COE Research Conversation Fall 2023

Large-Scale Assessment and Survey Data in Education: Challenges and Opportunities

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Presentation based on:

- Dai, S., & Higheagle Strong, Z. (2021). Educational applications using large-scale assessment and survey data: Opportunities and challenges. In U. Luhanga & G. Allen (Ed.), Basic elements of survey research in education: Addressing the problems your advisor never told you about (pp. 747-776). North Carolina. Information Age Publishing.
- Dai, S., Hao, T., Ardasheva, Y., Ramazan, O., Danielson, R., & Austin, B. (2023). PISA reading achievement: Identifying predictors and examining model generalizability for multilingual students. *Reading and Writing*.
- Ramazan, O., Dai, S., Danielson, R., Ardasheva, Hao, T., & Y. Austin, B., (2023). Students' 2018 PISA reading self-concept: Identifying predictors and examining model generalizability for emergent bilinguals. *Journal of School Psychology*.
- Kangas, S., Dai, S., & Ardasheva, Y. (accepted). Progress of English learners with disabilities on NAEP reading. *The Journal of Special Education*.
- Ramazan, O., Danielson, R. W., Rougee, A., Ardasheva, Y., & Austin, B. W. (2023). Effects of classroom and school climate on language minority students' PISA mathematics self-concept and achievement scores. *Large-scale Assessments in Education*, 11(1), 11.



Examples of Large-Scale Surveys

International large-scale surveys

- late 1950s International Association for the Evaluation of Education Achievement (<u>IEA</u>)
 - Trends in International Mathematics and Sciences Study (TIMSS)
 - Progress in International Reading Literacy Study (PIRLS)
 - International Computer and Information Literacy Study (ICILS)
 - International Civic and Citizenship Education Study (ICCS)
 - <u>Responses to Educational Disruption Survey (REDS)</u>
- OECD Product
 - Program for International Student Assessment (PISA)
 - <u>Teaching and Learning International Survey (TALIS)</u>

➤ U.S. large-scale surveys

- 1960s <u>National Assessment of Educational Progress (NAEP)</u>
- High School Longitudinal Study (HSLS:09)
- Youth Risk Behavior Surveillance System (YRBSS)

U.S. & international surveys

- 1980s TIMSS, PISA, PIRLS, TALIS, ICILS
- National Center for Education Statistics (NCES)

Opportunities for Grad Students and Faculty

AERA Dissertation Grant & <u>AERA Research Grant</u>

- The Grants Program is open to field-initiated research and welcomes proposals that:
 - 1. develop or benefit from advanced statistical or innovative quantitative methods or measures;
 - 2. analyze more than one large-scale national or international federally funded data set, or more than one statewide longitudinal data system (SLDS) or incorporate other data enhancements;
 - 3. integrate, link, or blend multiple large-scale data sources; or
 - 4. undertake replication research of major findings or major studies using large-scale, federally supported or enhanced data.



Ea	rly Childhood
Example of Funded Discortations	ngitudinal Program
LAAIIPIC OI I UIIUCU DISSCILATIOIIS Baccalaureate and Beyon	nd
Longitudinal Study	
How college affects students: Toward the reconciliation of theory with empirical	
evidence	B&B
An exploratory investigation of internalizing problem behavior among children from	↓ ↓
kindergarten to third grade	ECLS-K
Does school matter for the low SES student? Investigating the causal effects of school	
context on college enrollment	ELS
The effects of ability grouping on mathematics achievement: A hierarchical modeling	
approach with balanced comparison groups	LSAY
The stringency of the NCLB accountability standards, incentives and performance:	*
Multilevel analysis of NAEP data	NAEP
Investigating the causal effects of student mobility on negative academic outcomes: Who)
is disproportionately affected by transferring during high school?	NELS
A longitudinal study of the educational attainment process: Examining the effects of	/
environmental and social stressors on students' educational trajectory	NELS:88
School factors affecting postsecondary career pursuits of high-achieving girls in math/an	d
science Abstract	NELS:88
The Role of Reading Comprehension in Large-Scale Subject-Matter Assessments	TIMSS-99
Parental involvement in 34 nations: A comparative study from the TIMSS 1999	
data Abstract	TIMSS-99
Et al. I. I. State I and the Longitudinal State of American Wards National Education	
Education Longitudinal Study Longitudinal Study of American Youth	5

Longitudinal Study

Training Opportunities and workshops

Training and Workshops

- NAEP data training workshops (for both students and faculty)
- PhD internships,
 - Application Deadline: usually Feb 15
- Post-doctorate appointments, and
- Cooperative agreements.

http://naep-research.airprojects.org/

get PLUGGED IN WITH NAEP R&D-

Apply Now: HSTS Data Training Workshop

04-14-2023

Learn to use EdSurvey to analyze data from the 2019 NAEP High School Transcript Study (HSTS) data. Applications will be accepted until **May 14**. Learn more and apply <u>here</u>.

EdSurvey e-book now available!

Common Designs of LSAS

[Every 2-4 years]

Cognitive Assessment in multiple subject domains

 Math, science, reading, writing, arts, civics, geography economics, history, Technology & Engineering Literacy (TEL), Collaborative Problem Solving -PISA 2015

Context questionnaires

- o TIMSS: student, home, teacher, school, curriculum
- <u>NAEP</u>: student, teacher, school, etc.

> Other

Paper-based, computer-based, digital/tablet-based



Home, school, teacher, student, curriculum

- School questionnaire
 - Administered to school principals
 - 4th & 8th Grades
 - Domains
 - level of students' literacy and numeracy skills when they first enter the school,
 - \checkmark the availability of instructional resources,
 - \checkmark the socioeconomic background of the students attending the school,
 - the school's emphasis on academic success, the need for discipline, and the principals' education.

≻Home, school, **teacher,** student, curriculum

➤ Teacher questionnaire

- Administered to student teachers
- Single form at 4th Grade assuming the same teachers taught both math and science; but separate versions for math and science at 8th grade.

Domains

- ✓ the teachers' education, professional development, and career satisfaction as well as about students' readiness for instruction,
- the frequency they do various instructional activities, difficulties in providing instruction, curriculum topics covered, assessment practices, and availability of computers for instruction.

Home, school, teacher, student, curriculum

Student questionnaire

- Both 4th and 8th grades
- Separate versions of science (as a single subject or separate subjects such as earth science, physics) at 8th grade in some countries
- Administered together with cognitive assessments
- Domains
 - educational experiences at home and school related to learning mathematics and science,
 - \checkmark attitudes toward learning mathematics and science
 - [extra for eTIMSS]: experience taking the eTIMSS assessment and their familiarity with digital devices.



>Home, school, teacher, student, curriculum

Student questionnaire

MS	2									
He	ow much do you agree with th arning mathematics?	ese statei	ments ab	out		A. D	id you like that this te	st was on a com	puter or	tablet?
		Fill one ci	rcle for each	ı line.		\bigcirc	l liked it a lot	e	>	
		Agree a lot	Agree a little	Disagree a little	Disagı a lot	\bigcirc	l liked it a little			
a)	I enjoy learning mathematics	- 0	- O	- O	-0	\bigcirc	l didn't like it very much	(•	
b)	I wish I did not have to study mathematics	- 0	0	0	-0	\bigcirc	l didn't like it at all		••••••	
c)	Mathematics is boring	- ()	-0	-0	-0					
d)	I learn many interesting things in mathematics	- 0	0	0	-0	B. c	oid you have any of the	se difficulties?		
e)	I like mathematics	- ()	-0	-0				Click one circle	e for each ro	ow.
f)	I like any schoolwork that			0				Yes	No	
	involves numbers	- ()	0	0	-0	a)	lt was hard to type	\bigcirc	\bigcirc	



TIMSS Longitudinal Study 2023-2024

https://timssandpirls.bc.edu/timss2023/longitudinal-study.html

IEA's TIMSS continues to drive innovation in international comparative assessments of student achievement in mathematics and science by offering the TIMSS 2023 Longitudinal Study, an optional extension of TIMSS 2023 that explores student learning gains over one year of schooling. Countries participating in the TIMSS 2023 Longitudinal Study will re-assess their original sample of TIMSS 2023 students for the second time in 2024, creating two data points of student achievement. The TIMSS 2023 Longitudinal Study will provide the same group-level achievement data as TIMSS 2023 and allow a closer look into individual learning gains over time. This exciting new design expands the range of research questions that can be answered using TIMSS data and promises new insights that education policymakers and researchers worldwide can use to strengthen education systems.



Dai et al. (2023)

Reading and Writing https://doi.org/10.1007/s11145-022-10357-4



PISA reading achievement: identifying predictors and examining model generalizability for multilingual students

Shenghai Dai¹ · Tao Hao² · Yuliya Ardasheva³ · Onur Ramazan⁴ · Robert William Danielson⁵ · Bruce Austin⁶

Abstract

Reading research in the United States has mainly focused on early or, less frequently, middle grades and on monolingual (MN or English-only) rather than on multilingual (ML) students. To address these gaps, we focused on factors contributing to high school ML students' reading achievement. In particular, we first used machine learning to identify predictors of high school students' reading achievement on PISA 2018. We then conducted multilevel modeling on the entire sample (baseline model) and tested the model's generalizability to ML and MN populations. Results suggest that ML students would benefit from instruction focused on enhancing their reading self-efficacy and increased learning opportunities for extracurricular reading activities. The results also suggest that students, especially ML students, would benefit from schools avoiding grade retention policies and focusing on minimizing truancy and supporting positive peer and teacher relationships. Limitations of the study and future directions are discussed.

Dai et al. (2023) - Background

English learners (Multilingual learners)

- Fastest growing school-aged U.S. population both in size and percentage
- Culturally diverse speak over 400 different languages

➤Reading literacy

- Fundamental for student achievement across content areas, especially for English learners (ELs)
- Critical to economic growth and public health
- Impacted by a host of student-, classroom-, and schoollevel characteristics

≻Need for research

 There is a pressing need to uncover the underlying impacts of multiple, nested systems on improving reading literacy for students, especially ELs.



Dai et al. (2023) - RQs

- 1. What predictors of reading achievement are most salient at the student, teacher, and school levels?
- 2. What are the **relative contributions of the most salient** student-, teacher-, and school-level constructs to students' reading achievement?
- 3. What are the **relative contributions** of the most salient student-, teacher-, and school-level constructs to students' reading achievement **disaggregated by language status**?



Dai et al. (2023) - **Data**

- Programme for International Student Assessment (PISA)
 - U.S. 2018 reading assessment data
 - 4838 students, 3526 teachers, and 164 schools

➤Variables

- Outcome: Overall reading performance (20 sets of plausible values)
- **Predictors**: a total number of 1482 variables
 - Student level 943
 - Teacher level 347
 - o School level − 192



Dai et al. (2023) - Methods

- 1. What predictors of reading achievement are most salient at the student, teacher, and school levels?
 - Step 1: Variable selection
 - Statistical evidence: Machine learning variable selection (Elastic Net analysis)
 - Theoretical and literature support expert panel
 - Variable preparation generating composites (CFA & PCA)
- 2. What are the relative contributions of the most salient student-, teacher-, and school-level constructs to students' reading achievement?
 > Step 2: Multilevel modeling: General model for the entire sample
- 3. What are the relative contributions of the most salient student-, teacher-, and school-level constructs to students' reading achievement disaggregated by language status?
 > Step 3: Multilevel modeling for ELs and native speakers



Dai et al. (2023) - Steps

> Step 0: Data management and preparation

- Merging datasets from different levels
 - Issues: students nested within schools but not teachers
- Missing data
 - Different coding: omitted, no reached, multiple, etc.
 - Proportions: 0% ~ 100%.

> Step 1: Variable selection

- Elastic Net analysis (in R)
 - Missing data imputation
 - Analysis for each of the 20 sets of plausible values
 - Compiling 20 sets of results (i.e., 20 lists of ranked variables)
- Expert panel discussion
 - One final list of variable
- Combining variables (variable composites with CFA & PCA using both SPSS and Mplus)
 - One final final list of variables for MLM
- > Step 2: Multilevel modeling using the entire sample
 - Missing data imputation (again, using R)
 - Hierarchical by entering variables at student, teacher, and school variable (using R)
 - Null model, random intercept, random slope models
 - MLM using each plausible value, resulting in 20 sets of results
 - Combining 20 sets of the results using multiple imputation
- > Step 3: Multilevel modeling for ELs and native speakers
 - Same as step 2



Dai et al. (2023) - Results

Table 5

Model Parameter Estimates with the Entire Student Sample (N = 4838)

	C.	Mode	Model 1 Model 2						Model 3			
	Stu	dent Pr	edictor	S	Student	& Teach	her Pred	ictors		Full Mo	del	
Variable	b	SE	β	р	Est	SE	β	р	Est	SE	β	р
Fixed Parameters	501.04	2.01	0.00	< 0.0.1	501 10	2.00	0.01	< 0.01	501 41	2 50	0.01	< 0.01
Intercept	501.06	3.91	0.00	<.001	501.19	3.89	0.01	<.001	501.41	3.58	0.01	<.001
Student-Level Predictors	12.10	1 22	0.11	< 0.01	12.20	1 22	0.11	< 0.01	12.20	1 22	0.11	< 0.01
Ellori# Words Understood	12.19	1.22	0.11	~.001 0.25	12.20	1.22	0.11	~.001 0.35	12.20	1.22	0.11	~.001 0.35
ISCED L aval	22.64	5.42	0.01	- 001	22.62	5.42	0.01	0.55 < 001	22.64	5.43	0.01	0.35 < 001
Grada Banatitian	26.22	3.43	0.09	< 0.01	26.24	3.43	0.09	<.001	26.22	3.43	0.09	<.001
Musical Instrument	-20.33	4.75	-0.07	<.001	-20.34	4.75	-0.07	<.001	-20.55	4.75	-0.07	~.001
Paole at Home	10.02	1.00	0.07	<.001	10.02	1.00	0.07	<.001	10.02	1.00	0.07	<.001
Digital A ffordance*	26.22	1 49	0.15	<.001	26.22	1.49	0.13	<.001	10.34	0.90	0.15	<.001
Mataganitian*	20.23	1.40	0.21	<.001	20.23	1.40	0.21	<.001	20.23	1.40	0.21	<.001
Self Efficacy#	15 57	1.40	0.20	< 001	15 57	1.40	0.20	< 001	15 57	1.40	0.20	< 001
Peer Interaction#	15.37	1.24	0.14	< 001	15.57	1.24	0.14	< 001	15.37	1.24	0.14	< 0.01
Perceptions of Instructional	13.27	1.20	0.14	001	13.27	1.20	0.14	~001	13.27	1.20	0.14	001
Support#	4 22	1 24	0.04	< 001	4 21	1.24	0.04	< 001	4 22	1 24	0.04	< 001
Teacher-Level Predictors	4.22	1.24	0.04	001	4.21	1.24	0.04	~001	4.22	1.24	0.04	001
Initial Training*	/	/		/	8.92	7.00	0.07	0.20	7 73	6.63	0.06	0.24
Training Relevance*	,	,		<i>'</i> ,	_0.72	9.44	0.00	0.20	1.45	8.95	0.00	0.24
Teaching Experience*	,	,		1	-4.00	2.90	-0.05	0.17	_3.25	2 71	-0.04	0.23
Teacher Belief	,	,		1	-17.51	12.35	-0.05	0.17	-25.40	12.00	-0.07	0.03
Teaching Strategy#	,	,		1	-17.51	5 37	-0.05	0.10	-1.28	5 14	-0.01	0.80
Reading Habit#	,	,		1	-7.37	4 18	-0.07	0.57	-0.95	3 95	-0.01	0.81
Ich Satisfaction*	,	,		1	4 39	4.10	0.02	0.35	2.90	4 52	0.02	0.52
School-Level Predictors	'	1		1	4.57	4.00	0.05	0.55	2.90	4.52	0.02	0.52
School Type												
(0=Private 1=Public)	/	/		/	/	/		/	-14 17	19 50	-0.02	0.47
(o Thrute, T Tuble) Enrollment*	,	,		,	,			,	-0.08	0.15	-0.02	0.61
School Resources*	,	,		,				/	-1.41	3.82	-0.01	0.71
Student Truancy	/	/		/	/	/		/	-24.64	4.67	-0.19	<.001
Extracuricular Literacy*	/	/		/	/	/		/	-1.23	1.00	-0.04	0.22
Discuss Prograss with Perents (%)	,	,							0.11	0.15	0.02	0.47
Lise of A seasoment*	,	,		1	,	,		1	0.11	1.01	0.03	0.47
Computer WWW Connection	,	1		1	/	,		1	0.08	0.01	0.02	0.30
Use of Digital Devices*	,	,		,	1	',		,	3 13	4.16	0.04	0.31
Career Guidance Pesponsibility	/	/		1	1	'		1	-5.15	4.10	-0.05	0.45
(0=Not Checked, 1=Checked)	/	/		/	/	/		/	4.11	24.06	0.01	0.86
Variance Components	,	1		1	1	,		1	4.11	24.00	0.01	0.00
School (between)	2240 3	44			2213.8	38			1829.9	177		
Student (within)	5466 ()48			5465 5	98			5466.4	05		
Model Fit	2 10010	. 10			0 10010	,0			0.0011	02		
ICC	0.29				0.29				0.25			
Likelihood Ratio Test	F(11, 479)	= 221	.972. n	<.001	F (7, 18930	(0) = 1.3	25, p = 0	0.233	F (10, 208	400) = 3	.755. n	<.001
L1 R Square	0.44	,	, p		0.44	.)	.,r		0.44	, .	,p	
L2 R Square	١				1				0.11			

Note. ICC = intraclass corrrelation, β = Standardized coefficients.



Dai et al. (2023) - Results

Full Model Parameter Estimates (M	lultiling	ual vs. 1	Monol	ingual	Students))						
	1	Multilin	gual S	tudents	(N = 736	5)	1	Monolii	ngual S	Students	(N = 4054))
Variable	Est	SE	β	t	df	р	Est	SE	β	t	df	р
Fixed Parameters												
Intercept	484.53	5.68	0.04	85.29	796	<.001	505.79	3.54	0.01	142.84	21658	<.001
Student-Level Predictors												
Effort	11.26	3.18	0.12	3.54	322	<.001	10.67	1.39	0.10	7.70	345	<.001
Words Understood	-2.40	4.48	-0.02	-0.54	541	0.59	2.36	1.66	0.02	1.42	666	0.16
ISCED Level	-8.70	13.97	-0.02	-0.62	505	0.53	38.53	6.14	0.10	6.28	156	<.001
Grade Repetition	-42.54	12.05	-0.14	-3.53	440	<.001	-25.03	5.18	-0.07	-4.83	3227	<.001
Musical Instrument	8.76	3.37	0.09	2.60	280	<.001	6.42	1.15	0.07	5.57	1249	<.001
Books at Home	12.80	3.31	0.14	3.87	279	<.001	10.07	1.05	0.13	9.58	535	<.001
Digital Affordance	24.78	4.08	0.20	6.08	1318	<.001	26.10	1.65	0.21	15.85	390	<.001
Metacognition	33.96	4.01	0.28	8.47	1927	<.001	33.48	1.58	0.28	21.24	522	<.001
Self Efficacy	20.63	3.28	0.20	6.28	2975	<.001	15.74	1.34	0.15	11.73	1055	<.001
Peer Interaction#	21.55	3.80	0.19	5.67	1208	<.001	15.26	1.34	0.14	11.39	299	<.001
Perceptions of Instructional												
Support	5.11	3.62	0.05	1.41	315	0.16	4.13	1.32	0.04	3.13	319	<.001
Teacher-Level Predictors												
Initial Training	-1.68	10.38	-0.01	-0.16	4407	0.87	7.58	6.64	0.06	1.14	56130	0.25
Training Relevance	6.94	14.91	0.04	0.47	2810	0.64	5.61	9.06	0.04	0.62	37715	0.54
Teaching Experience	-6.63	4.37	-0.08	-1.52	856	0.13	-3.03	2.78	-0.04	-1.09	23500	0.28
Teacher Belief	1.32	20.17	0.00	0.07	5016	0.95	-28.70	11.87	-0.08	-2.42	28257	0.02
Teaching Strategy	8.71	7.29	0.08	1.19	2429	0.23	-3.13	5.42	-0.02	-0.58	414915	0.56
Reading Habit	-9.89	6.72	-0.09	-1.47	6714	0.14	-1.87	4.01	-0.02	-0.47	356220	0.64
Job Satisfaction	-6.24	7.71	-0.05	-0.81	2423	0.42	2.42	4.43	0.02	0.55	17045	0.58
School-Level Predictors												
School Type (0=Private, 1=Public)	-25.22	28.79	-0.05	-0.88	8302	0.38	-12.59	19.37	-0.02	-0.65	5031	0.52
Enrollment	-0.03	0.23	-0.01	-0.14	1226	0.89	0.02	0.15	0.01	0.15	11980	0.88
School Resources	1.99	6.07	0.02	0.33	14700	0.74	-4.97	4.05	-0.05	-1.23	77545	0.22
Student Truancy	-25.28	8.07	-0.17	-3.13	717	<.001	-23.08	4.46	-0.20	-5.18	15874	<.001
Extracuricular Literacy	3.24	1.56	0.10	2.08	8222	0.04	-1.03	0.95	-0.04	-1.09	24585	0.28
Discuss Progress with Parents (%)	0.20	0.25	0.05	0.78	3137	0.44	0.02	0.15	0.00	0.13	35996	0.89
Use of Assessment	1.13	1.61	0.04	0.70	1727	0.48	-0.03	1.04	0.00	-0.03	19270	0.97
Computer WWW Connection	0.00	0.01	0.01	0.20	186746	0.84	0.01	0.01	0.03	0.93	11608	0.35
Use of Digital Devices	0.75	6.36	0.01	0.12	3579	0.91	-0.91	4.06	-0.01	-0.22	11462	0.82
Career Guidance Responsibility												
(0=Not Checked, 1=Checked)	10.72	29.22	0.02	0.37	2240	0.71	36.35	23.17	0.06	1.57	8244	0.12
Variance Components												
School (between)	1963.9						1727.0					
Student (within)	5532.3						5356.6					
Model Fit												
ICC	0.26						0.24					

F(10, 193481) = 4.85, p < .001

0.44

0.19

Note. ICC = intraclass corrrelation, β = Standardized coefficients.

F(10, 761) = 1.851, p = 0.049

0.44

\

Likelihood Ratio Test

L1 R Square

L2 R Square



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Students' 2018 PISA reading self-concept: Identifying predictors and examining model generalizability for emergent bilinguals

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Challenges

>...

- Complex sampling design: sampling weights that need to be considered to ensure the data is representative
- >Multiple sets of **plausible values** used as proxies of student outcome
 - Need to conduct analysis using all PVs and then combining results using multiple imputation
- Hierarchical data structure multilevel models
- > Different types and proportions of **missing data**
- Specialized techniques and software tools (usually not part of the curricula of most educational graduate and certificate programs)
- Some may need a restricted data license

Software Availability

>Online interactive tools

- Online-based interactive tools that make it possible for users to run their analysis without downloading and managing the data
 - o International Data Explorer (IDE) PISA, PIRLS, TIMSS, PIAAC, and TALIS
 - NAEP Data Explorer (NDE)
 - o NCES Data Lab HSLS, NTPS, SASS, etc.
- Common statistical methods, including descriptive statistics such as mean, charts, significance test, gap analysis, and linear regression analysis.

>Other software

- IES IDB Analyzer (current version 4.0) Dependent on SAS or SPSS
- AM software
- R package EdSurvey
- SPSS, SAS, Mplus, etc.





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RESEARCH

Large-scale Assessments in Education

Open Access



Effects of classroom and school climate on language minority students' PISA mathematics self-concept and achievement scores

Onur Ramazan^{1*}, Robert William Danielson², Annick Rougee³, Yuliya Ardasheva³ and Bruce W. Austin¹



 Table 1
 School and Classroom Climate Contributions to Mathematics Self-Concept: Hierarchical

 Regression Model Results in the Aggregated Sample

Variables	Model 1: P	PMCE	Model 2: Pl	MCE+CMCE	Model 3: P	PMCE + CMCE + SLF
	β	Std. 95% Cl	β	95% Cl	β	95% Cl
MTCM	0.175***	0.126, 0.224	0.108***	0.057, 0.159	0.095***	0.044, 0.146
MTS	0.039	- 0.014, 0.092	- 0.007	- 0.060, 0.046	- 0.029	- 0.084, 0.026
CAML	0.116***	0.067, 0.165	0.088**	0.035, 0.141	0.072**	0.017, 0.127
DC			0.096***	0.053, 0.139	0.087*	0.042, 0.132
TS			0.470***	0.098, 0.196	0.121***	0.072, 0.170
SBS					0.064**	0.017, 0.111
TSR					0.077**	0.020, 0.134
Total R ²	0.074***		0.098***		0.111***	
ΔR^2	0.074***		0.024***		0.013***	
f ²	0.080		0.027		0.015	

MTCM = Mathematics Teacher's Classroom Management, MTS = Mathematics Teacher's Support, CAML = Cognitive Activation in Mathematics Lessons, DC = Disciplinary Climate, TS = Teacher Support, SBS = Sense of Belonging to School, TSR = Teacher Student Relations. PMCE = Perceived Prior mathematics classroom experience, CMCE = Perceived Current mathematics classroom experience, SLF = Perceived School-level factors

N = 3144. *p < 0.05, **p < 0.01, ***p < 0.001. β = standardized regression coefficient. f² = Cohen's f² for effect size

Analysis with IDB Analyzer

1. Select data file & Define survey context

Analysis File: E:\GoogleDrive_Teaching\Ed-Psych Seminar\WSU ED PSYCH Sharing Folder\Talks and Presentations\Dai, Shenghai_Intro to Large-Scale Surveys_2019\Data & Analysis\US2015TIMSSG8_bookchapter_201902.sav

2. Define Analysis type and others

Analysis Type:	Statistic Type:	Plausible Value Option:	Missing Data Option:	Number of Decimals:
TIMSS (Using Student Weights)	 Linear Regression 	✓ Use PVs ✓	Listwise ~	2 ~
2 0 1 / 1 1	(♠) Grouping Variables:	lysis		
3. Select Variables	Name I Ø IDCNTRY	Description *COUNTRY ID*	\$	
	Independent Variables: Concerning Marinelau			
	Name	Description Contrast Num	nber of Ca Reference C	
	Continuous Variables:	*SEX OF STUDENTS* Dummy Coding 2	1	
	Name	Description *STUDENTS LIKE LEARNING MATHEMATICS/SCL*		
	Plausible Values:			
	Name	Description		
	Dependent Variable: O Non Plausible Value Plausible Values:	lausible Values		
	Name	Description 1ST TO 5TH PLAUSIBLE VALUE MATHEMATICS*		
	Weight Variable:			
	Name [Description		

4. Generate SPSS syntax and run

Output Files: E:\GoogleDrive_Teaching\Ed-Psych Seminar\WSU ED PSYCH Sharing Folder\Talks and Presentations\Dai, Shenghai_Intro to Large-Scale
 Surveys_2019\Data & Analysis\SPSS_Syntax.*



Start SPSS



Select





- \leftrightarrow EL with SD \cdots \Box \cdots EL & Not SD - Δ - SD & Not EL - \times - Neither EL nor SD - \times \cdot Former EL with SD - O - Former EL & Not SD Note. EL = English Learners; SD = Student with Disabilities; Former EL = Students who tested out of language services; Two category EL status: 1) Not EL and 2) EL; Three category EL status: 1) Not EL, 2) EL, and 3) Former EL.

Table S4

Regressio	n Results	with SD a	nd EL (Two (Categor	ies) Predic	ting NAEF	P Reading (2009) - 2019)						
Crada	Vaar		Mode	el Sumn	nary				Reg	ression C	Coefficient	s		
Giade	1641	R^2	F	dfl	df2	р	Intercept	SE	Not SD	SE	р	Not ELL	SE	р
	2019	0.22	2566.68	2	18452	<.001	155.35	0.83	41.98	0.68	<.001	32.75	0.70	<.001
	2017	0.22	2213.62	2	16080	<.001	154.70	0.89	39.77	0.55	<.001	36.43	0.84	<.001
G4	2015	0.23	1366.92	2	9276	<.001	153.90	1.28	40.42	0.68	<.001	37.13	1.04	<.001
04	2013	0.22	2385.30	2	16785	<.001	150.39	0.76	41.72	0.55	<.001	38.03	0.73	<.001
	2011	0.20	1873.09	2	15270	<.001	154.00	0.86	38.55	0.56	<.001	36.20	0.79	<.001
	2009	0.16	1638.40	2	16813	<.001	156.15	1.05	34.81	0.67	<.001	36.39	0.79	<.001
	2019	0.20	2345.53	2	18304	<.001	190.38	0.98	37.82	0.55	<.001	42.78	0.89	<.001
	2017	0.20	1964.95	2	15778	<.001	195.79	0.91	37.39	0.55	<.001	40.34	0.84	<.001
G8	2015	0.21	2548.91	2	18779	<.001	191.73	0.94	38.58	0.62	<.001	42.03	0.87	<.001
00	2013	0.19	2202.89	2	18638	<.001	193.76	0.93	38.07	0.55	<.001	41.80	0.90	<.001
	2011	0.18	2297.98	2	21438	<.001	192.28	1.12	36.74	0.48	<.001	41.78	0.97	<.001
	2009	0.18	1870.33	2	17301	<.001	187.64	1.24	36.45	0.56	<.001	45.42	0.98	<.001

Note. EL = English Learners, SD = Student with Disabilities, two category EL status: 1) Not EL and 2) EL. Both variables SD and ELL were dummy coded in the regression analyses. SD = Yes and EL = Yes were treated as the reference groups, respectively.

<u>https://www.nationsreportcard.gov/ndecore/landing</u>





National

National

National

Reading,	Grade 4, Stu		HIDE REPORT DATA						
EDIT CRITER	ІА 📝 СОРУ	REPORT ANI			REN	AME 🥓	SAVE 🗁 DE		SHARE REPORT
SELECTED NAEP (Natio Reading, Gra Framework Scale Jurisdiction Variables Statistic	CRITERIA nal Assessment ade 4, 2009, 201 c: 1992 Reading c: Composite sc c: National c: National c: Student disat c: Average scale	of Educatior 1, 2013, 2019 ale bility or Engli e scores, Pere elow to build	nal Progress) 5, 2017, 2019 sh learner statu centages I reports.	ıs [SDELL]					
View Data	Table Crea	te Chart	Create Signi	ficance Tes	t Create G	Gap Analys	is Run Re	gression A	nalysis
DATA TAB	LE 1						RENAM	E 🥓 EDIT	TABLE LAYOUT
SHOW D	DATA CATEGORIZ	ED AS MISSIN	ADD	SIGNIFIC	ANCE TEST]			
Average s 2017, 201	cale scores and 5, 2013, 2011, ar	percentages nd 2009	for grade 4 read	ing, by stude	nt disability or l	English lear	ner status [SDEl	L] and juris	diction: 2019,
		Student	vith disability (SD)	English learr	language er (ELL)	Both :	SD and ELL	Neithe	r SD nor ELL
Year	Jurisdiction	Average scale score	Percentage	Average scale score	Percentage	Average scale score	Percentage	Average scale score	Percentage
2019	National	187	12	196	10	161	2	230	76



Resources

- College Results Online: <u>http://www.collegeresults.org</u>
- Common Core of Data (CCD): <u>https://nces.ed.gov/ccd/index.asp</u>
- Ed Data Express: <u>https://eddataexpress.ed.gov/index.cfm</u>
- International Activities Program (IAP): <u>https://nces.ed.gov/surveys/international</u>
- International Association for the Evaluation of Educational Achievement (IEA): <u>https://www.iea.nl</u>
- Integrated Postsecondary Education Data System (IPEDS): <u>https://nces.ed.gov/ipeds</u>
- National Assessment for Educational Progress (NAEP): <u>https://nces.ed.gov/nationsreportcard</u>
- National Center for Education Statistics (NCES): <u>https://nces.ed.gov</u>
- National Indian Education Study (NIES): <u>https://nces.ed.gov/nationsreportcard/nies</u>
- Program for the International Assessment of Adult Competencies (PIAAC): <u>https://nces.ed.gov/surveys/piaac</u>
- Programme for International Student Assessment (PISA): <u>http://www.oecd.org/pisa</u>
- Progress in International Reading Literacy Study (PIRLS): <u>https://timssandpirls.bc.edu</u>
- Teaching and Learning International Survey (TALIS): <u>http://www.oecd.org/education/talis</u>
- Trends in International Mathematics and Science Study (TIMSS): <u>https://timssandpirls.bc.edu</u>

Resources

Introductory Readings to Large-Scale Surveys

- Beaton, A., Rogers, A., Gonzalez, E., Hanly, M., Kolstad, A., Rust, K., ... Jia, Y. (2011). *The NAEP Primer*. National Center for Education Statistics.
- Rutkowski, L., von Davier, M., & Rutkowski, D. (Eds.). (2013). Handbook of international large-scale assessment: Background, technical issues, and methods of data analysis. CRC Press.
- Walter, M., & Andersen, Chris. (2013). *Indigenous statistics : A quantitative research methodology*. Walnut Creek, CA: Left Coast Press.

Workshops and Trainings

- NAEP Research and Development Program: <u>http://naep-research.airprojects.org</u>
- NCES Cooperative System Fellows Program: <u>https://ies.ed.gov/whatsnew/conferences/?id=184&cid=2</u>



Equipping Your Quant Skills - Courses

Measurement & Psychometrics





Equipping Your Quant Skills - Courses

≻Quant Methods



WSU COE Certificates

- <u>Graduate Certificate in Applied Educational Research</u>
 <u>Methods</u>
- <u>Graduate Certificate in Applied Measurement and</u> <u>Quantitative Methods</u>

Equipping Your Quant Skills – Training and Workshops

>APA Science Training Sessions

https://www.apa.org/science/programs/training-sessions

>AERA Virtual Research Learning Center

https://aera.elevate.commpartners.com/

>AERA PEERS Research Methods Series

https://www.aera.net/Professional-Opportunities-Funding/Professional-Development-

Courses/PEERS-Research-Methods-Series

ICPSR Sources

https://www.icpsr.umich.edu/web/pages/instructors/student-resources.html



Resources – Websites & Podcasts



Thank you! Welcome to the wonderful world of Large-scale assessment and surveys!



