.39	***
lnsig_e, constant	3.48	***	2.42	***		1.37	***	3.22	***	2.35	***
N	6643		19323			35846		6640		19323	

(Notes: * =p-value<.05; ** = p-value<.01; *** = p-value<.001)

Table A2: Effect of Within-Class Grouping on the Achievement Growth of Gifted Students

Table A2: Effect of Within-Class Grouping on Achievement Growth of Gifted Students											
	Model 3					Model 4					
	Math Achievement					Reading Achievement					
	State 2		State 3			State 1		State 2		State 3	
Level 1: Time											
Year (0,1, or 2)	16.95	***	8.43	***		5.15	***	19.54	***	9.3	***
Level 2: Student											
EVER_ELL	-9.4	**	-1.25			-2.83	***	-14.31	***	-3.14	***
EVER_FRL	-27.3	***	-4.09	***		-1.16	***	-18.55	***	-4.06	***
Underrepresented racial/ethnic group	-19.43	***	-2.39	***		-1.48	***	-11.74	***	-1.74	***
Year by EVER_ELL	5.47	***	0.98	**		0.39	**	4.71	***	1.02	**
Year by EVER_FRL	2.4		-0.3			-0.24	***	2.45	*	-0.49	*
Year by Under	1.21		0.04			-0.14		-0.77		0.1	
Level 3: School											
Push-In	-4.58		0.04			-0.16		-0.09		-0.11	
Cluster Grouping	-2.78		0			-0.06		-2.05		-0.03	
Push-In by Cluster grouping	6.49		-0.29			0.16		-3.5		-0.16	
Year by Push-In	-0.21		0.05			-0.04		-0.88		0.12	
Year by Cluster Grouping	0.21		-0.19			-0.19	**	0.41		-0.06	
Year by Push-In by Cluster grouping	-0.79		0.07			0.17		3.13		-0.39	
_cons	587.02	***	232.4	***		450.95	***	647.1	***	231.3	***
lns1_1_1, constant	2.26	***	1.11**	***		0.11		1.80**	***	0.99***	***
lns2_1_1, constant	2.61*	***	1.53**	***		-0.07		2.11**	***	1.15***	***
lns3_1_1, constant	3.63*	***	2.40**	***		1.33*	***	3.26**	***	2.39***	***
lnsig_e , constant	3.48*	***	2.42**	***		1.37*	***	3.22**	***	2.35***	***
N	6607		19542			36131		6604		19542	

(Notes: * =p-value<.05; ** = p-value<.01; *** = p-value<.001)

Table A3: **Effect of Between-Class Grouping on the Achievement Growth of Gifted Students with Interaction effects by SES, ELL, and Race/Ethnicity**

	Model 9				Model 10					
	Mathematics Achievement				Reading Achievements					
	State 2		State 3		State 1		State 2		State 3	
Level 1: Time										
year	18.44	***	8.89	***	4.74	***	19.84	***	8.76	***
Level 2: Students										
EVER_ELL	-15.26		-2.85		-2.24	*	-17.22	*	-4.17	*
EVER_FRL	-35.91	***	-4.95	***	-0.99	*	-15.83	*	-3.49	**
under	-13.49		-1.18		-1.62	**	-17.18	*	-2.63	*
EVER_ELLbyYR	2.21		0.82		0.39		5.99		1.47	
EVER_FRLbyYR	7.64		-0.24		-0.33		-0.09		-0.64	
underbyYR	-3.05		-0.38		-0.12		-0.31		0.84	
Level 3: Schools										
Q9_PL	3.79		1.57		-0.59		3.86		-0.07	
hgroup	9.58		0.63		-0.58		0.28		-1.45	
PLbyH	-10.46		-2.26		0.89	*	-4.32		0.73	
Q9_PLbyyear	0.22		-0.89	*	0.33	**	1.46		0.24	
hgroupbyyear	-6.08	*	-0.41		0.2		-1.36		0.66	
PLbyHbyyear	3.98		0.92		-0.11		1.39		-0.11	
Pull-Out Interactions										
Q9_PLELL	0.16		3.59		-0.91		1.15		1.19	
Q9_PLFRL	14.09		0.56		-0.1		-1.12		-1.59	
Q9_PLunder	-14.56		-2.57		0.12		5.2		0.55	
Q9_PLyrELL	1.3		0.27		-0.08		-4.19		-0.53	

Q9_PLyrFRL	-8.54		-0.42		0.12		3.71		0.56	
Q9_PLyrunder	8.22		1.32		-0.09		-1.98		-1.18	
Homogeneous Group Interactions										
hgroupELL	21.63		0.31		-2.16		6.76		1.65	
hgroupFRL	0.52		1.65		0.18		-8.99		-0.3	
hgroupunder	-2.81		-1.16		0.39		8.54		1.72	
hgroupyrELL	4.41		0.05		0.49		1.47		-0.85	
hgroupyrFRL	-1.37		0.02		-0.02		4.68		0.43	
hgroupyrun~r	5.31		0.25		0.03		-0.51		-0.56	
Homogeneous Group by Pull-Out Group Interactions										
PLbyHELL	-22.02		-1.29		3.09	*	-5.39		-2.28	
PLbyHFRL	-5.2		-1.35		-0.47		10.09		2.17	
PLbyHunder	16.79		2.9		-0.4		-7.2		-1.67	
PLbyHyrELL	0.01		-0.23		-0.31		2.48		0.91	
PLbyHyrFRL	4.7		0.51		0.02		-7.45		-1.57	
PLbyHyrunder	-11.14		-1.58		0.1		2.81		1.16	
_cons	582.09	***	231.82	***	451.3	***	643.29	***	231.91	***
lns1_1_1	2.24	***	1.17	***	0.14		1.79	***	0.95	***
lns2_1_1	2.63	***	1.54	***	-0.09		2.21	***	1.13	***
lns3_1_1	3.63	***	2.4	***	1.33	***	3.26	***	2.39	***
lnsig_e	3.48	***	2.42	***	1.37	***	3.22	***	2.35	***
N	6643		19323		35846		6640		19323	

Table A4: **Effect of Within-Class Grouping on the Achievement Growth of Gifted Students with Interaction effects by SES, ELL, and Race/Ethnicity**

	Model 5					Model 6					
	Mathematics Achievement					Reading Achievement					
	State 2		State 3			State 1		State 2		State 3	
Level 1: Time											
year	17.98	***	8.53	***	year	5.21	***	19.69	***	9.34	***
Level 2: Students											
EVER_ELL	-2.37		-2.1	*	EVER_ELL	-2.4	***	-11.55	*	-2.81	**
EVER_FRL	-23.85	***	-3.06	***	EVER_FRL	-1.39	***	-22.64	***	-3.78	***
under	-20.76	***	-2.28	***	under	-0.92	**	-10.95	*	-1.18	
EVER_ELLbyYR	5.23		1.15	*	EVER_ELLbyYR	0.65		5.55	*	0.96	*
EVER_FRLbyYR	1.41		-0.72	*	EVER_FRLbyYR	-0.44	***	4.78	*	-0.44	
underbyYR	-0.84		0.18		underbyYR	-0.16		-4.5	*	-0.07	
Level 3: Schools											
Q10_PS	3.29		2.2		Q10_PS	0.02		6.17		0.28	
cg	-0.23		0.01		cg	-0.03		-3.59		0.24	
PSbyCG	-2.11		-0.63		PSbyCG	-0.05		-10.78		1.25	
cgbyyear	-1.71		-0.13		cgbyyear	-0.29	***	-0.89		-0.04	
cgELL	-9.01		0.62		cgELL	-0.71		2.53		0.28	
cgFRL	-8.56		-0.73		cgFRL	0.48		4.52		0.46	
cgunder	7.66		0.59		cgunder	-0.97	*	-2.21		-1.43	
cgyrELL	-0.31		0.54		cgyrELL	-0.41		-4.86		-0.6	
cgyrFRL	2.75		0.49		cgyrFRL	0.33		-0.8		-0.14	
cgyrunder	3.29		-0.93		cgyrunder	0.12		8.12	**	0.29	

Q10_PSbyyear	-1.58		-0.65		Q10_PSbyyear	-0.14		-2.11		-0.01	
Q10_PSELL	-6.79		6.38	*	Q10_PSELL	-0.39		-2.77		-7.18	*
Q10_PSFRL	-0.41		-7.09	***	Q10_PSFRL	0.02		-7.41		0.03	
Q10_PSunder	-15.52		0.81		Q10_PSunder	-1.04	*	-2.67		0.14	
Q10_PSyrELL	3.57		-1.91		Q10_PSyrELL	-0.24		0.51		4.7	**
Q10_PSyrFRL	-0.27		2.67	**	Q10_PSyrFRL	0.56	**	3.66		-0.8	
Q10_PSyrun~r	2.18		-0.42		Q10_PSyrun~r	-0.27		-2.13		0.45	
PSbyCGbyyear	1.76		0.24		PSbyCGbyyear	0.34	**	6.77	**	-0.58	
PSbyCGELL	6.01		-2.86		PSbyCGELL	0.75		-9.99		5.07	
PSbyCGFRL	8.27		4.43		PSbyCGFRL	-0.32		13.97		-3.46	
PSbyCGunder	9.99		-3.02		PSbyCGunder	1.72	**	7.26		-0.86	
PSbyCGyrELL	-3.92		-1.07		PSbyCGyrELL	0.36		6.21		-4.23	
PSbyCGyrFRL	-2.06		-2.08		PSbyCGyrFRL	-0.85	**	-10.77	*	1.11	
PSbyCGyrun~r	-3.3		1.78		PSbyCGyrun~r	0.24		-2.52		0.06	
_cons	584.63	***	232.03	***	_cons	450.91	***	647.78	***	230.99	***
lns1_1_1	2.26	***	1.11	***	_cons	0.11		1.8	***	0.98	***
lns2_1_1	2.63	***	1.53	***	_cons	-0.08		2.13	***	1.13	***
lns3_1_1	3.63	***	2.4	***	_cons	1.33	***	3.26	***	2.39	***
lnsig_e	3.48	***	2.42	***	_cons	1.37	***	3.22	***	2.35	***
N	6607		19542		N	36131		6604		19542	

Table A5: **Effect of Between-Class Grouping on the Achievement Growth of Non-Gifted Students**

	Model 9				Model 10					
	Mathematics Achievement				Reading Achievement					
	State 2		State 3		State 1		State 2		State 3	
Level 1: Time										
year	23.67	***	9.61	***	5.07	***	23.14	***	9.35	***
Level 2: Students										
EVER_ELL	-13.61	***	-2.82	***	-3.04*	***	-19.45	***	-5.22	***
EVER_FRL	-34.24	***	-8.07	***	-3.01*	***	-25	***	-8.03	***
Underrepresented racial/ethnic group	-25.3	***	-3.91	***	-2.38*	***	-11.86	***	-3.9	***
Year by EVER_ELL	8.03	***	1.39	***	0.45*	***	6.25	***	1.42	***
Year by EVER_FRL	3.95	***	-0.55	***	-0.30*	***	-0.54		-0.57	***
Year by Under	3.51	***	-0.49	***	-0.05		-0.67		-0.05	
Level 3: Schools										
Pull-out	5.55		0.13		-0.17		6.53		-0.15	
Homogeneous grouping	5.76		1.7	*	0.34		3.52		1.63	*
Pull-out by Homogeneous grouping	-1.76		-1.92	*	-0.44		-5.32		-1.64	*
year by Pull-out	1.03		-0.2	*	0.07		1.79	***	-0.33	***
year by Homogeneous grouping	-0.44		-0.25	*	0.13		1.21		0.07	
year by Pull-out by Homogeneous grouping	-1.08		0.28	*	0.06		-0.41		0.07	
_cons	479.19	***	210.8	***	441.46*	***	573.43	***	209.91	***
lns1_1_1, constat_cons	2.46	***	0.84	***	0.25*	*	2.23	***	0.52	*
lns2_1_1, constat_cons	2.95	***	1.54	***	0.32*	***	2.62	***	1.41	***
lns3_1_1, constat_cons	4.07	***	2.76	***	1.89*	***	3.97	***	2.72	***
lnsig_e, constant	3.4	***	2.29	***	1.43*	***	3.41	***	2.19	***
N	45611		147165		152539		45562		147165	

(Notes: * =p-value<.05; ** = p-value<.01; *** = p-value<.001)

Table 6: **Effect of Within-Class Grouping on the Achievement Growth of Non-Gifted Students**

	Model 11				Model 12					
	Mathematics Achievement				Reading Achievement					
	State 2		State 3		State 1		State 2		State 3	
Level 1: Time										
year	24.53	***	9.5	***	5.13	***	25.1	***	9.19	***
Level 2: Students										
EVER_ELL	-13.88	***	-2.79	***	-3.04	***	-20.1	***	-5.19	***
EVER_FRL	-34.04	***	-8.07	***	-3.03	***	-24.71	***	-8	***
Underrepresented racial/ethnic group	-25.34	***	-3.9	***	-2.35	***	-11.05	***	-3.94	***
Year by EVER_ELL	8	***	1.39	***	0.46	***	5.96	***	1.43	***
Year by EVER_FRL	3.75	***	-0.52	***	-0.29	***	-0.78		-0.58	***
Year by Under	3.82	***	-0.51	***	-0.08	**	-0.54		-0.05	
Level 3: Schools										
Push-In	1.97		-0.15		0.15		2.82		0.72	
Cluster Grouping	6.65		-0.75		-0.13		5.53	*	-0.46	
Push-In by Cluster grouping	-7.15		0.41		0.09		-8.66		-0.33	
Year by Push-In	0.09		0.24		0.12	*	0		-0.13	
Year by Cluster Grouping	-1.66	***	-0.19	*	0.06		-0.78		0.04	
Year Push-In by Cluster grouping	1.04		-0.36	*	-0.08		1.74	*	0	
_cons	481.3	***	211.32	***	441.36	***	573.92	***	210.14	***
lns1_1_1	2.46	***	0.77	***	0.24	*	2.25	***	0.54	**
lns2_1_1	2.95	***	1.54	***	0.3	***	2.65	***	1.41	***
lns3_1_1	4.07	***	2.75	***	1.89	***	3.97	***	2.72	***
lnsig_e	3.4	***	2.29	***	1.43	***	3.4	***	2.19	***
N	45751		146889		154307		45695		146889	

(Notes: * =p-value<.05; ** = p-value<.01; *** = p-value<.001)

Table A7: : **Effect of Between-Class Grouping on the Achievement Growth of Non-Gifted Students with Interaction effects by SES, ELL, and Race/Ethnicity**

	Model 13				Model 14					
	Mathematics Achievement				Reading Achievement					
Level 1: Time										
year	23.69	***	9.79	***	5.07	***	22.73	***	9.38	***
Level 2: Students										
EVER_ELL	-8.27	*	-3.68	***	-3.02	***	-16.72	***	-5.27	***
EVER_FRL	-34.33	***	-7.81	***	-3.13	***	-22.98	***	-8.63	***
under	-28.9	***	-3.5	***	-2.02	***	-18.74	***	-3.65	***
EVER_ELLbyYR	8.00	***	2.05	***	0.51	***	6.52	***	1.47	***
EVER_FRLbyYR	3.25	**	-0.63	**	-0.17		-1.03		-0.37	*
underbyYR	4.35	***	-0.99	***	-0.25	*	0.50		-0.35	*
Level 3: School										
Q9_PL	8.92		0.61		-0.17		7.35		-0.43	
hgroup	4.33		1.06		0.78		1.21		0.5	
PLbyH	-6.19		-1.09		-0.86		-6.93		0.02	
Q9_PLbyyear	1.49		-0.48	*	0.11		3.12	***	-0.25	
hgroupbyyear	-1.32		-0.6	**	0.1		1.13		-0.09	
PLbyHbyyear	-0.59		0.91	***	0.02		-1.46		0.04	
Interactions by homogeneous grouping										
hgroupELL	1.86		0.18		0.14		2		-1.25	
hgroupFRL	-3.45		0.16		-0.15		-4.57		1.22	
hgroupunder	7.05		0.78		-0.91	*	9.67	*	0.95	
hgroupyrELL	0.05		-1.04	***	-0.13		-1.49		0	
hgroupyrFRL	3.36	*	0.23		-0.13		1.48		-0.31	
hgroupyrun~r	-2.15		0.75	**	0.29	*	-0.56		0.61	**

Interactions by pull out classrooms										
Q9_PLELL	-9.29	*	1.49	*	-0.15		-4.62		0.81	
Q9_PLFRL	0.65		-0.65		0.22		-0.76		0.49	
Q9_PLunder	-3.32		-0.61		-0.31		1.31		-0.36	
Q9_PLyrELL	0.08		-0.65	*	0		0.58		-0.22	
Q9_PLyrFRL	-0.14		0.24		-0.15		-1.43		-0.23	
Q9_PLyrunder	-0.84		0.47	*	0.14		-1.15		0.18	
Interactions by homogeneous grouping and pullout classrooms										
PLbyHELL	-1.64		-0.3		0.15		-2.14		0.93	
PLbyHFRL	4.3		0.2		0.07		2.91		-1.26	
PLbyHunder	4.92		-1.59		0.92	*	1.5		-1.9	*
PLbyHyrELL	-0.2		0.97	**	-0.01		0.24		0.31	
PLbyHyrFRL	-2.74		-0.72	*	0.16		1.60		0.36	
PLbyHyrunder	2.28		-0.63	*	-0.15		-0.23		-0.4	
_cons	479.45	***	210.59	***	441.39	***	574.78	***	210.21	***
lns1_1_1	2.49	***	0.83	***	0.25	*	2.26	***	0.51	*
lns2_1_1	2.93	***	1.54	***	0.32	***	2.61	***	1.4	***
lns3_1_1	4.07	***	2.75	***	1.89	***	3.97	***	2.72	***
lnsig_e	3.4	***	2.29	***	1.43	***	3.41	***	2.19	***
N	45611		147165		152539		45562		147165	

Table A8: : **Effect of Within-Class Grouping on the Achievement Growth of Non-Gifted Students with Interaction effects by SES, ELL, and Race/Ethnicity**

	Model 15				Model 16					
	Mathematics Achievement				Reading Achievement					
	State 2		State 3		State 1		State 2		State 3	
Level 1: Time										
year	24.61	***	9.44	***	5.28	***	25.02	***	9.25	***
Level 2: Students										
EVER_ELL	-10.99	***	-2.48	***	-3.14	***	-14.65	***	-5.32	***
EVER_FRL	-29.82	***	-7.63	***	-2.84	***	-24.08	***	-7.44	***
under	-30.19	***	-4.08	***	-2.57	***	-17.14	***	-3.97	***
EVER_ELLbyYR	8.24	***	1.31	***	0.5	***	4.3	***	1.44	***
EVER_FRLbyYR	2.8	**	-0.56	***	-0.4	***	-0.79		-0.67	***
underbyYR	4.8	***	-0.29	**	-0.23	***	0.5		-0.06	
Level 3: School										
Q10_PS	9.97		1.16		0.06		4.21		1.83	
cg	7.65		-0.25		-0.16		3.61		0.1	
PSbyCG	-16.67	*	-1.04		0.35		-9.58		-1.22	
Q10_PSbyyear	-1.79		0.04		-0.01		0.38		-0.18	
cgbyyear	-1.04		-0.01		-0.15	*	-0.39		0.03	
PSbyCGbyyear	1.48		-0.14		0.07		0.36		-0.27	
Cluster grouping interactions										
cgELL	-5.2		-0.64		0.38		-7.31	*	0.17	
cgFRL	-5.89		-0.65		-0.23		-0.51		-0.76	
cgunder	8.27	*	0.14		0.32		8.65	**	-0.16	
cgyrELL	-0.03		-0.11		-0.09		1.32		-0.06	

cgyrFRL	0.51		0.09		0.13		-0.26		0.11	
cgyrunder	-2.15		-0.42	*	0.28	***	-1.26		-0.09	
Push In interactions										
Q10_PSELL	-4		-0.35		0.18		-10.21		0.74	
Q10_PSFRL	-11.7	*	-2.6	**	-0.01		-3.74		-2.76	***
Q10_PSunder	0.47		0.96		0.19		6.94		1.19	
Q10_PSyrELL	0.3		0.62		-0.1		5.57	**	-0.08	
Q10_PSyrFRL	3.25	*	0.38		0.13		0.43		0.05	
Q10_PSyrun~r	-0.28		-0.31		0.09		-4.02	*	0.07	
Push in by Cluster group interactions										
PSbyCGELL	7.99		0.25		-0.72		12.22		-0.66	
PSbyCGFRL	16	**	2.56	*	-0.14		4.2		2.34	*
PSbyCGunder	-4.42		-0.64		-0.24		-9.71		-1.12	
PSbyCGyrELL	-1.53		0.02		0.2		-4.76	*	0.24	
PSbyCGyrFRL	-1.94		-0.54		-0.1		0.06		0.23	
PSbyCGyrun~r	2.7		0.23		-0.22		5.37	**	0.16	
_cons	480.2	***	211.05	***	441.33	***	575	***	209.8	***
lns1_1_1	2.46	***	0.77	***	0.23	*	2.25	***	0.55	**
lns2_1_1	2.95	***	1.54	***	0.31	***	2.65	***	1.41	***
lns3_1_1	4.07	***	2.75	***	1.89	***	3.97	***	2.72	***
lnsig_e	3.39	***	2.29	***	1.43	***	3.4	***	2.19	***
N	45751		146889		154307		45695		146889	