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THE GOVERNOR JOHN ENGLER
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Quality Instruction Matters: The Connection Between Student Engagement Antecedents and Assessment Outcomes



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Introduction

- » School evaluation, especially in the charter school space, has extended beyond standardized state assessments to include additional measures such as the learning environment and levels of student engagement.
- » These qualitative measures are not usually connected to more quantitative outcomes.
- » This current study provides an opportunity to explore the connection between academic achievement and growth and other classroom-level qualitative indicators of success.



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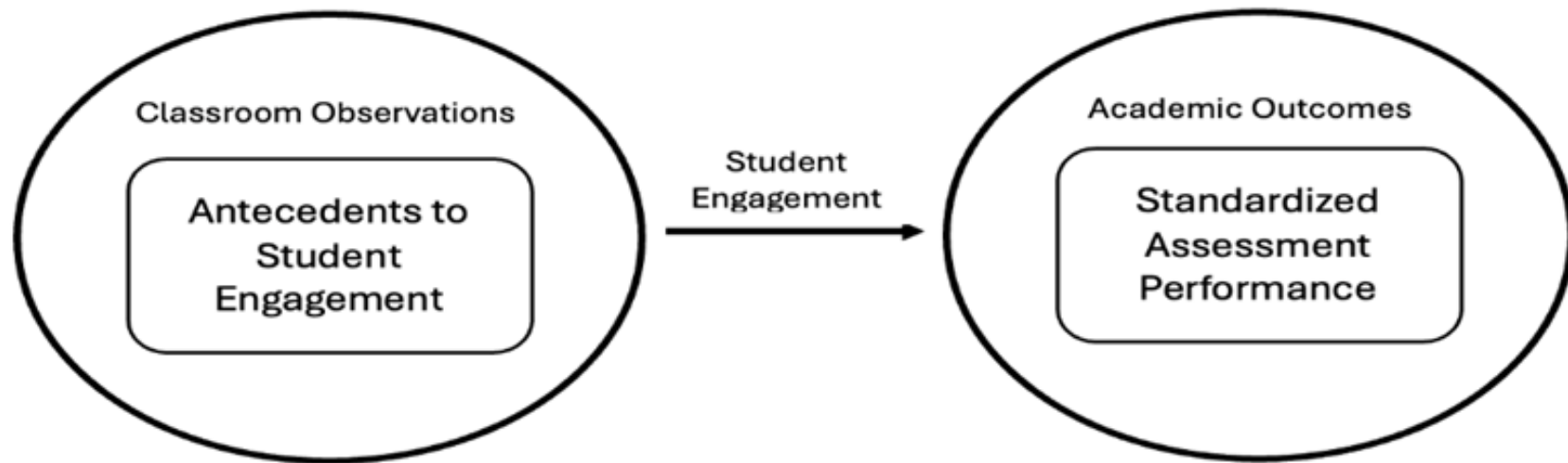
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Research Questions

- » Is there a relationship between the Antecedents to Student Engagement, as measured by the EPR Classroom Observation Protocol, and NWEA MAP achievement and growth?
- » Are there a set of specific indicators or groups of indicators with more significance?
- » Does higher ratings on the EPR Classroom Observation Protocol have any mediating effects on Socio-Economic Status?



Conceptual Framework



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Student Engagement

- » Engagement comprises three distinct types (Irvine, 2020; Maamin et al., 2022):
 - Emotional engagement refers to students' reactions to other students and adults that lead to responses such as boredom, happiness, or anxiety.
 - Cognitive engagement is a student's investment in learning complex ideas and concepts (Fredricks et al., 2004; Lei et al., 2018).
 - Behavioral engagement is the level to which students participate in learning activities and the effort put forth while learning.
- » If educators pay attention to specific strategies for engagement, student attitudes toward instruction will improve, leading to better educational outcomes (Irvine, 2020).
- » A student's time engaged academically strongly predicts academic achievement (Gettinger & Walter, 2012).
- » Students must actively engage in the classroom setting to see achievement results (Guo et al., 2011).



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School Level Variables

» Classroom Observations

- Represented 21 schools
- Median number of classes observed in each school = 26.
- Each observations lasted 20-50 minutes
- Emphasis on English Language Arts and Math
- Trained observers used a prescribed rubric like the Danielson Framework for Teaching and the Marzano Teacher Evaluation Model

» Principal Component Analysis

- Identified two main variable: Learning Environment and subset we named “Antecedent to Student Engagement”



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Antecedents to Student Engagement

Instructional design is important to engagement categorized by using a variety of teaching methods and matching instruction to student ability levels. (Gettinger & Walter, 2012).

Engagement is increased by using interactive teaching, facilitating active student responses, and providing frequent feedback. Instructional design, including research-based teaching methods and matching instruction to student ability, also promotes engagement (Danielson, 2022; Hattie, 1992; Marzano, 2011).



Antecedents to Student Engagement

Student Centered	Active Learners	Pace	Prior Knowledge to the Real World	Academic Questions	Academic Discussions	Interventions and Supports	Scaffolding
Observed instruction was primarily student-centered, with opportunities for students to demonstrate learning.	The teacher provides opportunities for students to discuss content, collaborate with other students, or reflect on their own learning.	The observer judged that the pace of the lesson was appropriate for student learning.	The teacher must consistently connect the learning objective to a student's prior knowledge of the real world.	The teacher must pose academic questions that deepen academic understanding and encourage elaboration on content or examination of reasoning.	Students should be consistently encouraged to engage in substantive academic discussions and make connections to prior or future learning.	The teacher provides specific interventions or additional supports within general instruction.	The teacher provides intentional scaffolding at a deliberate pace to progress students toward independence (I do, We do, You do).



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Sample

Analytic Sample – Population Comparison

	Sample Size (n)	% SES	% LEP	% White
Sample	5,763	69.6%	12.9%	33.2%
State Charter Schools	150,486	78.0%	12.0%	32.5%
All State Public Schools	1,429,895	56.0%	7.0%	64.3%



Standardized Assessment

- » NWEA's MAP measured student-level mathematics and Reading achievement in the fall and spring.
- » MAP is a nationally normed, standardized achievement test delivered via a computer adaptive model that adjusts to a student's skill level.
- » Scores are scaled to a Rausch Unit Interval. Vertical nature allows comparison across grade levels.
- » Each school administers tests in a fall and spring test window to students in grades 3 through 8.
- » The spring score represents the achievement level at the end of the school year
- » The fall score is used in the growth model to control for the achievement level at the beginning of the school year.



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Additional Covariate:

Socioeconomic Status (SES)

- » Information from the Michigan Student Data System (MSDS) on a student's eligibility for the Supplemental Nutrition Assistance Program (SNAP).
- » Provides a measure of student-level socioeconomic status (SES)



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Methods

- » One variable constructed to create the Antecedents to Student Engagement index from subgroups that were part of the observation tool.
- » Hierarchical Linear Models (HLM) to model our nested data (students within schools).
- » Modeled NWEA spring scores for the achievement model
- » Added a fall assessment score variable for the growth model
- » Other relevant covariates:
 - Variables for student and school-level SES
 - School-level scores on the antecedents to student engagement.



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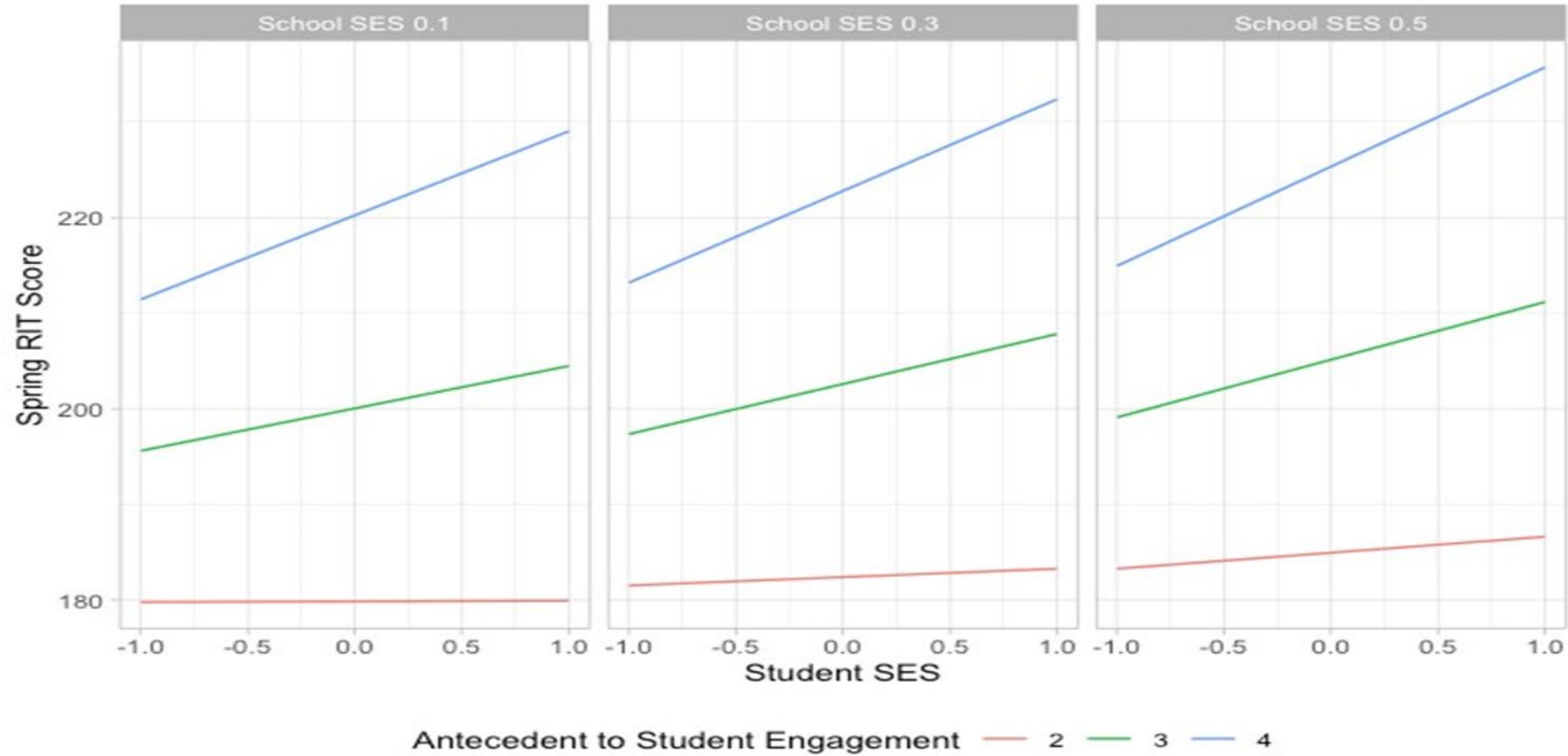
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Coefficient	Null Model			Mathematics Achievement			Mathematics Growth		
	Estimates	Conf. Int (95%)	P-Value	Estimates	Conf. Int (95%)	P-Value	Estimates	Conf. Int (95%)	P-Value
Intercept	205.89	201.19 – 210.58	<0.001	204.76	200.18 – 209.33	<0.001	22.38	19.34 – 25.41	<0.001
Student Engagement (School)				20.98	11.96 – 30.01	<0.001	4.02	1.33 – 6.70	0.003
SES (School)				7.95	-8.43 – 24.34	0.341	0.96	-3.99 – 5.91	0.704
SES (Student)				2.95	1.81 – 4.09	<0.001	0.68	0.10 – 1.26	0.021
Grade [3]				-14.18	-15.43 – -12.93	<0.001	3.17	2.50 – 3.84	<0.001
Grade [4]				-6.44	-7.70 – -5.17	<0.001	1.07	0.43 – 1.70	0.001
Grade [6]				5.27	4.00 – 6.53	<0.001	-0.28	-0.91 – 0.35	0.382
Grade [7]				11.36	10.04 – 12.68	<0.001	-0.34	-1.02 – 0.33	0.318
Grade [8]				14.78	13.43 – 16.13	<0.001	-1.81	-2.52 – -1.10	<0.001
Student Engagement x SES-School				11.77	-49.33 – 72.87	0.706	-4.45	-23.07 – 14.17	0.639
Student Engagment x SES-Student				6.17	3.29 – 9.05	<0.001	0.25	-1.22 – 1.73	0.737
Fall							0.93	0.91 – 0.94	<0.001

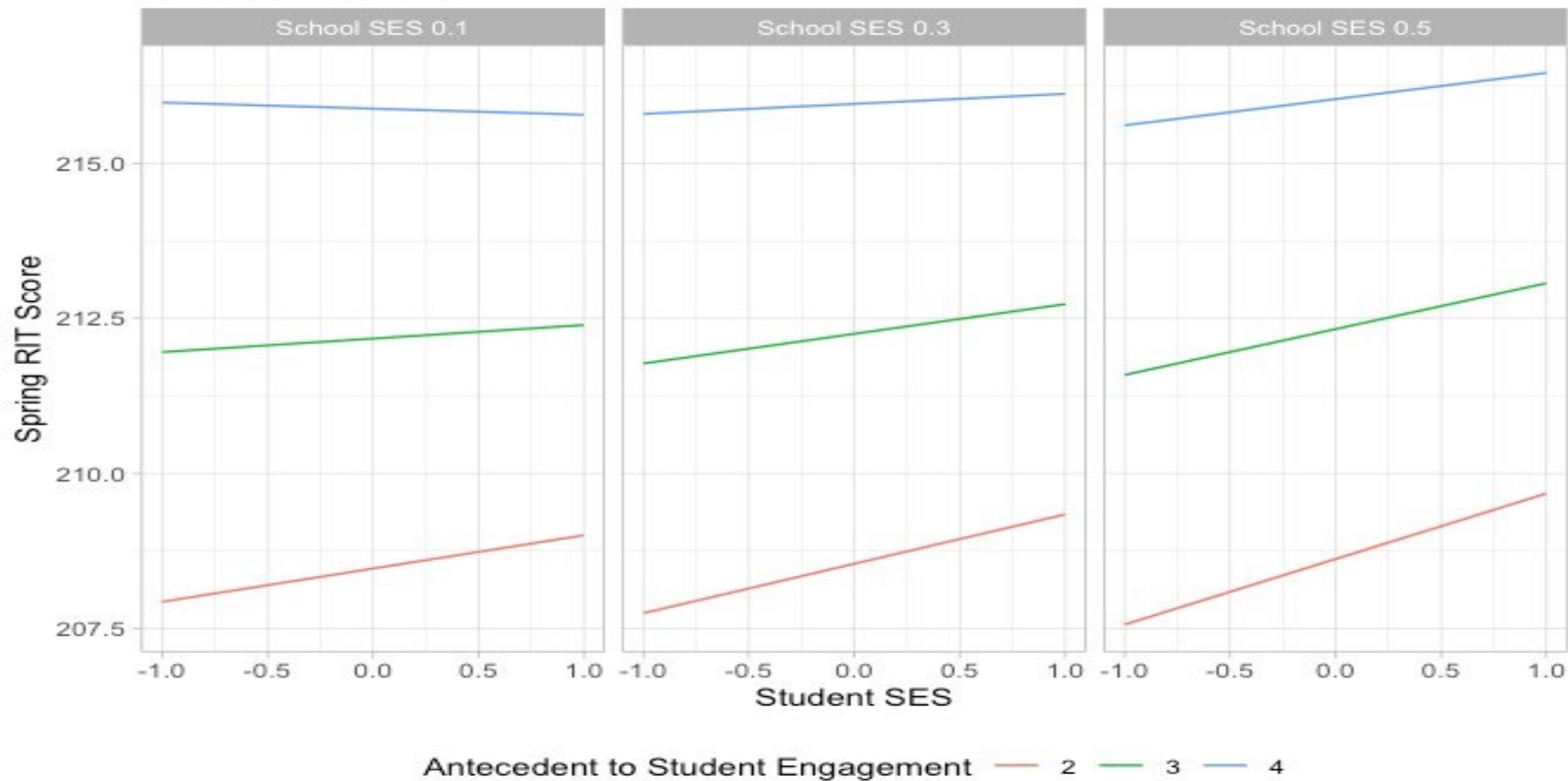
	Null Model			Reading Achievement			Reading Growth		
<i>Coefficient</i>	<i>Estimates</i>	<i>Conf. Int (95%)</i>	<i>P-Value</i>	<i>Estimates</i>	<i>Conf. Int (95%)</i>	<i>P-Value</i>	<i>Estimates</i>	<i>Conf. Int (95%)</i>	<i>P-Value</i>
Intercept	202.94	198.84 – 207.03	<0.001	189.14	185.02 – 193.27	<0.001	40.02	37.14 – 42.90	<0.001
Student Engagement (School)				20.29	12.16 – 28.42	<0.001	5.01	2.59 – 7.42	<0.001
SES (School)				7.82	-6.84 – 22.49	0.296	-2.14	-6.25 – 1.97	0.307
SES (Student)				3.13	1.95 – 4.30	<0.001	1.05	0.32 – 1.79	0.005
Grade [3]				8.30	7.03 – 9.57	<0.001	-0.72	-1.45 – 0.01	0.052
Grade [4]				13.94	12.67 – 15.22	<0.001	-1.55	-2.31 – -0.78	<0.001
Grade [6]				19.19	17.92 – 20.46	<0.001	-1.67	-2.47 – -0.87	<0.001
Grade [7]				24.18	22.85 – 25.51	<0.001	-0.98	-1.85 – -0.12	0.026
Grade [8]				26.89	25.53 – 28.25	<0.001	-2.11	-3.02 – -1.20	<0.001
Student Engagement x SES-School				-5.96	-60.69 – 48.78	0.831	0.93	-14.54 – 16.39	0.907
Student Engagment x SES-Student				5.05	2.06 – 8.04	0.001	0.62	-1.30 – 2.55	0.526
Fall							0.83	0.82 – 0.85	<0.001

Achievement Model



Growth Model

Controls for Fall Score



Discussion & Summary

- » Our work demonstrates that these Antecedents to Student Engagement are positively associated with strong student outcomes as measured by standardized tests. This validates the focus on student engagement overall.
- » We have shown that student growth associated with student engagement antecedents impacts all students regardless of socioeconomic status.
- » To close achievement gaps, educators and policymakers must focus on those factors that benefit all students. The Antecedents to Student Engagement that we have outlined appear to do just that.





Dr. Christopher White

**Director of Assessment & Evaluation
Central Michigan University
The John Engler Center for Charter Schools**

white2ca@cmich.edu



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Co-Authors:

Dr. Gregg Dionne

Central Michigan University

dionn1g@cmich.edu

Joe Marr



joe@solomonra.com

William Sullivan



bill@solomonra.com



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Questions?



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